Place, recreation and local development

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▶ **To cite this version:**

Jeoffrey Dehez, G. Lambert, Ludovic Ginelli, K. Ben Adj Abdallah (Dir.). Place, recreation and local development. Dehez, J. Irstea, 488 p., 2018. ⟨hal-02267209⟩

HAL Id: hal-02267209

https://hal.science/hal-02267209v1

Submitted on 19 Aug 2019

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The 9th International Conference on Monitoring and Management of Visitors in Recreational and Protected Areas (MMV9)

Place, recreation and local development
29-31 August 2018, Bordeaux, France

ABSTRACT BOOK

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The 9th International Conference on Monitoring and Management of Visitors in Recreational and Protected Areas (MMV9)

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ISBN

978-2-9551251-1-3

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Introduction

Welcome

It is our pleasure to welcome you to the 9th international Conference on *Monitoring and Management of Visitors in Recreational and Protected Areas* (MMV9) with a program including keynote speeches, organized and poster sessions, a half-day field trip, social events and post conference trips.
This is the first time that France has hosted an MMV Conference. Our country is ranked as the world's top tourist destination, thanks largely to its culture, art, and gastronomy, as well as popular cities such as Paris and Bordeaux. On the other hand, France's potential as a destination for outdoor recreation and nature-based tourism is not hugely publicized, despite its many unique features in this respect: varied climate and natural assets (shoreline, mountains, lakes, and forests), large expanses of countryside, and a network of protected natural areas, to name but a few.
France's protected areas are often free to access for the general public. However, in contrast with other countries, nature conservation in specific areas is much less widespread. Where it does take place, it is often centered on territories that are perceived to be "attractive", and where many conflicting activities are practiced. This may be one of the reasons why contractual tools and regional park systems are quite popular in France. The MMV Conference offers an excellent opportunity to discuss the situation in France in greater depth.
The theme proposed for the conference was "*recreation, place and local development*". This reflects our assumption that recreational areas are not just physical assets designed to receive visitors for the purpose of leisure - which in itself would already be something of great importance - but that they reflect deeper social phenomena, as demonstrated through the range of organized sessions dedicated to discussing questions such as environmental education and economic development, but also emerging themes such as social integration, community resilience, environmental justice, and health. The traditional topics covered by MMV Conference reflect an evolving society: with innovations in monitoring techniques (both on people and nature), focus on new populations (Y generation, ethnic minority) and a larger concern for individual engagement and participative management.
The 9th Edition of MMV is co-hosted by Irstea and BSA. This would not have been possible without significant contributions from a large number of additional partners and sponsors as well as our national scientific and organizing committee. We would like to take this opportunity to thank everyone for their help.
After two years of planning, we are proud to announce that we have more than 160 presentations from 30 countries, meaning that the conference will host over 200 participants from across the globe. We are honored that the International Steering Committee has given us the opportunity to be part of this great MMV community, which organized its first meeting in 2002. We hope you will enjoy the conference as much as we enjoyed organizing it.
If you can't be with us in person, we hope that you will enjoy reading our publications.

All the very best from the organizing committee.

Jeoffrey Dehez
Chair of MMV9 Conference

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KEYNOTE LECTURES

Outdoor, conservation and environmental inequalities

***Cécilia Claeys**, Aix Marseille University, Laboratoire Population Environnement Développement (LPED) research unit, France, cecilia.claeys@univ-amu.fr*
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Policies aimed at the creation of protected natural areas, and notably national parks, are originally related to western and elitist recreational practices towards nature which developed during the 19th century. Since the second half of the 20th century, these protected natural areas have become field of outdoor recreation massification, bringing managers and naturalists to worry about its impacts on ecosystems. This observation originated the development of reflections and methodologies to assess the environmental impact of the frequentation of natural areas protected, such as the research carried out within the MMV network.

Despite the massification of leisure, the populations less well endowed with economic and cultural capital, as well as those belonging to ethno-phenotypic minorities tend to be under-represented among users of protected natural areas. In addition, the post-slavery and/or post-colonial legacy in many territories tends to exacerbate the social inequalities of access to environmental amenities, which can take the form of territorial dispossession processes.

Concerning this double challenge of nature protection versus social equity, this article proposes an analysis in terms of environmental inequalities. The concept of environmental inequalities gathers different forms of unequal access to resources and natural amenities, exposure to risk, environmental impact, ability to participate in and reap the benefits of environmental policies, and contribution to the effort required by these policies.

The framework of environmental inequalities helps to base the analysis on an eco-focused ethical approach breaking the dichotomous stalemate of anthropocentrism versus biocentrism, to analyse social inequalities regarding access to natural environment in all their diversity (socio-economic, cultural, gendered, ethno-phenotypic, etc.), and to understand the process of mutual reinforcement or conversely of compensation. However, can this framework completely address the numerous taxonomic and methodological issues inherent to the measurement of inequalities? And, to what extent is this framework appropriate to address the difficult transition from ethics to practice, questioning the empirical feasibility of complementarity or at least compatibility between social equity of access to nature and protection of ecosystems?

From these questions, this article proposes to test the framework of environmental inequalities through field surveys conducted in mainland and ultramarine France. Selected territories allow a comparison between different environmental and socio-historical contexts: Ranging from West Indies to Réunion, from Côte d'Azur to the Calanques of Marseille, the goal is to understand the formation of inequalities in access and use of these territories. How are regulated the access to protected areas and uses of walkers, climbers, pickers, boaters, fishers, picnickers...? According to which ecological, philosophical principles and belief of justice?

These fieldworks carried out over the past ten years in different research projects show that the creation processes, including concerted ones, and decision-making processes related to nature protection policies tend today to favour the recreational actors from middle and upper classes, who are organized and most “visible” in the public space. Concomitantly, these same processes tend to make invisible, or even to delegitimise, the most popular autochthonous practices. The definition of “good uses” of a protected natural area is based on values and standards, or even economic interests, which reflect the membership of social groups.

Our research shows that the tension between nature conservation and social justice depends largely on the feelings of justice or injustice that the various users and local residents have. Again the question is how to measure and which methods use to capture the dual dimension of environmental inequalities, as an objectivable process and subject of feeling by individuals. This demanding approach requires different methodologies combining quantitative techniques (questionnaires), visual techniques (to observe flows, spatial occupation, distribution of uses, avoidance strategies, etc.) and qualitative techniques (participant observation, semi-structured interviews, etc.).

Work on such a framework implies, finally, to question the limits and scope of the underlying concepts. What define *ultimately* an environmental inequality? Is it lesser when accessibility to outdoor activities limited to an elite is promoted? But, in this case, might this not be a form of class ethnocentrism? Unless reducing environmental inequalities might require also, if not first, recognition of a wider variety of relations to nature and potential forms of conservation?

Recreational Transition and management of protected areas. The Cultural turn ?

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Cultural dilemmas in transition pathways of recreational areas: looking for recreational laboratories

Confronted with multiple injunctions for change in the face of climate and energy crises and changes in lifestyles and recreational practices, tourism in recreational and protected areas is required to adapt and even to "reinvent itself". At the scale of the places, sectors and trades, various processes of transition and transformation are already active. At the same time, inertia and (mis)adaptation seem to take precedence in a logic of simple updating of the development model inherited from the epic of sports tourism in the 20th century.
This duality, which bears functional contradictions and strategic conflicts, can be partly described as an undecidable dilemma between dynamics of acceleration and deceleration, of opening and locking in, which are illustrated in the cultural, ideological, economic and sociotechnical aspects of recreation.

Based on various illustrations drawn from observations and research programs conducted in different tourist configurations in the French Alps, the key-note will define recreational transition as a set of processes, approaches and actions by which tourism practices and policies are transformed into becoming coherent and resilient with change in fields such as climate, energy, culture, and the economy. We'll examine the contradictory processes, ambivalences and conditions in which the sustainable recreational transition is and is not being operated.

This perspective will draw attention to factors and actors of transformative practices that can be analysed as signals of change and indicators of transition. These include many practices, experiments and in particular experiments undertaken by professional operators, stake holders and places that play the role of "recreational laboratories" at the crossing of a variety of potential development initiatives.

Beyond recreation experience and expenditure: Well-being and resilience in natural area-human community systems

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Natural area agencies have managed outdoor recreation and nature-based tourism with varied priorities and considerations, from sustaining quality experiences and the natural resources on which they depend to contributing to local economies and sustaining public support for agencies themselves. The above priorities remain important, but societal goals evolve, and there is increasing recognition of the importance of natural area visitation's broader benefits. This presentation focuses on well-being and resilience effects of local (e.g., outdoor recreation) and non-local (e.g., nature-based tourism) visitation.

Well-being and community resilience provide new lenses through which to understand, develop, and manage natural experiences. They complement a traditional focus on experiences and the benefits of visitor expenditure. In so doing, they can enhance policy maker and general public support for the provision and management of natural experiences.

Although well-being can include many aspects, the focus here is on subjective well-being (SWB), which reflects affective (emotional) states and evaluations of one's life. Natural area visitation potentially combines the SWB benefits of both leisure and in-nature experiences. In recent years, researchers have found that nature experiences enhance hedonic (affective), evaluative (life satisfaction), and eudaimonic (flourishing) well-being (e.g., Wolsko and Lindberg, 2013). Moreover, natural area visitation may affect resident SWB not only via an individual's recreation engagement but also via the tourism – and associated SWB effects – catalyzed by nature experiences (Uysal et al, 2016).

Nature-based tourism (NBT) also may contribute to community resilience, which refers to a community's ability to thrive in the face of change; more broadly, Adger (2000, p. 347) refers to resilience as "the ability of groups or communities to cope with external stresses and disturbances as a result of social, political and environmental change." Norris et al (2008) provide a foundation for community resilience concepts and evaluation, while Steiner and colleagues (e.g., Steiner and Atterton, 2015) provide a foundation for understanding the specific contribution of firms.

Resilience is complex, with interdependence across the traditional dimensions of economic, social, and ecologic. In the economic dimension, NBT can enhance sectoral, livelihood, and job type diversity. In the social dimension, NBT can enhance networks (both professional and personal), promote net in-migration (or reduce net out-migration), contribute flexibility and creativity, strengthen community identity, and sustain local institutions, facilities, and services. In the ecologic dimension, NBT may provide a complementary source of income for landowners, thereby reducing pressure to harvest natural resources in a manner that could cross ecological thresholds (Walker and Salt, 2012).

The sometimes part-time and/or seasonal nature of NBT employment illustrates relationships across dimensions. Such employment provides job type diversity and may contribute to livelihood diversity. On the other hand, it may limit contributions with respect to net migration and associated benefits in the social dimension.

Although NBT, and any associated migration, can generate important well-being and resilience benefits, literatures as diverse as recreation ecology, recreation conflict, and tourism's social impacts remind us that it also can generate negative impacts. For example, competition across activity groups for outdoor recreation resources (recreation conflict and contested spaces) can increase bonding (intra-group) social capital but harm bridging (inter-group) social capital. This may reduce generalized reciprocity, trust, and cohesion within the community.

Likewise, though multiplier effects may lead to community-wide economic benefits, immediate employment benefits may be limited to a relatively small portion of the community. However, negative impacts may be spread more widely – especially as attractions and lodging become more spatially distributed due to social media (e.g., expanded visitor awareness of previously-unpromoted attractions) and non-traditional lodging options (e.g., Airbnb and vacation rentals in residential areas).

This presentation will review well-being and resilience concepts and recent research, describe case studies and results, and suggest opportunities for future research and management. The well-being case study is based on a general population survey in Bend, Oregon, USA, while the community resilience case study is based on a nationwide survey of NBT firms in Norway.

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Recreation Ecology

Understanding the Distance Between Humans and Brown Bears That Tourists Consider Appropriate: A Case Study at Shiretoko National Park, Japan

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Introduction

This study's purpose was to understand distance between humans and brown bears that domestic and foreign tourists consider appropriate at Shiretoko National Park in northern Japan. The national park is well known as an important brown bear habitat (Itoh et al., 2013; Sato et al., 2008), and its rich ecosystem attracts many tourists. On the other hand, the management of conflicts between tourists and brown bears is a critical issue in this location. To date, there have been no recorded fatal accidents involving brown bears and tourists. Behind this is the consensus among Japanese tourists that wild brown bears are dangerous (e.g. Kubo and Shoji, 2016). Thus, keeping a safe distance from these bears is considered important. Park managers have also provided information on the park's bears based on this idea.

In recent years, however, many foreign tourists have visited the national park (the number of foreign tourists to Japan reached 6.2 million in 2011, but increased to 24.0 million in 2016). Under these circumstances, park managers have noticed that the safe distance between brown bears and humans as considered by foreign tourists is different from that of Japanese tourists. Park managers are aware that some foreign tourists are not frightened by bear encounters. Thus, park managers need to provide different types of bear information for these foreign tourists, and may need to alter the current management system, primarily for Japanese tourists. However, little is currently known about the distance between brown bears and humans as considered safe by domestic and foreign tourists.

Methods

Regarding the desirable distance from brown bears, we applied a method to measure the social norm of acceptable change (Kim and Shelby, 2006) and asked respondents to evaluate an illustration showing varying distances between brown bear and humans. Questionnaire surveys were conducted at the Shiretoko National Park in 2016 and 2017. One survey was for domestic tourists, and the other was for foreign tourists.

In these surveys, we defined five distances and asked respondents to rate their level of desirability to maintain these distances between themselves and brown bears on a five-point Likert-type scale (1 = highly undesirable and 5 = highly desirable). The distances are as follows:

1. (Remote observation) You cannot usually observe the bear without special assistance (e.g., tour boat and/or vehicle, or guided tour).
2. (Observation by using binoculars) It is difficult to observe the bear with the naked eye, but it can be observed using binoculars.
3. (Observation with the naked eye) You can observe the bear with the naked eye. However, if you approach too closely, the bear will run away.

4. (Nearly touching) You can observe the bear with the naked eye. If you approach too closely, it will remain.
5. (Animals approaching) The bear cheerfully approaches, even when you are not attempting to feed it.

The distances between "Nearly touching" and "Animals approaching" is not different, but the behavior of brown bear is different. The result of domestic tourists has already reported by Aikoh et al. (2016).

Results

Figure 1 shows the average rating for each distance. The figure shows a horizontal axis representing the average rating on a five-point Likert-type scale, and a vertical axis depicting each distance between the person and the brown bear.

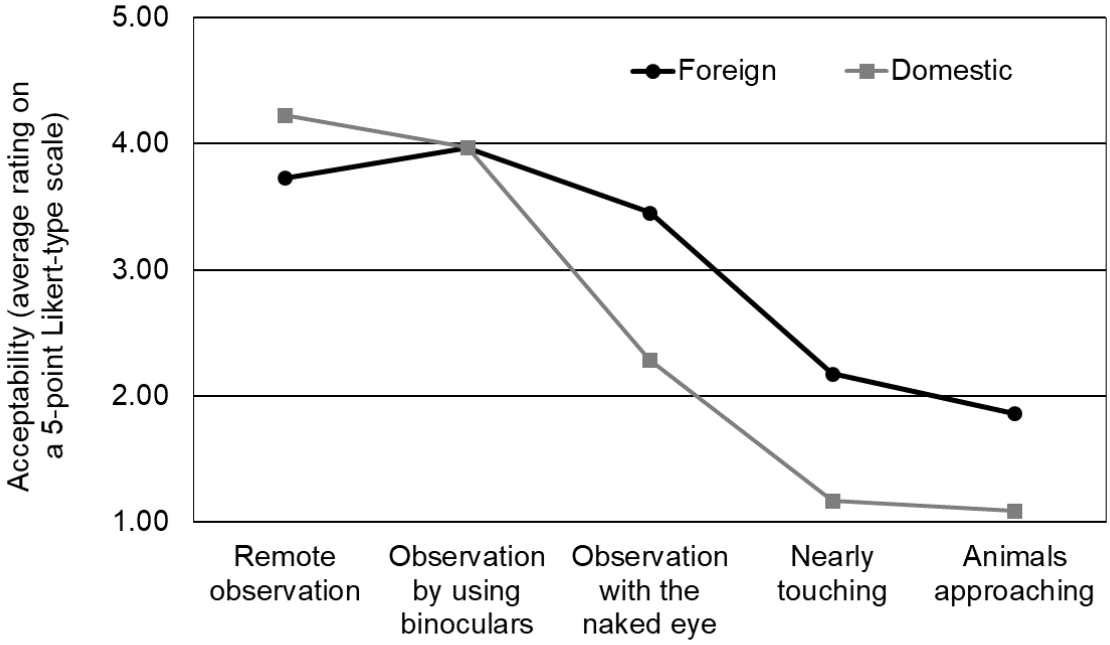

Figure 1: Distance between humans and brown bears and the average value of evaluation
*The result of domestic tourist is from Aikoh et al. (2016)

On average, both Japanese and foreign tourists considered it desirable to keep longer distances from brown bears; as the distances become shorter, the ratings drop. However, data reveal that foreign tourists consider shorter distances more appropriate than Japanese tourists on average. The ratings for distances "Observation with the naked eye" through "Nearly touching" differ between Japanese and foreign respondents (*t*-test; $p < 0.05$). The ratings for distance "Animals approaching" were not statistically significant among either group. Intuitively, these findings seem to demonstrate that both Japanese and foreign tourists negatively evaluated distance "Animals approaching". However, this conclusion is incorrect. Rather, non-negligible foreign tourists (13.8%) regarded distance "Animals approaching" as either desirable or highly desirable. In contrast, only 0.7% of Japanese tourists responded the same. The statistical significance of distance "Animals approaching" seems to be lost because the variance of the rating for foreign tourists increased.

Discussion

The results showed that Japanese and foreign tourists considered different distances between themselves and brown bears to be appropriate. These findings indicate that park managers need to provide different types of information on brown bears for foreign tourists. In particular, it is necessary to promptly respond to tourists who consider distance “Animals approaching” desirable.

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Spatial segmentation of hikers and wild reindeer (*Rangifer tarandus tarandus*) at Hardangervidda National Park: Management implications

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Recent years we have seen a paradigm-shift in – primarily – national park policy in Norway, but partly also in management and planning of Norwegian national parks: the role of nature-based tourism has clearly increased in attention and importance. A national branding strategy for national park tourism and a program for development of local visitor strategies for national parks in Norway was presented in April 2015 (Norwegian Environment Agency 2015). The ambition is to increase local economic and tourism development in and around the national parks, but not on the expense of the conservation interests. The focus is to increase visitation through some main entrances and other attractive areas, primarily in the fringe areas of the NPs. The immense disturbance potential of humans becomes clear in a Norwegian National park where wild reindeer (*Rangifer tarandus tarandus*) react to the presence of tourists by avoiding high-altitude infrastructure like resort areas, tourist roads, tourist cabins, marked trails etc. (Nellemann et al. 2010; Panzacchi et al. 2013 a, b; 2015). Thus, in many areas a much deeper understanding of the responses to anthropogenic disturbance is needed to support sustainable and more flexible management strategies (Kaltenborn et al. 2014). Hence, there is an urgent need in management to carefully study human-reindeer interactions and actual carrying capacities of national parks to fulfill their multiple goals. Especially it is important to try to identify conflict areas where tourists have great impact on wild reindeer, meaning acceptable number of visitors in critical periods or in important grazing, migratory areas etc. In this paper, our ambition is to estimate visitor use intensity and spatial pattern during summer and analyze the spatial overlap with wild reindeer in Hardangervidda National Park (3 422 km²), Southern Norway.

The human use of the area during summer was monitored in 2017 by surveys with short questionnaire and map in self-registration checkpoints on site along main entrances (n=33 sites, n=4055 respondents), and by automatic counters (n=75) at main entrances and in core area. Self-registration cards include questions of respondents demography, characteristics of the trip, accommodations, and their preferences for recreational facilities and management, and were available in Norwegian, English and German. In addition, each hiking route drawn by the respondents was digitized, and all routes were overlaid to calculate the tourist volume along each trail. Each trail was divided into shorter segments, separated at the intersection point with other trail branches. These trail segments became the basic unit through which we could link survey data with data from automatic counters and thereby obtain a proxy of the daily intensity of use of each trail segment in the study area, which we called Trail Use Index, TUI.

Equipped reindeer females by GPS devices obtained data on wild reindeer in the period of 2001-2018. For each individual we selected one GPS location every 3 h during the period June 15th –October 1st, as this is the period in Norway when tourists hike in high mountain.

In all, 148 individuals of wild reindeer were captured and GPS collared. The wild reindeer data are presented descriptive on maps including kernel density analyses.

The daily sum of TUI during summer peak between the end of July and the beginning of August. During the hunting period TUI is much lower compared to the high tourist season, and it is highest during the first week of the hunting period.

We identify large variation in the intensity of use of trails by the tourists. Some areas have a dense network of trails and that additional have high intensity of use by the tourists, and other areas have few trails and low intensity of use. In general, the most intensive used areas of Hardangervidda is in the western parts, at spectacular attractions in the fjord landscapes. In this area the attraction Trolltunga have almost an equal visitor volume as counts on all the other 74 counters at Hardangervidda. There is relatively low visitor volume in the core area of Hardangervidda, but here is the human – wild reindeer coexistence more pronounced.

The density of wild reindeer shows similar spatial use during the sampling period 2001-2018. The space use is very concentrated during the low and high tourist season, but more dispersed during the hunting period. In high tourist season wild reindeer are concentrated in the southeastern part of the area, covering only less than 20 % of the summer range at Hardangervidda. The comparison of space use data for humans and wild reindeer indicates seasonal large-scale segregation and suggest that reindeer move to areas with lower density of trails or areas including trails with low intensity of use during the whole tourist season.

During high season, we identified several trails that, based on findings from previous studies, are expected to function as barriers and hamper wild reindeer space use. For example, the core summer area for wild reindeer is surrounded by trails with more than 30 visitors / day (08:00-20:00), which seem difficult for wild reindeer to cross.

Our study suggests a strong potential for coexistence between wild reindeer and tourists in Hardangervidda National Park, at large spatial scale, and indicates that wild reindeer move to refuge areas with less tourist infrastructure and fewer hikers during the peak tourist season. More specifically, the study identifies popular hiking trails that are predicted to hamper the possibilities for wild reindeer to migrate and access important resources. We discuss overall management implications with the aim to reduce the impact of human activities on wild reindeer at Hardangervidda National Park.

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Bear tourism in South Kamchatka Sanctuary (Russia): visitors and wildlife monitoring and management

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Introduction

A common justification for developing ecotourism opportunities within natural protected areas (PAs) is that ecotourism helps to secure long-term conservation of wildlife and habitats and also contributes to local socio-economic development.

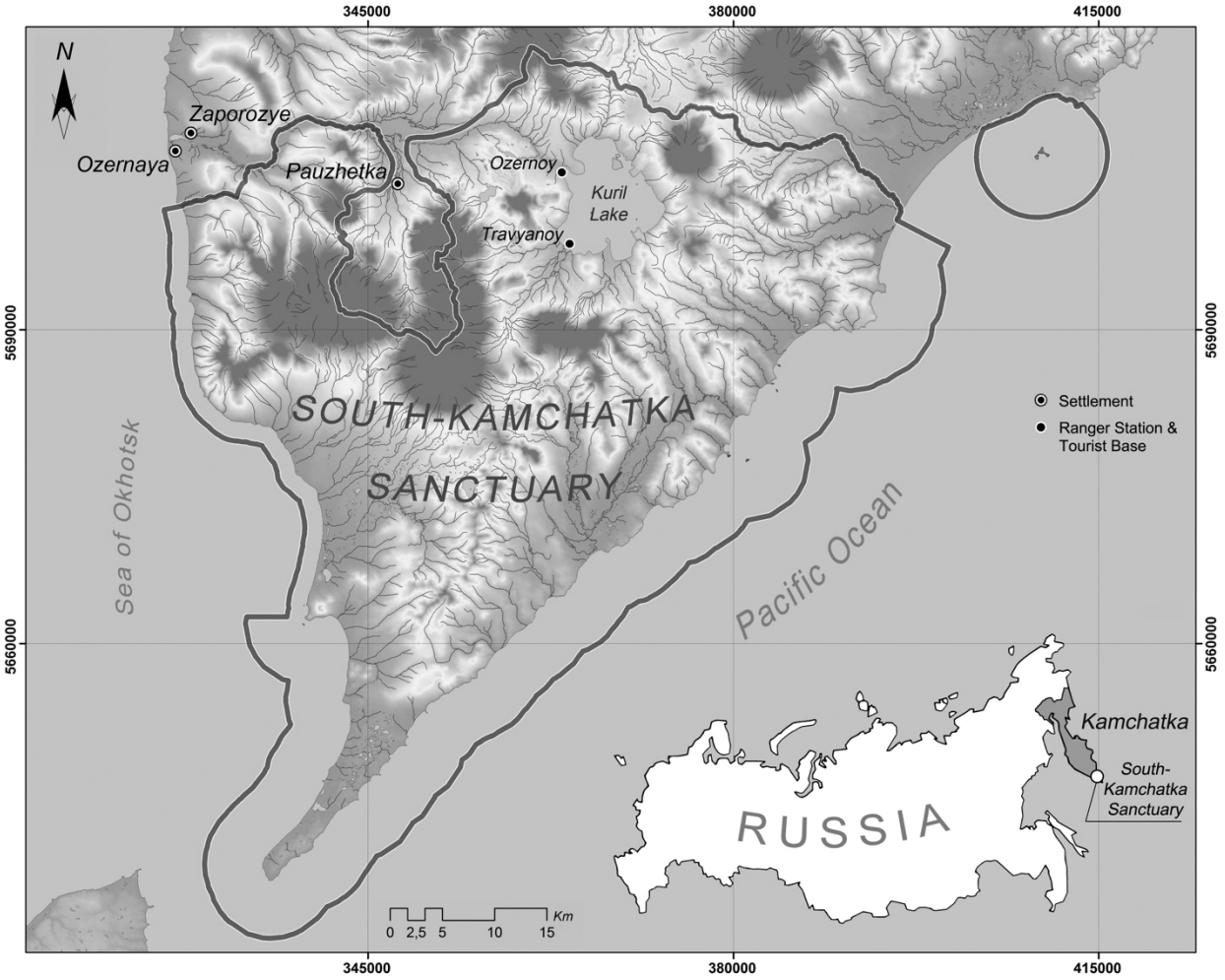
Although Russia has a long and rich history of nature conservation (its traditions go back to the 17th century), tourism development within Russian PAs started only in the early 1980s, with establishment of Russia's first national parks. Before this Russian PAs, represented originally by Russia's distinctive system of *zapovedniks* (strict nature preserves), emphasized preservation of ecosystems primarily for scientific purposes; as a result, management strategies for zapovedniks excluded all economic activities including tourism (Ostergen and Hollenhorst 1999; Watson et al. 2009). After the establishment of national parks, conservation policy for almost all categories of Russian PAs broadened to include environmental education and ecotourism.

Lack of experience managing the impacts of recreational visitors, however, has created many challenges for Russian PA managers who seek to achieve sustainable environmental, social and economic outcomes. In many cases, quite rapid opening of PAs for tourism has occurred in the absence of knowledge about environmental impacts, visitors' preferences, and local social and economic effects − all essential for successful management of tourism.

Perhaps the fullest study of such impacts and effects in Russia is now in progress at a long-protected nursery area for female brown bears (*Ursus arctos*) and their cubs, Kurile Lake in South Kamchatka Sanctuary. This paper offers a case study showing the potential for significant and rapid adjustments, in PAs in Russia and perhaps other nations, to diminish adverse impacts of human presence in critical areas of habitat for wildlife.

Background

South Kamchatka Federal Sanctuary (figure) is one of the most attractive areas for wildlife tourism in Russia. As well as being a part of UNESCO's World Heritage Site "Volcanoes of Kamchatka", an area now attracting visitors due to its primeval nature and picturesque scenery, the Sanctuary provides habitat for what may be the world's largest population of brown bears (*Ursus arctos*) within a single protected area. As a result, the Sanctuary is experiencing rapid growth in numbers of visitors. During the past 10 years the number of tourists, who travel to the Sanctuary mostly to view its abundant bears, grew 10 times and now has reached 4000 visitors per year. The majority of bear viewing activity occurs along the coast of Kurile Lake, where bears congregate to feed on the abundant runs of sockeye salmon that occur from the middle to the end of summer.



Location of the study area

At the same time that the Southern Kamchatka Sanctuary is a haven for wildlife, it also must be a neighbour to adjacent settlements with a total population of about 2,500 people. In this remote and isolated area, people's lives and local economies depend upon the exploitation of natural resources, most importantly through fishing. Ecotourism development in areas such as this can add significantly to the otherwise limited range of economic opportunities; ecotourism can simultaneously raise the level of environmental awareness of the area's residents and offer them alternatives to poaching and other forms of illegal activity.

Until last year, tourism development in the area was carried out without any scientific or research support. But with growth in the numbers of tourists, it is becoming necessary to design mechanisms to provide appropriate visitor experiences that can protect vulnerable ecosystems, reduce the negative impact of tourism, and provide benefits for local economies.

Methods

This paper presents results of our research projects, which focused on gathering knowledge needed to create tools to support sustainable tourism development in Southern Kamchatka, particularly in the basin of the Kurile Lake.

The project, which utilised an interdisciplinary approach, included zoological studies of bear-human interactions and sociological studies of visitors' use.

Zoological studies were conducted throughout the period of salmon runs, from late June until the end of September 2017. These studies aimed to improve understanding of the potential

individual-level and population-level effects of recreational activities in order to help develop tools to aid managers in making decisions about further recreational activities in brown bear habitats. Studies utilized direct observations as well as photo-traps, which were set up in areas with and without tourists, in order to collect data.
Sociological studies were conducted in the region's two most-popular tourist bases (Travyanoy and Ozernoy ranger stations) throughout the period when visitors use the area (from the middle of July until the end of September) in order to assess the current nature of bear viewing opportunities, significant factors that influence the quality of those opportunities, and public acceptability of current management startegies in bear viewing. The studies included observations of tourist activities and collections of sociological data using in-depth personal interviews (semi-structured), during which 449 questionnaires were collected. Interview topics included tourists' expectations and satisfaction, experience of crowding, feelings about interactions with brown bears, educational experiences resulting from bear-viewing programmes, and perceptions about future management of the area.
In order to develop our recommendations for sustainable tourism, we also drew on results and analysis from our previous studies devoted to assessment of ecosystem services and values of the area for local communities (Zavadskaya et al. 2017) and to attitudes of residents and tourists towards protected areas (Nikolaeva et al. 2015).

Results

Our study showed that bear viewing activities (tracking, photographing, using drones, travelling via boats and helicopters) in the basin of the Kurile Lake cause the full spectrum of impacts upon the area's population of brown bears that has been well described in other bear-viewing areas (Fortin et al 2016; Penteriani et al. 2017). Impacts on bears that we witnessed include: spatial and temporal avoidance, changes in the time spent at a habitat, changes in the number of bears present, changes in sex/age class of bears in a habitat, and changes in activity budget.
Our study of visitor use gave information for establishing acceptable carrying capacities for visitors and for developing and improving interpretative programmes intended to enrich visitors' recreational and educational opportunities. Although our study showed that most visitors give a positive evaluation to their experience in the Sanctuary, the study revealed a number of negative impressions. Some visitors contended that a discrepancy exists between ideals of ecotourism and the current impacts of tourism in the area; others expressed concerns about current management practices, about the extent of tourism development, about what could be called "touristization" of an area that is promoted to be wilderness, and about unacceptable levels of intervention by tourists in the lives of brown bears.
Combining the results of this study with those of our previous studies allowed us to reach the following principal outcomes, designed to help harmonize relationships between people and wildlife in the area:
1) A code of ethical bear viewing practices for the area was developed and implemented.
2) Hotspots with excessive recreational impacts and areas of potential conflicts over resource use in the area were identified, and as a result an optimal spatial structure for bear viewing opportunities was proposed.
3) In order to provide long-term support for management decisions designed to assure that bear viewing is compatible with conservation benefits and community-development benefits, an ongoing monitoring programme was developed and implemented − a programme that will monitor social and physical conditions, which are constantly changing and interacting in new ways, as well as monitor communities' involvement with tourism development.

4) A programme of detailed training for rangers and tourist guides, designed to improve understanding about the area and about bears' behaviour, as well as to minimize conflicts, was developed.
5) A programme that involves local communities with tourism development − including through educational events, promotion of local products to tourists, and logistical support − was developed and implemented.
The research was supported by the Russian Geographical Society project "Ecotourism in the Land of Bears – the Ethics of Bears' Hospitality" (2017–2018).

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Recreation Ecology in Brazil: a preliminary review.

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Introduction

Visitation in Brazilian National Parks (NP) increased twofold in the last decade. Managers must take advantage of this as an opportunity for increasing environmental awareness and nature conservation support. On the other hand, NP together with other protected areas (PAs) and natural areas are not enough for the persistence of species and maintenance of environmental services. Biodiversity crisis is hampering unprecedented number of threatened species and collapsing ecosystems.

PA and particularly NP, in Brazil, are the most important tools for conservation strategies. Despite its potential, visitation in Brazilian PAs is still limited in terms of delivering direct benefits to nature conservation, to environmental awareness, and to local people. Resources to identify and monitor recreation impacts are still scarce in Brazil. PAs and PAs agencies have insufficient staff, time and resources, despite the increasing effort in capacity building for planning and managing visitation. In this context, agencies prioritize to establish new attractions, increase visitors flow, and provide basic services, mainly through public-private partnerships. Identifying and monitoring the impacts in a more systematic way is fundamental to track the sustainability of ecotourism and to support PA managers.

Research institutions, particularly universities, are better positioned to fill this gap by building transdisciplinary approaches. Research on nature tourism in Brazil, are more focused on social science using qualitative methods. Quantitative or mixed-methods to monitor tourism and recreation impacts are still in an initial stage and must be stimulated. In this study, we conduct a preliminary literature review on recreation ecology in Brazil.

Methods

We analyzed the types and numbers of studies conducted in different biomes, ecoregions, habitats, ecosystems, and upon distinct taxonomic groups; the metrics used, as well as the types of recreation activities, impacts, and specific sites sampled. We searched for papers in *Web of Science* and *Google scholar* engines, using keywords: *Brazil*; *touris**; *impact*; *environment*; and also changing *environment* to *nature* or to *biodiversity*, and adding *protected area*. In a preliminary effort, 600 papers were analyzed, from which we selected 20 studies designed to measure the impact of recreation activities on biodiversity.

Preliminary results and next steps

Two thirds of the papers concentrated in the Marine-Coastal biome, mostly on coral reefs, but also on rocky shores, sand beaches and seagrass meadow ecosystems. Recreation activities considered on these sites were swimming, snorkeling, splashing, walking, and boat tours. Impacts evaluated were human presence (visitor occurrence and densities), trampling, and handling and removal of organisms.

Macrobenthic fauna and flora were the most frequent taxa studied in coral reefs; fishes, crustaceans, birds and dolphins were also studied in other marine ecosystems. In Brazilian tropical forests, mammals were studied in three different areas (north and southern Amazon, and in the Atlantic Forest), always comparing visited *vs* non-visited trails. Birds were studied in Pantanal, and fishes in streams in the Cerrado biome.

Based on these preliminary results, except for marine ecosystems we have a very limited knowledge about the actual impacts of recreation on terrestrial ecosystems in Brazil. We have a very limited idea of the recreation impacts on forest mammals, on fishes in the streams of Bonito, a famous world nature tourism destination, and birds in Pantanal. At a broader level, we have almost no idea about the recreation impacts in the whole biodiversity in Brazil, considering different species, ecosystems, habitats, and also dozens of activities under different levels of intensity. Impacts on plant species, vertebrate and invertebrates in the Cerrado, Caatinga, and other fragile biomes and ecosystems are unknown.

This ongoing study is being expanded to include additional sampling efforts, clarifying taxonomic and ecological gaps on what we don't know about the impacts of recreation in Brazil. Besides international journals, we will also include Brazilian journals and papers written in Brazilian language (Portuguese). Unpublished thesis and dissertations could also bring more studies into the ongoing literature review.

Recommendations

On the one hand, researchers must concentrate efforts to understand recreation impacts on less studied ecosystems and organisms, and particularly those ones with extraordinary importance for the maintenance of biodiversity and ecosystem process, such as flagship, landscape or keystone species. On the other hand, PAs managers and agencies must incentivize research on these topics, promoting dialogue between managers and researchers, providing facilities, infrastructure and funds for recreation ecology studies.

At the same time, visitation must be managed carefully, due to the escalating increase in visitor flows in the Brazilian NPs, our most precious land for world's biodiversity protection. Based on precautionary principle, visitation in strictly protected areas must avoid the increase in trail density, and potential impacts on sensitive habitats and threatened species.

Simple protocols to monitor visitor's impact, as well as involving volunteers and citizen science approach seems to be promising to couple visitor management with nature conservation. Finally, considering both the high level of threatened species and ecosystems and the high environmental perception of Brazilian NP visitors, we must find ways to minimize negative impacts and optimize direct benefits to nature conservation.

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Reconciling outdoor sport, biodiversity and wood production in a peri-urban forest – using the example of Fontainebleau Forest

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Fontainebleau Forest: an outdoor sports stadium for over a century

Fontainebleau Forest is a 23,000-hectare forest located 60km south of Paris, managed by a government body specialised in wood production, the National Office for Forestry (ONF). Being so close to Paris and its ever-growing expansion, a law was passed in 2002 to prevent any land purchase in this area.

Data provided by a recent study *(ONF, 2015)* measured that there are between 4 and 10 million visits every year[i]. Visitors are either people living in Paris and surroundings, coming for short visits, walks and outdoor sports, or international visitors, mostly coming for outdoor sports. Boulder climbing attracts around a third of the visitors, 50% of them being international visitors.

In the middle of a highly productive agricultural region, Fontainebleau's soil is actually dry and poor. Forestry was seen as more suitable than agriculture from early times and a royal forest and castle were built in the area in the 11th century. It rapidly became one of the main hunting lodges for all the French kings practising the spectacular sport of deer-hunting with hounds.

Later, when the steam train first arrived from Paris, more visitors arrived, keen on getting out of the newly industrialised cities. One of them, Claude François Dénecourt, marked up to 200km of walking tracks, with the sole purpose of revealing a diverse landscape. Those tracks allowed more tourists to enter the forest. In 1853, pre-Impressionist artists obtained an agreement that part of the forest wouldn't be cut, to maintain their cherished landscape. Fontainebleau landscapes were officially protected when the forest was registered as a "classified area" in 1965.

Similarly, other visitors were also paying attention to the fauna and the flora. One of the most prominent botanists of the time chose Fontainebleau to open the first in-situ ecology research Centre. Any naturalist from Paris and the surrounding area would come to Fontainebleau, as it combines various habitats: old-growth oak groves, open moorland, sandstone plateaus. In May 2010, Fontainebleau Forest was officially registered as a "Natura 2000" area.

In this context, the ONF is facing a complex challenge: managing the timing and location of outdoor events, while maintaining wood production and biodiversity conservation.

A cornerstone: authorising sporting events

A formal authorisation is needed to organise any sporting events with more than 60 people. There are around 350 sporting events organised every year in Fontainebleau.

The criteria analysed while processing sports organisers' requests are: other existing activities (forestry, hunting, research) on the same day and in the same location, environmental impacts, erosive impacts. Event organisers have to provide a copy of their itinerary. Up until recently, the process was based on paper copies and both the ONF and users would regard this process as "another administrative constraint".

Due to the increasing number of requests, the ONF has changed its strategy and is developing an online tool to process them. It is also seen as a communication tool. It is made up of an

interactive map, containing most of the relevant georeferenced data for a given year, and entry forms where users can describe their event. The georeferenced data includes (see figure 1): parking locations and capacities, different types of roads, tracks and their recommended uses, environmental sensitivity or other georeferenced constraints: cultural items, private properties, restricted areas, biodiversity sensitivity. Users also have the capacity to modify their routes as they discover possible constraints. They receive a summary of their request, with detailed information on the possible impact of their sporting event and clear information on the rest of the process. When their event requires more work, they are offered the opportunity of contributing directly by participating in workshops.

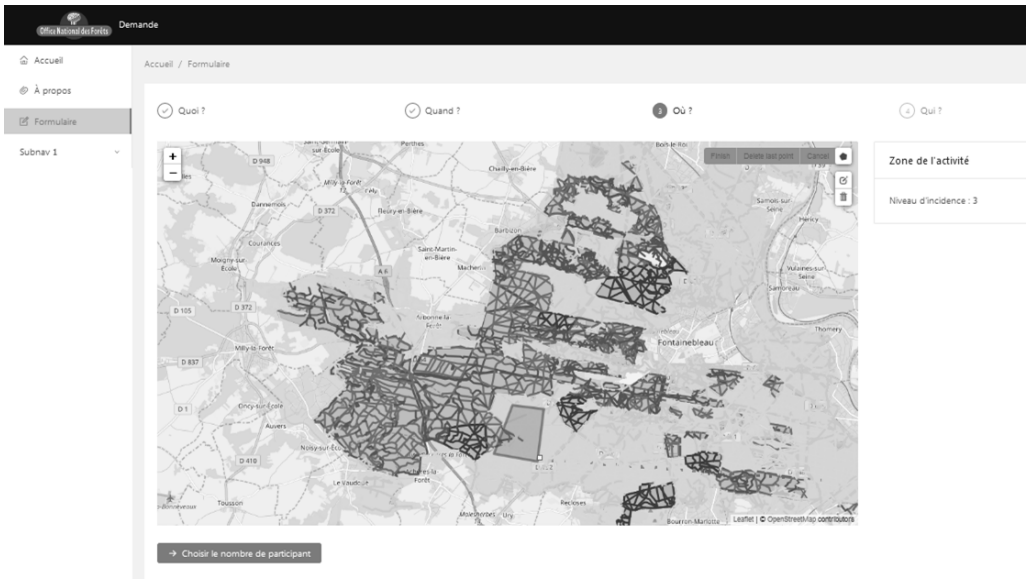

Figure 1: Web page to create a sporting event's itinerary by showing its ecological impacts (Source: ONF)

A broad range of outdoor sports users: how to inform a complex web of stakeholders

Most visitors believe this area is a "public space", but it is actually a private space open to the public, which is slightly different. Individuals can enter and exit the forest as they please, as long as they respect general rules, which are often unknown to them.

Outdoor sports most frequently practised are: boulder climbing, mountain biking, trail-running, orienteering and horse riding. The majority of those sports are "self-organised"; users don't belong to a club. This creates difficulties, as no professional entity oversees the safety of the users, or communicates about good practices.

Through the development of private interactive maps and corresponding apps, most users can find sites corresponding to their sporting expectations. Most of those tools have been developed using users' data but without ONF consent. This situation increases the risk of conflict: mountain bikers eroding pedestrian tracks, climbers publicising routes in non-secure sites, trail-runners creating new tracks in very sensitive areas.

Different strategies have been trialled in order to convey important information regarding both rules and good practice:

- Using illustration-based noticeboards instead of text-based noticeboards
- Educating and giving responsibility to active volunteers (VTT)

- Choosing respected champions to become ambassadors of the forest (climbing)
- Using social media to communicate.

Much more needs to be done, with mountain biking and climbing becoming the main sports practised in the forest.

At a time when outdoor sport in natural areas is developing widely and when sports users are more and more autonomous, it is imperative to find ways to reconcile the different priorities of these natural sites. Fontainebleau Forest is a French peri-urban forest historically regarded as a local outdoor facility for an increasing number of outdoor sports users. Considering most of these outdoor sports have direct and indirect impacts on the area, where a series of complex rules apply, the ONF has endeavoured to create new policy instruments to target more and more autonomous users. In a context where public funding is constrained, it is also time to ask whether the outdoor sports industry needs to take these questions more seriously.

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Visitor influx and sustainable tourism development - paradoxes and dilemmas in the Nordic countries

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Introduction

Visitors' experiences of nature attractions are at the core of the tourism industry of the Nordic countries (Fredman & Tyrväinen, 2010). Recently, these countries have experienced rapid increases in visitation from international tourists. Within a relatively short time period some nature attractions that used to represent goals for outdoor recreation trips have been transformed into international destinations for tourists, who via social media want to document their visits to attractions with iconic statuses. The motives for the visits, as well as the experiences people seek, have hence become more diverse and complex to understand. Many popular nature attractions of the Nordic countries are situated within alpine, boreal forest or polar ecosystems, which are all particularly vulnerable to the effects of tourism. Moreover, the attractions are often located in regions and communities which in terms of management policies and infrastructures are not sufficiently prepared to handle large scale visitation.

Unprecedented growth in the numbers of visitors has in several places resulted in environmental damage, costly rescue operations and overload on common goods and public infrastructures. Responding to these challenges, implementation of economic instruments, such as entrance fees and concessions, have been suggested by some policy makers, managers and tourism businesses. The purpose is primarily to limit or structure the visitation streams and to secure sufficient funding for the management of the influx of visitors causes. These kinds of policy instruments are particularly challenging in the Nordic countries where the traditions of freedom to roam have been transformed into public rights (Kaltenborn et al., 2001). The main aim with this presentation is to discuss some dilemmas and paradoxes arising from the efforts of finding sustainable solutions to urgent problems caused by the rather sudden influx of tourist and the increasing variety of demands that follows from this

Global trends and sustainable tourism development

The increase in tourism the Nordic countries have experienced recently should be seen in the context of the global trends of differentiation, specialisation and individualisation of tourism practices, which amongst other things involve the information flows made possible by the social media and the increased mobility the networks of inexpensive airline routes have contributed to. While this development represents huge economic and social benefits for the tourists and the tourism industry, it also generates some major sustainability concerns associated with traffic congestion and noise, accidents, air pollution, greenhouse gas emissions, resource depletion etc. As tourist attractions have become more available to more people, an increasing number of travel destinations are transformed from regional or national

recreation sites to international tourism destinations. Having limited capacities, many of these destinations are not prepared to handle the influx of new visitors and struggle to meet an increasing of variety of behaviours and demands in a sustainable manner. Sustainable tourism development requires policies and planning processes that take environmental, social, and economic dimensions into consideration in a long-term perspective. This is more difficult to achieve as trends become less predictable and tourism more difficult to manage through marketing and planning strategies.

Policy instruments and the public rights of access in the Nordic countries

The rights of public access of the Nordic countries represents some challenges regarding sustainable development tourism. One the one hand, these rights indirectly facilitate for a large-scale influx of tourists to natural areas. Firstly, the rights of public access make unimpeded visits to nature attractions and destination possible. Secondly, in some of the countries, such as Sweden and to a certain extent Norway, they even enable nature-based tourism enterprises to operate on land areas regardless of ownership. On the other hand, resource-based management strategies, which typically involve direct regulations of traffic using prohibitions, fencing, entrance fees etc., will in many instances contradict the principles of the rights of public access. While measures like these are likely to encounter some legal hindrances, they can even be contested on political and moral grounds since the public rights of access are closely associated with both social equality and individual freedom. Being assigned to individuals, the public rights of access were originally designed on the basis of historically and culturally grounded outdoor recreation practices that did not entail large scale and commercial organized visitation (Sandell, 2006). In part due to this, legislation and management practices are not sufficiently adapted to the challenges large volumes of visitors may cause.

As long as the opportunities for direct regulations and use of economic instruments are limited, the development of infrastructures appears to be the immediate solution to the acute problems caused by rapid increase in visitation to nature attractions. Improving transport solutions, facilitating hiking trails, extending on-site services etc. may contribute to reducing congestion, improve the safety of visitors and enhance their experiences. However, these measures also have the propensity of making attractions even more available to a greater variety of visitors, causing further negative impacts on both local communities and nature environments (Sæþórsdóttir & Ólafsdóttir, 2017). This may result in conflicts between diverse groups of visitors, as well as between various stakeholders related to the tourism industry. Furthermore, as visitors' demands and expectations become more varied, the question of what kinds concerns and whose interests should to be considered in the management of natural areas becomes more complex (Saarinen, 2016: Sæþórsdóttir & Ólafsdóttir, 2017).

Activity-based strategies that are based on stakeholder involvement in planning and monitoring have in some regions already become important instruments for regulating the influx of tourist in time and space, with the aims of reducing risk of conflicts and minimizing negative impacts on ecological systems (Kaltenborn et al., 2017). In view of the above-mentioned dilemmas and paradoxes, we will discuss to what extent adaptive management approaches, informed by preferences, motivations, attitudes and opinions of visitors, represent more sustainable solutions when it comes to regulative measures.

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Participatory planning for nature-based tourism and place-making

Visitor management for nature-based tourism and community development: Participation across protected area borders

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Introduction

This paper addresses participation and cooperation in developing visitor strategies across protected borders in order to achieve synergies between nature-based tourism and local community development. Whereas the conservation authority is responsible for planning and land-use decisions within the protected area border, the municipalities are responsible for the adjacent areas. We present two case areas from Norway: Nærøyfjorden in the west and Varanger in the high north. The two areas consist of large protected areas: the Nærøyfjorden landscape protected area (and part of Norwegian West Fjords, a UNESCO World Heritage Area) and Varanger Peninsula National Park. In both places, there are several small rural communities nearby. In addition, regional nature and culture parks (regional parks) have been established in the two regions. Nærøyfjorden World Heritage Park was established in 2008, and Varanger Arctic Norway was established in 2016. In this paper, we discuss the role of the regional parks as a bridge-builder among the environmental conservation authority, municipalities and other actors in order to create sustainable synergies between tourism and community development.

Conservation policy in change

There are two ongoing trends for decentralised and integrated protection and community development in Norway (Skjeggedal & Clemetsen 2017). The first is related to changes in conservation policy due to the decentralisation of management responsibility from the state to inter-municipal boards with political representation beginning in 2009 and from the introduction of visitor strategies for larger protected areas launched in 2015. The second trend is the emergence of regional parks in voluntary cooperation and partnerships between public bodies and private organisations to promote sustainable community development, which may include protected areas (as in our two case study areas). Unlike regional parks in many other European countries, Norwegian parks have no formal status in any legislation.

Methods and data

This paper is based on case studies, including qualitative interviews, funded by two research projects. The study of Nærøyfjorden was funded by the Norwegian Research Council's regional body, and Varanger is part of the ongoing research project BIOTOUR (From place-based natural resources to value-added experiences: Tourism in the new bio-economy; funded by the Norwegian Research Council). In Nærøyfjorden, 12 semi-structured interviews with 13 persons representing public agencies and businesses were conducted in 2015 and 2016. So far, in Varanger, five representatives from different public bodies and two local small-scale tourism providers were interviewed in May 2017.

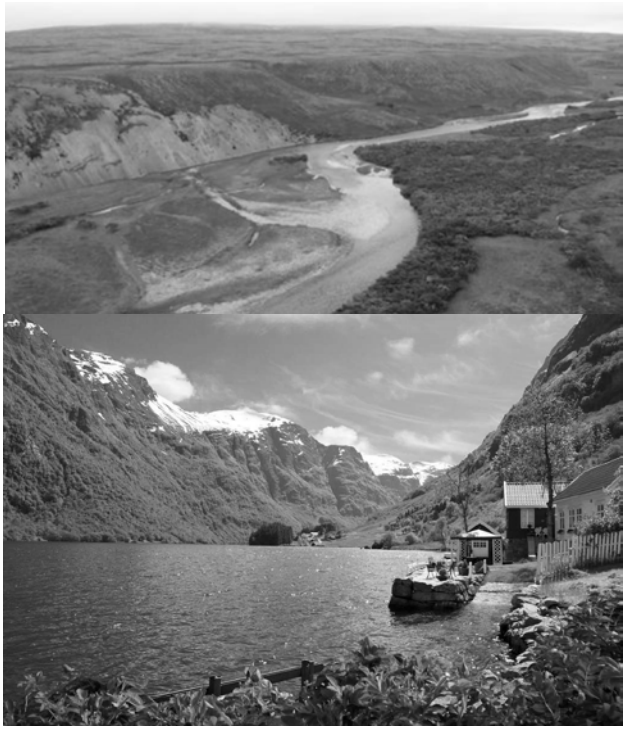

Figure 1: The *Varanger arctic landscape at the top and the fjord landscape at Nærøyfjorden below.*

The two case areas (see Figure 1) represent two different contexts related to tourism; whereas Nærøyfjorden in one of the most popular destinations in Norway, receiving about 700,000 tourists per year, Varanger has a much smaller number of visitors. However, the region experiences a seasonal increase in tourism, particular related to bird watching (mainly arctic sea birds, such as eiders). The landscape characteristics are also quite different: Varanger represents an open and arctic landscape, whereas Nærøyfjorden represents a dramatic fjord landscape (see Figure 1). The Varanger region is multicultural, with Sami, Finnish and Norwegian inhabitants.

Results and discussion

A visitor strategy was developed for Varanger Peninsula National Park in 2015, as one of three pilots initiated by the national conservation authority. The goals of the strategy are: 1) strengthen the conservation values and increase understanding of protection, 2) local community development and 3) valuable experiences for visitors. An important aim is to limit the number of tourists visiting the inner part of the national park, while emphasising the outer parts and four selected gateways in order to welcome more tourists. A general impression from the interviews is that there is limited integration between national park management and municipal land use planning for the adjacent areas in visitor management, despite the fact that these areas are considered to have much of the same qualities as the national park. Proactive land use planning for adjacent areas is lacking due to limited capacity in the municipalities and a traditional focus on the built-up areas (towns and larger villages). Participation from other actors in the process has also been limited.

In the other case study area, Nærøyfjorden World Heritage Park took the initiative to develop a first generation visitor strategy in 2016 for the World Heritage Area, including the protected areas. In this area, participation and cooperation between the regional park and other actors have been rather intensive (Stokke, Haukeland & Clemetsen 2016). Because regional parks have no formal status, they depend on voluntary participation and involvement in the process of developing the visitor strategy. This approach has been successful when it comes to local

organisations, small-scale businesses and management of protected areas, but this approach has greater limitations when dealing with larger, more authoritative actors, such as the harbour authority and cruise ship actors.

Despite ongoing trends of changing conservation policy and the emergence of regional parks, Norway still takes a rather segregated approach to nature conservation. Applying a stronger link to European regional park models may have the potential to bridge nature and culture, as well as conservation, nature-based tourism and place making, across the national park border (Gambino & Peano 2015). A landscape perspective based on the European Landscape Convention may provide a common arena across legal boundaries and include a broad spectrum of actors from municipalities, local inhabitants, industries and nature-based tourism entrepreneurs. In this presentation, we will explore opportunities and constraints associated with these potentials.

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Participatory management to engage society with the planning of protected areas: a mountain bike trail planning

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Participatory management is the practice of involving members of a group, such as employees of a company or citizens of a community, in organizational decision making in issues that concern these people. It is used as an alternative to traditional vertical management structures, and in outdoor recreation management it has shown to be effective in clarifying the aspirations and intentions of different stakeholders. Participatory management can result in a reduction of potential social conflicts and natural impacts and – in the context of outdoor recreation - reduce the creation of unauthorized trails (NEWSOME et al., 2016). Similar to Newsome et al. (2016), we have implemented a collaborative approach to develop a mountain bike trail at Tupi Research Station, a public natural area in São Paulo State, Brazil. Between mid-September and late November 2017, we conducted surveys during the weekends to better understand the perceptions of visitors (mountain bikers and hikers) regarding the recreational use of mountain bikes. The survey focused on perceived social conflicts and also in whether the visitors would be willing to actively and voluntarily participate in the design and future management of a mountain bike trail in the area. The main idea was to separate the hikers and bikers once the area only has walking trails and old log roads that have been used by both visitors. Besides the greater intention showed by the respondents to collaborate in the process we had low initial involvement at a first public meeting in 2018.

Methods

Between September 16th, 2017 and November 26th, 2017, we conducted surveys of visitors (mountain bikers and hikers) at Tupi Research Station (E.E. Tupi, in Portuguese). We initially conducted only surveys as this method is often used in outdoor recreation planning (MANNING, 2009; ROSSI et al., 2013; VEAL, 2011). However, we expanded our methods by organizing a public meeting on February 24th, 2018. We did this based on Smith's (2003) research on deliberative democracy wherein the author argued that democratic processes fail when subjects are only allowed to express their opinions and needs individually, isolated from the collective in which they can deliberate, argue, confront views and change opinions.

The public meeting was advertised at the official website of the governmental institution responsible for the management of Tupi Research Station (Forest Institute) as through direct e-mail to all visitors that were interviewed in 2017 who manifested interested in the participatory management of the mountain bike trail. The meeting consisted of talks given by the conservation professionals who work at E.E. Tupi as well as by the people involved in outdoor recreation research at the area. Additionally, there were break-out sessions where participants were asked to think about the ideal bike trail they would like to have in that area.

Preliminary Results

We conducted 112 interviews for the survey; 56 mountain bikers and 56 hikers. 60,7% of the hikers reported having met bikers along their way. However, only two hikers (5,9%) said their experience was negatively affected by these encounters. In one case the hiker

experienced a fast biker who did not slow down when approaching the hiker, and in the other case the hiker did not like sharing the same trail with a biker. Generally (82,3%), the hikers surveyed enjoyed encountering with bikers for they believed the encounters denoted safety in the area and opportunities for socialization.

The surveys also questioned whether the visitors would be willing to actively and voluntarily take part in a participatory management of mountain bike trails at *Tupi Research Station*. 48,2% of the hikers and 66,1% of the bikers surveyed manifested interest in being a part of this participatory process which meant 64 people. However, at the first public meeting in February 2018 where these people would again be listened to only two bikers previously surveyed showed up.

It is known in science that subjects will often respond positively to questions that pass a good image of themselves or of an institution they represent (AJZEN, 1991; MANNING, 2009) which means that the ones who manifested interest in being part of the participatory management of the trails may have only done so not to give a bad image of themselves.

Nonetheless 32 people participated in the public meeting among which 11 bikers (the 2 previously interviewed and 9 newcomers) which represented 34,38% of the group; 7 hikers (none who had been previously interviewed) who represented 21,88% of the group; 4 people from the academic community (12,5%); 2 employees of state environmental agencies (6,25%); 2 employees of city environmental agencies (6,25%) and 6 scouts (18,74%).

These were divided in smaller groups of five or six people – mixed groups preferably with one hiker, one biker, one graduate student, one scout and one worker either of the city hall or of E.E. Tupi so that discussions could be rich in variety of points of view.

These groups were asked to discuss again – now collectively - a question that was in the survey targeted for bikers: “rank the following features of a mountain bike trail in importance to you as a visitor”. Each group discussed this and in the end of the meeting a chosen spokesperson for each group to summarize their opinions. Their results were combined based on Likert scale evaluation and they were summarized as a group ranking (table 1).

The next steps of the participatory mountain bike trail management process will further address features that are perceived as important both individually and collectively (e.g. a narrow trail), avoid what is perceived as negative (e.g. gravel and ramps), and make an implementation plan that also takes the conservation goals of the natural area and available volunteer work force into consideration.

Table 1. Comparative results of MTB trail feature evaluation

Rank the following MTB trail features in importance to you as a visitor.	
Survey results (individual)	**Public meeting results (collective)**
1. Natural inclination (ups/downs)	1.Broad trail
2. Narrow trail	2.Narrow trail
3. Bridge	3.Bridge
4. Natural obstacles (i.e.stones, trunks)	4. Natural inclination (ups/downs)
5. Ramp	5.Natural obstacles (i.e.stones, trunks)
6. Broad trail	6.Ramp
7. Gravel	7.Gravel

After the first meeting, a new public announcement went out for participation in a field reconnaissance of the proposed mountain bike trail area. The trails already in use by cyclists were not designed for this specific purpose and processes of erosion are already intensifying. The intention is to keep the existing trails for hikers and adapt the old log tracks for bikers.

Our methodology involves four public meetings for planning and designing the mountain bike trail. The last step of the participatory management approach is the trail construction by volunteers of the different stakeholder groups.

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Community entrepreneurship and collective orientation at the intersection of place-making and nature-based tourism

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Figure. Fishery harbour in Vardø

Introduction

This paper addresses the need for integrated perspectives on nature-based tourism and place-making through the lens of community entrepreneurship. The study is part of the research project BIOTOUR (from place-based natural resources to value added experiences, tourism in the new bio economy), funded by the Norwegian Research Council. The case area is the arctic town of Vardø in the Varanger region in Norway, located on a 3.7 square km island. The shifting arctic lights, rough geology and extreme weather conditions are prominent landscape features. Vardø has a long history as a strategic military outpost near Russia and as an administrative centre for trade and fisheries in the north. In the period from 1980–2010, Vardø suffered from a decline in the fishing industry, leading to a population drop from 4,000 to 2,000 inhabitants. This decay was followed by social problems and an impaired reputation. Vardø is described as a landscape on hold, waiting for future resolutions to contemporary problems (Kampevold & Hemmersam 2017). However, during the crisis, new initiatives emerged from a local alliance of actors trying to regenerate the place. In my study of the

regeneration process, I have focused on the story of the cultural heritage entrepreneurship project 'Vardø Restored', which combines the restoration of historic buildings and community-based art projects. A second entrepreneurship story is that of the architecture company 'Biotope', which uses their passion for birds to design and build modern wind-shelters and birding hides in combination with destination development. Both initiatives have a strong collective orientation, resulting in optimism and confidence in a better future for the inhabitants of Vardø.

Community entrepreneurship

The need to involve inhabitants and local communities in the development of nature-based tourism is a starting point for the discussion. The development of responsible, nature-based tourism should be combined with the principles of geotourism, in which place, culture and community are central concepts. This can create opportunities for new place-based nature and cultural experiences in which local communities are involved and take ownership in defining the tourism landscape.

'Community entrepreneurship' can be useful as a process perspective to understand activities leading to new collective solutions (Førde & Ringholm 2014). Such processes are characterised by their qualitative social and cultural value creation rather than merely economic orientations. Community entrepreneurs are often associated with local enthusiasts or activists, which are vital to a place's survival. The community entrepreneurship approach seeks to combine innovation theory with praxis-oriented perspectives on cultural change (Borch & Førde 2010). Social creativity is a central concept related to people's ability to meet new challenges and find solutions based on envisioning scenarios from bottom-up processes. According to Ingold and Hallam (2007), one must embrace the value of the lived creative praxis of experimentation and improvisation.

Methods and data

Fifteen in-depth interviews, several informal conversations, observations and participatory observations took place during five fieldwork trips to Vardø (for durations of one to two weeks) in the period between 2016 and 2018. A strategic selection of people and the snowball method have been used as strategies for finding informants. Participatory observation has been used to allow myself as a researcher to participate within the processes of the study.

Preliminary results and discussion

On the level of each individual entrepreneur, the role of bridging local and external resources is crucial. It is also important to take advantage of how different entrepreneurs can contribute to place-making based on their relationships with places. Both strong emotional bonds and an orientation towards new development possibilities can be the basis of an entrepreneur's value perspectives, as indicated in this case.

Two critical factors in understanding the collective orientation of community entrepreneurship processes are *abrupt changes* (cultural component) and *social arenas* (social component). Such an understanding involves how the processes create collective awareness, belonging and possibilities for inhabitants, in addition to a focus on how this adds value to visitor experiences. These processes also exist with complex actor–network constellations involving nature and built environments. Vardø Restored and Biotope are mutually reinforcing projects, and the study shows that both have contributed to positive changes within the community. As an example, the work of Vardø Restored has led to the preservation of Nordpol Kro, the oldest tavern in the region and an important meeting place in town for both residents and visitors. Vardø has five festivals during the year, in which

Vardø Restored and Biotope are involved. However, it seems that there is important work yet to be done regarding local anchoring towards the municipality's appreciations of small-scale entrepreneurial activities.

Cross-sectoral orientations and transdisciplinary working methods are vital to the future development of more responsible landscape-based tourism. Community entrepreneurship can be used as a practical process orientation for understanding and managing the intersecting areas of place-making and nature-based tourism within a place. Such an orientation illuminates bottom-up perspectives with collective orientations on development, in which residents are involved in defining the integrated tourism landscape to include both nature and culture.

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Storytelling as an intermediary between local communities and visitors in nature-based tourism

"*Creating values through the encounter"*

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Introduction

Tourism is one of the largest economic sectors in the world, with substantial impact on national and local economies in many countries. Local communities in rural regions in Norway are increasingly dependent on income from tourism, especially from nature-based tourism (NBT). Fredman and Tyrväinen (2010) define NBT as 'recreative activities occurring when people visit "natural" areas away from the area they live'. In Norway, many districts and communities provide space for a broad range of unique nature experiences, attracting people from all over the world. Nature features and the landscape as a whole offer spectacular sceneries to the visitor. Sometimes these attractions are only accessible through organised activities that require both skills and special equipment, such as dog sledging, fjord rafting and mountain hiking. Although NBT is concerned with 'nature experiences', in most cases, they are part of culture. There is always an element of facilitation dependent on knowledge, embedded experiences and versatile practical and communicative skills. Someone is 'opening the gate' to facilitate visitor experiences. These people can be NBT entrepreneurs or guides, or simply residents in the local community.

We claim that nature-based tourism experiences will always take place in a cultural context, and the broad range of interconnected human and cultural resources related to the territory in which NBT is performed must be recognised. NBT has the potential to facilitate encounters between visitors and local communities, adding value in both directions. Thus, it should be possible to achieve a more sustainable tourism industry and enhance the viability and wellbeing of local communities. In this paper, we will present and discuss methods to identify and activate potential resources for integrated tourism and community development and wellbeing, particularly using storytelling as a way to reveal resources and to focus on integrity and the ethical aspects of NBT.

From an integrated planning perspective on NBT, the role of the local communities in which the tourism activities take place has not been sufficiently acknowledged as a vital part of the entire value chain. The taking of a more deliberate, proactive position—by both the tourism industry and local authorities within a region—may generate a broad range of added values for the tourism industry and for the society.

Identifying landscape resources

The landscape—with its natural elements, its cultural history, its built features and the skills, memories and stories associated with it—is the framework and the arena for both residents' and visitors' activities. Sharing the same space might imply some challenges, but there is also a great potential for synergies. Applying a 'landscape perspective' means less focus on boundaries and more focus on connectedness and interactions between man and nature in local and regional contexts (Gambino and Peano 2015). It also implies a sense of strong forward looking. A model of landscape resource analysis (LRA) is presented and discussed in

light of transdisciplinary theory (Vilsmaier 2008), perspectives on landscape and place (Selman 2012) and theories on integrated regional planning (Welter 2002).
The LRA model has been applied in several place-based projects and functions as a process tool at the level of local communities. It consists of four stages, each of which addresses certain questions related to the past, present and future, as well as the outer, shared reality and the inner, individually perceived reality.

Local NBT entrepreneurs and other community actors in Varanger, telling their story using an object that connects personal values with the common landscape and future potentials.

Methods and data

The procedure and the outcome from the two case areas that will be presented; *Nærøyfjorden*, which is part of the UNESCO World Heritage Area of West-Norwegian Fjords. Data was collected from the research project: 'Ideals, Models and Practice in Natural Resource Management. Does Local Management Matter?(LOCALMAN) Norwegian Research Council No.203784 (2011–2015). (Some additional data from other projects is also used.) In the other case area—the *Varanger peninsula*, including Varanger National Park—data was collected from the project: From place-based natural resources to value-added experiences: Tourism in the new bio-economy (BIOTOUR) – funded by the Norwegian Research Council, project no. 255271 (2016–2020).
The research material was derived from several methodological approaches: semi-structured, in-depth interviews conducted in both Nærøyfjorden and Varanger, a simple questionnaire administered within gateways to the Nærøyfjorden, two workshops in Varanger (2013 and 2017), one in Nærøyfjorden (2005) and a continuing education course in Nærøyfjorden (2011).

Results and discussion

The LRA process goes through four stages or levels of reality: *empirical* (material and cultural resources), *pragmatic* (individual identity and competences), *normative* (ideas and visions for the future) and the *value level* (sustainable value creation). Storytelling has proven to be a very effective tool in the process of moving from one level to the next. In Varanger, the participants were asked to bring a 'token', an object representing something precious to them, something that biographic information and personal values could be projected through. Taking an individual ethical position as an NBT entrepreneur is vital for activating the broad

potential of added value that makes it possible to develop tourism industries that both visitors and local communities can benefit from.

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Linking Nature and Culture in World Heritage management. Lessons learned in Norway

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Introduction

Sustainable visitor management means finding a balance between preservation of important sites and giving visitors a rewarding experience, while at the same time supporting local economic development. Linking nature and culture with peoples approach to planning and management is fundamental to support sustainability. This is time consuming and anchoring the processes will be difficult if roles and responsibility are not understood or accepted. Lessons learned from projects in the West Norwegian Fjords WHS (Lykkja et al, 2018) are taken into account as Nordland County is building up a new visitor strategy for Vega World Heritage Site, the Lofoten islands (on the tentative list) and Meløy/Svartisen (entrance National park) (Hansen and Lykkja, in prep).

Tourism - threat and opportunity

UNESCO (2012) considers tourism to be one of the greatest threats to the World Heritage Sites, while the industry also provides economic opportunities in and adjacent to the sites. In 2014, the small communities of Flåm and Geiranger had around 300 residents and received 700.000 visitors in (including 280.000 cruise ship passengers). In 2017 the number of visitors was close to 1 million. Limits of sustainability for nature, the local communities and tourism is a big debate. Each year, the media describes protests against mass tourism, pollution and noise. This is also the case for the Lofoten islands, who are on the tentative list. (Lykkja et al, 2018).

Local involvement

UNESCO has experienced that including the locals in the decision making is needed for long term results and sustainable development (Court and Wijesuriya, 2017). The Heritage council for the West Norwegian Fjords WHS is working to establish more sustainable practices, both within and outside the protected areas. The goal is to find a balance between preservation of important sites, and giving visitors a rewarding experience, while at the same time supporting local social and economic development. The visitor management strategies are built on these fundaments.

Report to UNESCO

UNESCO demands Visitor Management Strategies and regular reports proving the sites are being well maintained. The West Norwegian Fjord landscape was entered on UNESCO's World Heritage List in 2005. The report system is still under development. UNESCO is now integrating the ICCROM-led Managing Cultural World Heritage manual and the IUCN-led Managing Natural World Heritage manual into a single new publication. This will take years to be finished, but we have taken advantage developing a system that fuses both natural and cultural resources.

Visitor management in the West Norwegian Fjords

The project has developed different types of maps and methods for rural development and visitor management that takes care of nature and landscape, supports local community growth

and broad value creation. The project has been using interviews, public assemblies, regional park meetings, dialog conferences, student theses, expert seminars, and collaborations with other research projects, seeking to involve as many actors as possible. Findings from visitor studies have been charted against landscape resource analyses, and have been subject to new gatherings and workshops.
During this project, we have been working closely with the authorities and managers of the protected areas, the tourist organizations, landowners and other stakeholders to coordinate visitor management strategies inside and outside the protected areas. During this cooperation, we were able to map how the world heritage values are developing and changing over time (positive/negative patterns) and, also the creation of new digital maps showing touristic infrastructure.

Challenges: Anchoring, roles and responsibilities

The last step was to work with the municipalities and the counties to establish the visitor management plans. In this case, it was not possible to succeed because of not enough time and resources to establish a common understanding of roles and responsibilities. This has to be part of the common planning processes in the municipalities. It has to be done properly, to secure involvement of stakeholders and cooperation with decision makers.
The research shows that we are lacking a holistic management of the World Heritage Fjords. Both the Nærøyfjord World Heritage Park and Green Fjord-partnership have been established as a result of this. These important integration actors have, together with other local and regional actors, contributed to put sustainability on the agenda, and succeeded through networking with regional and national actors. For example financial support for farming and maintenance of traditional culture-landscape and regulations of the cruise ship-traffic (Stokke et al, 2017).

- A new discipline takes a long time to integrate, in both education, business and management. In the planning area, we naturally find more actors who have not identified and/or accepted visitor management as part of their area of responsibility.
- The World Heritage Park and the World Heritage Council have helped financing development projects and mobilized volunteer community efforts. They are important integration actors, but they are advisory bodies and lacking management tools.
- The World Heritage Municipalities have to work closely together with the management of the protected areas to develop visitor management strategies. The Tourism industry and local communities must be integrated to a larger extent than what has been the case so far (Clemetsen and Stokke, in press).

Visitor management on the county level – pilot project in Nordland

Nordland County is on the way to accomplish a pilot project in visitor management for the region of Lofoten, Vega and Meløy-Svartisen (2018-2020/22). The project is strongly anchored in both political and administrative ways. Nordland County has taken the lead in Norway, when it comes to landscape inventory and development of an innovative and experience-based tourism (Lykkja og Hansen, in prep).
To work out examples of good practice, the project cooperates with managers and researchers on many levels. Tests will be done to understand how the person-as-groups (that you find among both local and far away visitors) correspond to different landscapes and how this can be used to reach the visitor groups throughout their customer journey. This landscape approach seems to open up for new dialogs between the many shareholders, and will be a part of the ongoing planning processes for outdoor recreation and visitor management on municipal and regional level. The Project is a good follow up of the work started up in the West Norwegian Fjords (Lykkja og Hansen, in prep).

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Whatsalp – A hiking study on protected area tourism across the Alps

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The "whatsalp Vienna – Nice 2017" project

How has the image of the Alps changed over the decades? What traces are left behind in the landscape by people and natural events? Between June and September 2017, a group of Alpine experts hiked from Vienna to Nice under the name "whatsalp". Along their journey on foot, they examined the current state of and changes in Alpine regions, documented developments across the landscape and in society, and discussed future scenarios with local actors (Siegrist, Baumgartner, Spiess 2017). An important aim of whatsalp was to compare the present situation with that of 1992. At that time, several group members of the 2017 project had undertaken a similar walk, under the name "TransALPedes", along approximately the same route (Siegrist et al. 1993). In this paper we focus on the situation of protected area tourism in great protected areas of the Alps.

Investigated large protected area and research question

Large protected areas are predominantly located close to nature, and sometimes interspersed with pockets of land featuring new forms of wilderness. We visited twenty-five parks and spoke to their managers, who instructed us in how to take care when traversing the Alpine landscape (see fig. 1). As hikers, we were invited to explore great protected areas of the categories national park, nature park, wilderness area, UNESCO biosphere reserve and UNESCO world heritage area. We held discussions with their representatives.
The following research questions were at the center:

- What are the most important current challenges of the large protected area?
- What are the objectives of large protected areas in the area of protected area tourism?
- How is the cooperation with local and regional tourism?
- What problems and what future prospects exist and how is this dealt with?

Protected area tourism means a close-to-nature form of tourism, which essentially takes place in the perimeter of the large protected area and takes into account the criteria of nature-based tourism (Siegrist, Ketterer Bonnelame 2017).

Results

First of all, it should be noted that the investigated large protected areas sometimes differ greatly in their basic as well as their touristic character. The spectrum ranges from the hardly managed nature park in Italy, to the large UNESCO World Heritage site in the Dolomites, and to the national park with its strictly protected core zone. Some large protected areas are directly confronted with the consequences of mass tourism (e.g. ski resorts, well-known natural attractions), while others only have extensive tourism. Since 1992 there were founded a relevant number of new large protected areas in the Alps.
However, the investigated large protected areas have some key challenges in common such as declining financial support from the state, the difficult acceptance of nature conservation among the local population and the growing demands of the leisure society in the context of

changing trends. Depending on the country, however, these challenges vary: While e.g. the national parks in Austria and the large protected areas in Switzerland continue to have sufficient financial resources, it is more difficult for nature parks in Austria and the large protected areas in France and Italy.
In the field of nature-based tourism, the goals set by the large protected areas since 1992 are becoming more important, but are still very different. They range from the explicit exclusion of tourism such as in the wilderness area of Dürrenstein to active tourism strategies including product development and marketing as in the Austrian and French nature parks. National parks are usually less involved in tourism and delegate this field of action to others, partly organizations especially created for this purpose or to the regional tourism associations. In contrast, most nature parks actively set goals in nature-based tourism.
The cooperation between the individual large protected areas and tourism is very different. It ranges from joint information and management offices to strictly separate structures. In particular national parks, which focus on conservation and non-development targets, tend to seek the distance to tourism. For example, in the case of the national parks visited, tourism is by no means located in protected area management. However, we note that the relevance of tourism has increased in all large protected areas including the national parks visited in recent years.
For the future, most of the investigated large protected areas are confronted with manifold problems. Changing social attitudes and new leisure trends are the most important causes for this. Thus, the social trend towards nature leads to a large popularity of the large protected areas among tourists. At the same time, the boom in outdoor sports is causing increasing problems. These include impacts on nature by to some extent new leisure activities as well as conflicts between the individual activities.
In order to tackle these problems, large protected areas develop a variety of strategies and solutions regardless of their category. These include sensitization and information for visitors, a good development of offers and visitor guidance with measures to influence recreational activities in terms of their spatial, temporal and quantitative distribution and their behaviour (Arnberger 2013).

Discussion

An alpine crossing on foot as a traveling research is certainly an unconventional research method. Nevertheless, this has a long tradition in geography and landscape planning (Siegrist, Baumgartner, Spiess 2017). Due to the slowness of the movement in the landscape, many observations can be made even off the beaten track, which are not possible with only internet and literature research. The talks and discussions with the responsible persons belong to the field of qualitative methods of participatory observation. In addition written survey with quantitative evaluation carried out across the large protected areas, it is thus possible to deal more specifically with the locally resulting questions. By visiting large protected areas of different countries and categories a general overview was possible, and also a comparison with the results of the crossing in 1992. Limits of the chosen approach lie in the lack of representativeness of the statements, since not all large alpine protected areas could be covered and not everywhere the same topics were in the focus due to the situation-related approach. All in all, the qualitative approach of several months of research on foot has proved very successful and delivered rich results.

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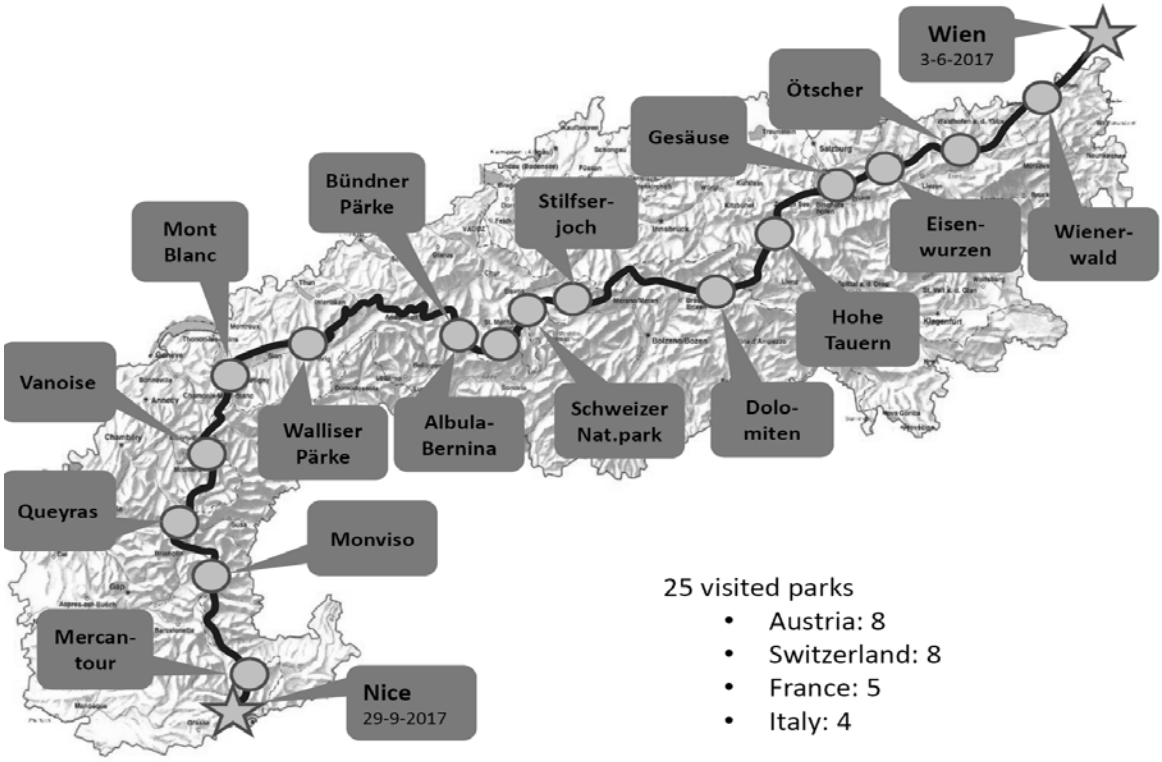

Figure 1: Alpine parks visited by whatsalp

Why Count? Best practicies in the field of data collection to preserve and manage natural areas1

Global attendance study in the Estérel Massif to preserve and manage a protected area

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Estérel attendance study context

Located between the Alps and the Méditerranée, the Estérel Massif is a remarkable natural area of the Côte d'Azur seashore. Due to its diverse and spectacular volcanic landscapes, protected natural areas, rich Mediterranean biodiversity and proximity to great touristic cities such as Cannes and Saint-Tropez, the Massif is very attended.
Even though parts of the Massif are protected by a variety of conservation programs or rules, the Estérel area had no specific coordinated policy for natural area preservation before 2016 : the area's management was shared between several local organizations and jurisdictions with no common policy. Over time, dysfunctions developed, such as landscape quality deterioration, degradation of roads and paths, lack of overall coherence in the touristic development, defective signage, uncontrolled public attendance on specific fragile areas and an increased risk of forest fire.

To cope with these difficulties and to mobilize new financial resources, the Intercommunal Syndicate for the Protection of the Estérel Massif (SIPME) adopted in 2015 a Forest Charter to better integrate the multiple functions of the forest (ecological, social and economic) within the framework of a coordinated management. It is also planned to complete this process with a "Grand Site de France approach" to deal with the high attendance level issues and to reach excellence in sustainable territory management.

The Grand Site de France approach aims to:

• restore and actively protect the landscape, natural and cultural quality of an iconic and well-known "Classified Site";

• improve the quality of the visit (reception, parking, trails, information, animations) in respect of the site;

• promote local socio-economic development in respect of the inhabitants;

This process aims for the site to be registered by the French State as a "Grand Site de France" (demanding trademark) and justify the launch of a quantitative and qualitative attendance study.

Material and methods

The quantitative and qualitative attendance study commissioned by SIPME and carried out by TRACES TPI began in July 2016. It included a data collection period of 12 consecutive months for a total duration of 24 months. The study was conducted on a forest and coastal natural area of 22,000 hectares with numerous access points within the Massif. Various measures were put in place to determine the importance and location of visitor flows, the number of visitors, their profiles, their activities and their expectations:

The attendance study protocol was based on nine complementary measures:
1. Completion of 1629 visitors surveys/interviews, spread over 27 different survey points (6000 profiles obtained) to analyze profiles, practices, expectations, and description of the routes taken on the day of the interview.
2. 120 half-days of visual counting of people and vehicles, spread over 24 counting points (including car parks).
3. Installation of permanent eco-counters (pedestrians, pedestrians-mountain bikes, or car), belonging to 3 different organizations (SIPME included), spread over 17 counting points.
4. 1500 self-administered questionnaires given at tourist offices of the territory and at hosting places (tourist residences and campsites) with 158 responses.
5. Online survey of locals and residents which gave 937 responses.
6. Online survey for tourism professionals (hosts, activity providers, restaurants, crafts, others) - 47 responses were received.
7. Interviews (4) with officials of tourist offices of the territory.
8. Interviews (10) with a panel of tourism professionals offering services in the massif or its coastline (guides, marine activity managers, etc.).
9. Interviews with a breeder / a beekeeper / representatives of hunting federations.
The permanent eco-counters will allow to updated the data for the years to come in order to observe the attendance evolution.
For natural area attendance analysis, the combination of several measures draws a body of evidence to validate the overall attendance (number of visits and number of unique visitors) and its spatial distribution. The results of eco-counters, visual counts, profile surveys and circuit descriptions were cross-checked. Data validation was undertaken, using mathematical, statistical and econometric skills to verify, correct, convert and consolidate data locally and globally.
The cross-referencing of qualitative observation data (profile and route survey) and quantitative data (car parks and trails visual counting) with automatic counting devices ensured the most accurate, consistent and relevant attendance study possible. It made it possible to quantify the number of visits and to deduce the number of unique visitors.
Interviews were also used as methodological elements to check and complete statisticians' approach.

Results

The study conducted by TRACES TPI provided detailed information on the use of the Estérel Massif.

- Overall attendance of the Massif: yearly attendance (number of visits and number of unique visitors), attendance by period (monthly, weekly), and attendance by type of user.
- Attendance profile: variations between sectors, parking lot attendance, mapping of main transit routes.
- Visitors profile: sociological profile, activities, transport mode, profile and practices by geographical origin (tourist, resident, regional excursionists).
- Detailed attendance analysis by sector (15 sectors in total. Example: Figure 1).
- Perception, expectations and knowledge of the Massif: visitors, inhabitants, tourist offices, professionals involved in the Massif, tourism professionals (hosts, etc.).
- Attendance evolution analysis with recommendations for planning, governance, information and communication.

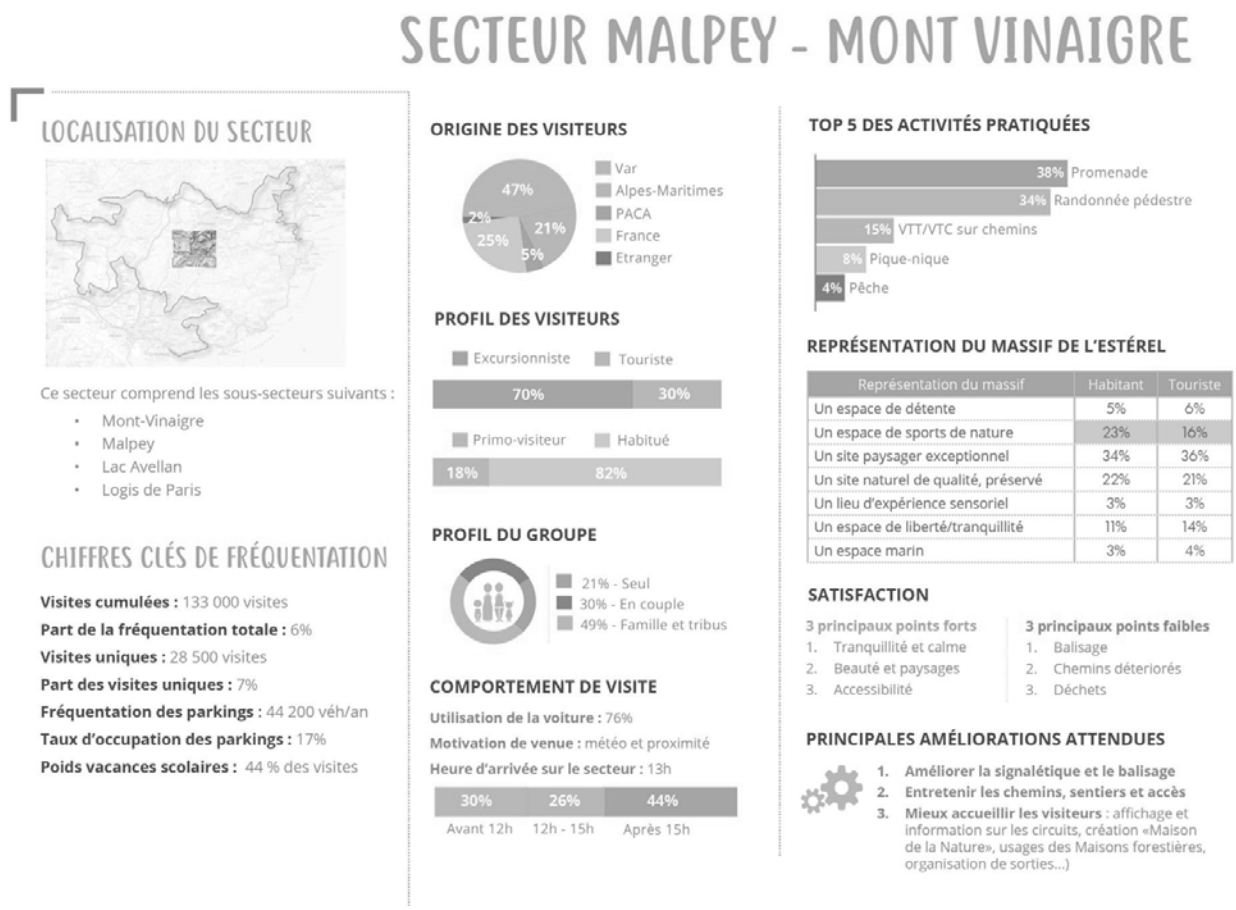
The study highlighted major challenges for the area's managers.

- Attendance is massive in terms of cumulative volumes (2,150,000 visits / year and 435,000 unique visitors / year).

• Attendance is growing, making today's minor difficulties problematic for the future.
• Large differences exist across sectors, in terms of attendance and visitor profiles, which implies different planning and communication strategies for each sector.
• The site is visited all year long, with a peak in pre-season (April-May) and is subject to very diverse user experiences (hiking, strolling, mountain biking, rock climbing, hunting …)
• The dissemination of users in time and space, the diversity of access and activities observed and feedback from users highlight the need for a spatial master plan, including sites and trails related to outdoor activities.

Conclusion: data usefulness for Estérel managers

The diversity of quantitative and qualitative data produced allowed area-managers to:
• highlight territory dysfunctions and management issues;
• justify development, management or communication projects with politicians, financial partners and inhabitants (citizens voters);
• provide statistical data to develop routes and manage expectations of target audiences;
• mobilize additional financial means to implement sustainable, active and ambitious management of this exceptional natural area.



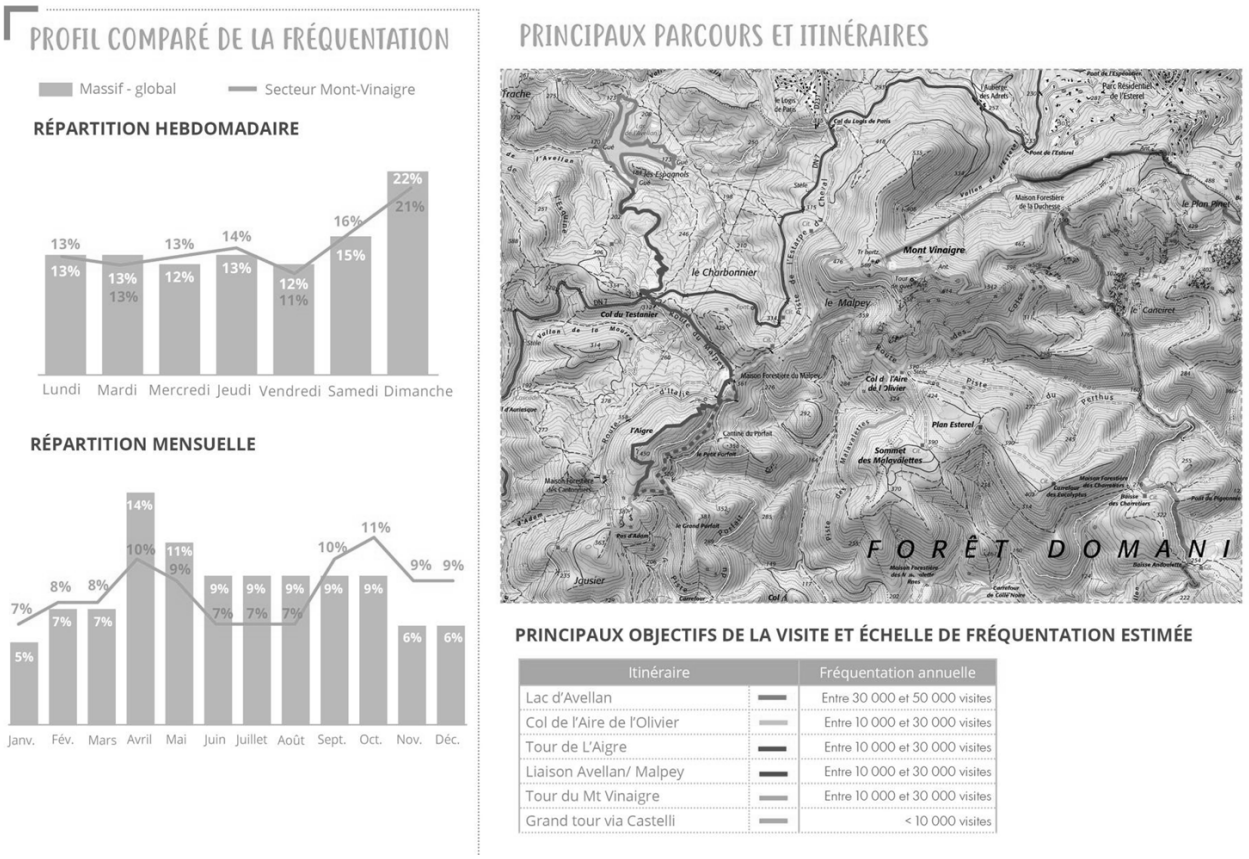


Figure 1 : Sector analysis example. Extract from the attendance study (SIPME, 2018).

Why count visitors? Twenty years of experiences on visitor monitoring in Finland's protected areas

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Introduction

Protected and recreational areas are increasingly significant visitor attractions, and information on visitors is a necessity for the successful management of these areas. Visitor information is essential in ensuring the protection of nature and cultural heritage, quality recreation experiences, sustainable tourism development, and showcasing the benefits of protected areas.

This paper presents the Finnish case of visitor monitoring as implemented by Parks & Wildlife Finland (P&WF) in national parks and other protected areas. We give an overview of the entire visitor monitoring process from data collection and storage to using the data in reporting, management and decision making. P&WF is a unit within Metsähallitus, managing Finland's national parks and other state-owned protected and recreational areas.

Material and methods

P&WF established a national visitor monitoring system of parks and protected areas in late 1990s (Horne et al. 1998, Erkkonen & Sievänen 2001). Visitor monitoring activities include visitor counting and visitor surveys. With visitor counting one obtains estimates on the amount of use, whereas with visitor surveys one can obtain more descriptive information e.g. on the types of visitors, their recreational behavior, motives, needs, opinions, expenditures, and perceived health benefits. By combining these two types information, one can draw a much more diverse picture of protected area visitation than with either one type of information alone.

For visitor counting, P&WF uses mostly data storing electronic people counters located at main entry points. In some areas, where roads capture the visitor flows well, data storing electronic traffic counters are used. The point specific visitation counts obtained by electronic counters are extrapolated into area level visitation numbers by area coverage percentage (Kajala et al. 2007).

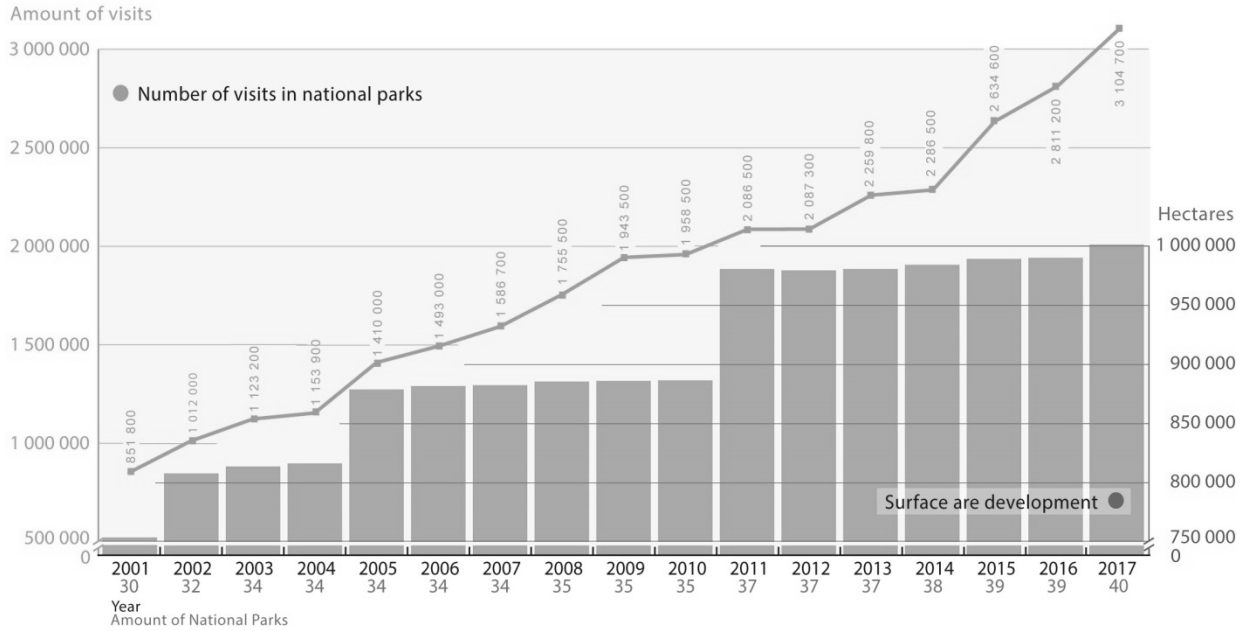
Visitor surveys are implemented by P&WF as standardized on-site guided surveys (Kajala et al. 2007). The sampling aims to be as close to a random sample as possible, yet taking into account the limitations brought by resources and demanding circumstances out in the field. The questionnaire is four A4 pages (a folded A3) and visitors are asked to fill it towards the end of their visit, ideally when they are exiting the site. The interviewer is available for questions and further information, but typically respondents fill out questionnaire independently. Each protected area with significant recreational use is surveyed on average every five years, which means annually close to ten surveys to be administered across Finland.

For data entry, storage, management and reporting, P&WF uses ASTA visitor information database system, which has been in use since year 2006.

Results

P&WF reports visitor monitoring results for each area, but also as national statistics. The reports on visitor counting, visitor spending effects and health and well-being effects

perceived by visitors are published annually in January separately for each protected area and as cumulative national figures (Metsähallitus 2018a, 2018b, 2018c).
Visitation to Finnish national parks shows a significant increase over the period of last 17 years (figure, Metsähallitus 2018a). Parallel to the increase in national park visitation, the visitor spending effects have increased even more rapidly. Year 2010 the local economic impacts of visitors' spending to 35 national parks were 108.9 million euros and year 2017 with 40 national parks, they had almost doubled to 206.5 million euros. According to the P&WF assessment 1 € investment in national parks and other key protected areas results on average in 10 € return to local economies (Metsähallitus 2018b).
P&WF also monitors the health and well-being effects perceived by visitors. Visitors to Finland's national parks estimate their health and well-being benefits to around 100 euros (median) per visit. With 3,1 million visits to Finnish national parks year 2017, the total health and well-being value as perceived by visitors is roughly 310 million euros (Metsähallitus 2108c).



The development of the number of visits to Finland's national parks, the number of parks, and the surface area of the parks during years 2001–2017. N.B. In addition to the apparent increase in the popularity of national parks, the number of visits has increased due to enlargement of existing national parks as well establishment of new national parks.

Conclusions

When visitor data is gathered in a uniform and systematic manner, it provides possibilities for diverse analyses, reporting and comparisons, both across areas and across time, and at different levels from local to regional, national and international (Hornback & Eagles 1999, Kajala et al. 2007, Kajala & Karoles-Viia 2016). The experience of P&WF is that this kind of information is essential not only for planning and management, but also for well-informed policy making (Kajala 2012).

P&WF is actively developing its visitor monitoring methodology. For example, year 2018, remote reading counters and digital collection of visitor survey answers on-site will be piloted in three national hiking areas. P&WF is also cooperating with researchers to study the potential of evolving technologies, e.g. social media, in providing complementary visitor information (Heikinheimo et al. 2017, Tenkanen et al. 2017). However, in the term monitoring there is embedded the idea of inflexibility; no changes should be implemented into the methodology without a careful analysis of how methodology might influence the data, if one is not to lose the comparability of the data.

The amount of recreational use of protected areas is a fundamental basic information for any protected area. If one was to select only one single indicator of visitor use in protected areas, in Finland at least it would be the amount of use. As seen from the examples above, number of visits is a useful indicator alone, but also a necessity for any additional calculations on effectiveness. Even though establishing and maintaining a comprehensive visitor monitoring system requires significant investment in both time and resources, P&WF managers think that this investment is not only useful but a necessity for successful management as well as for showcasing the benefits of the protected areas.

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Monitoring recreational use in protected natural areas. Alt Pirineu Natural Park 2011-2017. Spain

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Introduction

The management of public use and the promotion of sustainable tourism are two of the main concerns of protected natural areas. Regarding the planning and management of the public use of these areas, it is essential to gain further knowledge of the characterization and monitoring of the recreational, sporting and tourist demand that takes place within their boundaries. Despite the appearance of new methods to monitor public use in these areas, eco-counters and questionnaires are still reliable monitoring tools. During 2011, a technical study was carried out in the Alt Pirineu Natural Park to assess the number, distribution and characterization of visitors (Farías, 2011). Six years later, in 2017, a detailed study was carried out with the following aims: to review the data collected in 2011; 2) to assess the changes related with the use made by the visitors of this area; and 3) to advance in the knowledge of other aspects related to visits to the Park, which in this case focused on the direct economic impact generated by visitors in the Park territory. The purpose of this oral presentation is to discuss with the scientific community the results and their application in the monitoring and the management of public use in these areas.

Methodology

The same study methodologies were applied in the two reports (2011 and 2017): 1) estimation of visitor inflow and distribution in the area, and 2) questionnaires on motivations, habits and preferences. Visitor estimation was based on the consideration of nine different indicators: registration time, number of people per group, means of access to the park, direction of travel -input/output-, itinerary visited, activity carried out, crossing/non-crossing and passage/non-passage through the eco-counter). For the questionnaires, 32 questions were considered including five principal dimensions: socio-type, visit characteristics, expenses incurred, motivations for the visit, activity carried out, and itinerary visited. A total of 1,859 surveys were conducted during the two years: 1,150 in 2011 and 709 in 2017, including the consideration of 80 sampling units developed over 18 field work days.

Results

On the one hand, regarding the number of visitors to the area, the results obtained allow estimating 314,000 visitors in 2017, an increase of 100,000 visitors in the period from 2011 to 2017. On the other hand, in terms of the use of the area (distribution) the results revealed visitors' increased dispersion in the area. With the exception of the Sant Joan access point, the rest of the entrances reviewed showed 10 to 20% increased dispersion of use (Figure 1). Furthermore, based on the 1,859 surveys, it was possible to identify the following main changes in terms of use of the area: a higher frequency of visits (average: from 3 to 3.61 times in the last two years); a shorter duration of the visit to the park (average: from 3.20 to 2.60 hours), and a smaller number of people per group (average: from 4.26 to 3.42 people per

group). Moreover, important changes were identified related with the recreational activity carried out during the visit to the park, and shorter walks and activities linked to staying around the entrance point (from 25.3% to 42.6%). Finally, taking into account the identification of an average expenditure of 69.39 euros/visitor/day, a direct economic impact in the area of more than 14,500,000 euros was estimated.

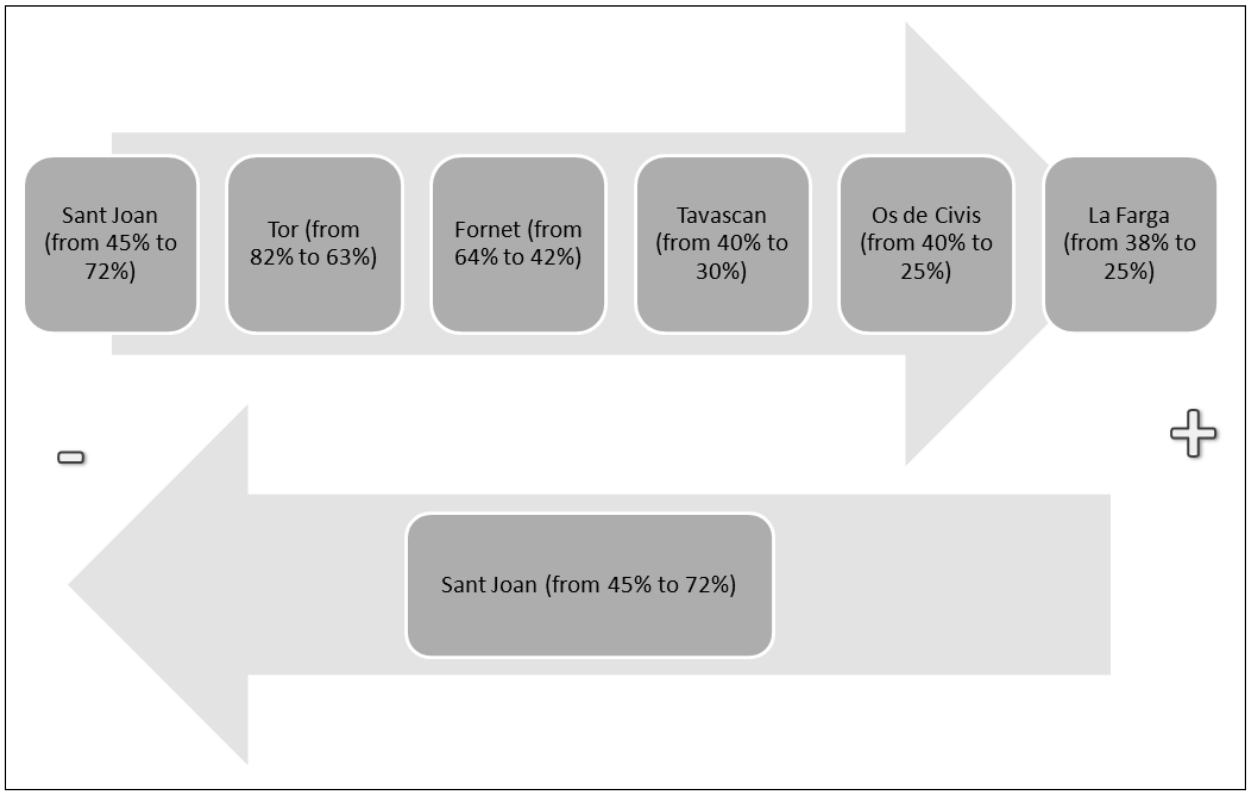

Figure 1. Main changes in terms of dispersion of uses 2011-2017.

Note: Percentages represent the level of concentration of use (number of visitors who use the four main trails at the entrance). The direction of the arrow indicates increasing or decreasing concentration.

Conclusions

This study not only shows that common public use monitoring systems (eco-counter and questionnaires) are still valid systems for tracking the public use of this kind of areas, but also demonstrates the utility of the results obtained by this system for public use management decision-making, both in terms of quantity (variation in the number of visits), as well as in terms of distribution and visitor behaviour (activities, trail visited, etc.). The simplicity and usefulness of the methodology used in the first assessment of the direct economic impact derived from the public use of this kind of areas and the system for tracking dispersion are other contributions of this study.

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“Master of Data” shows some jewels from his visitor monitoring drawer (interesting results from visitor monitoring in Czechia)

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Introduction

Nature Conservation Agency of the Czech Republic (“NCA”) administrates 24 Protected Landscape Areas and several hundreds of National Nature Reserves and National Nature Monuments. Some impact of tourism is visible in those areas not only on protected natural phenomena, but also on visitors’ experience. To assess these impacts, data about visitation rate is essential. Modern visitor monitoring started in 2009 and is performed at about 100 profiles in last years. Although the results represent only natural areas in the Czech Republic, they can serve as a reference to other data or as an inspiration for comparable research in other countries. Such a huge amount of data represents good background for methodological alterations, too. Issues dealing with methodology were presented at MMV8 (Vitek, 2016).

Study Area

The profiles, where visitation is monitored, are spread all over the Czech Republic. They mostly occur on the territory of Protected Landscape Areas, some of them are located in National Natural Reserves or National Natural Monuments.

Methods

Systematic monitoring using automated counters started in 2009 at first profiles and is performed at about 100 profiles in last years. In this abstract, data from 2016 is presented. The oral presentation shows data from 2017. The data is stored in MS Excel sheets, since 2018 in Eco-Visio internet database. “Profile” is the cross-section of a trail monitored with an automated counter sensor.

Results

In 2016, there were 3,280,000 passes recorded at all profiles monitored by NCA. In 2017 it was 3,250,000 passes. Although generally tourism in Czech natural areas increases in past years (at some profiles it redoubled during 6 years), it is not common for all monitored profiles. The highest visitation on a trail was recorded close to the top of the Beskydy Mts. called “Lysa hora” (eastern part of Czechia on the border with Slovakia; 2016: 272,000 passes) and that is one of the 8 profiles, where passes are recorded every single day throughout the year (daily minimum was 34). Maximum visitation in one day was recorded in 2016, July 5th, at Radhost (also in the Beskydy Mts.): 4,534 passes.

In an average, maximum monthly values occur in July and August: those months are the school vacation in Czechia. Nevertheless, some trails are more used during winter (Iser Mts. in northern part of Czechia on the border with Poland). 42 % of canoers recorded on Luznice River (southern part of Czechia) paddled in July, while from November to April it was almost zero. At Mednik (central part of Czechia, some 20 km south from downtown of the capital

Praha), which is known for occurrence of Dogtooth Violet, 33 % of annual visits are made in March during blooming.

Average ratio between “weekend+holiday” and “weekday” visitation in our profiles is 2.52. It ranges from 0.51 (ancient forest closed for public) to 12.36 (researched cave). Significant differences between profiles were detected also in visitation during average day (see Fig.). Typically it forms “lunch saddle”, when visitation temporarily decreases after midday.

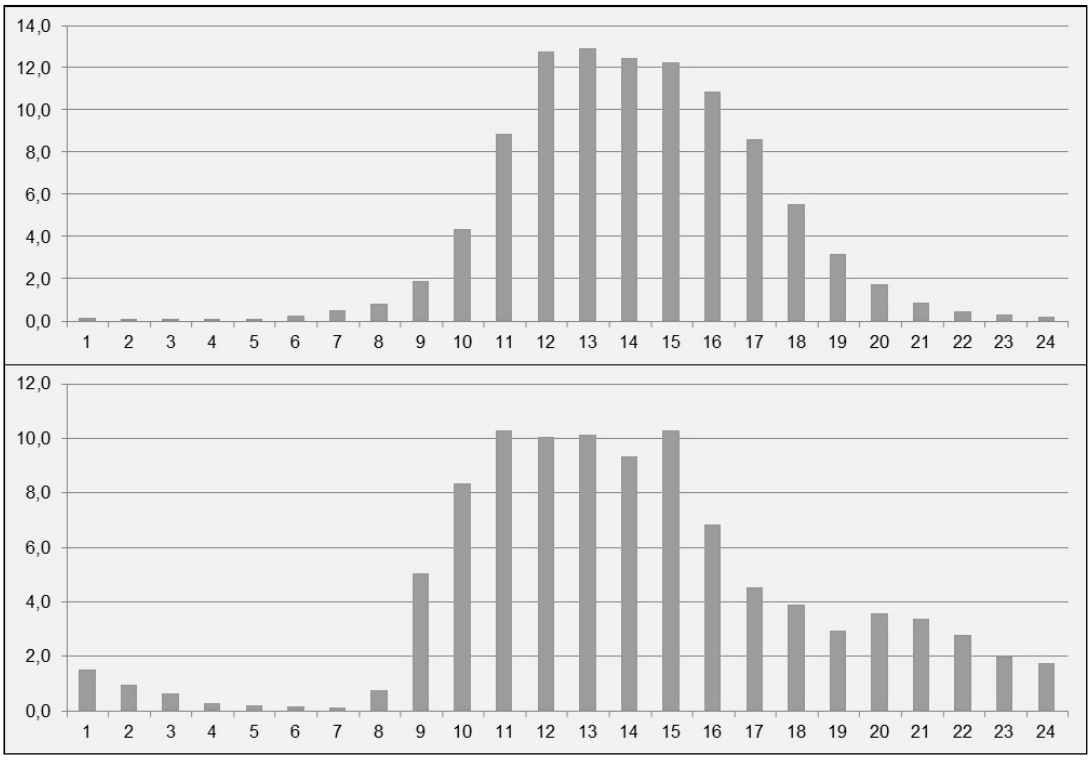

Figure: Average day visitation from all profiles (above) and from a profile with highest equability (below). X Axis: hour, Y Axis: Percentage ratio between hour total and daily total.

Conclusions

Over 3,000,000 passes recorded every year give the possibility to assess natural areas visitation by statistical methods. However, researchers are not interested to cooperate in this topic yet and NCA has not got sufficient capacity to perform detailed statistical analysis. The data is not open to public; it could be obtained upon request.

Visitor monitoring will be continued in the next years. Decreasing amount of available finances results in a decreasing number of monitored profiles. Visitor monitoring brings important information for planning, decision-making and maintenance of protected areas. NCA shares know-how among own employees as well as among National Park Authorities and visitor monitoring companies through organising professional seminars, that usually take place each year.

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Monitoring System of Tourist Traffic (MSTT) in Stołowe Mts. National Park in SW Poland

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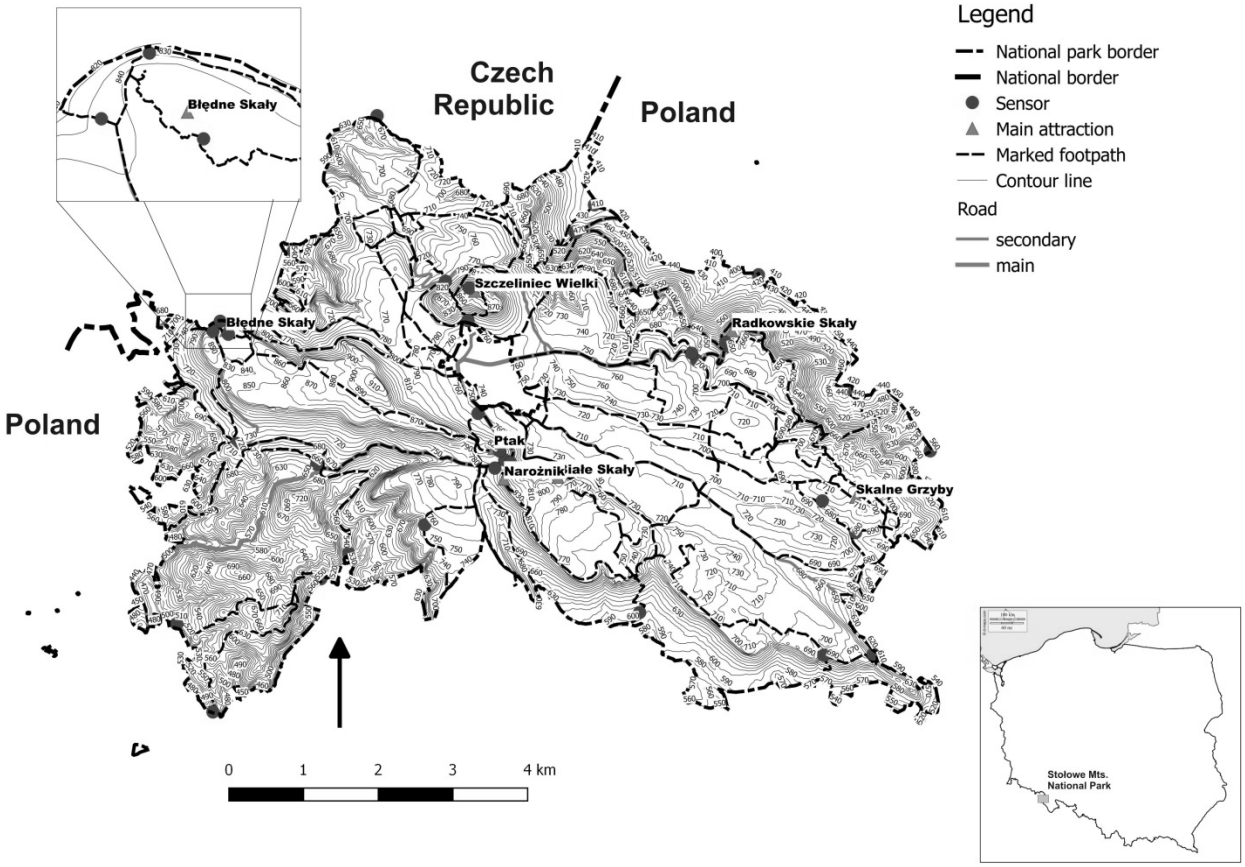
The Stołowe Mts. National Park (SMNP) is located in the Sudetes Mts. in South-West Poland, on the border with the Czech Republic. The total area of the SMNP is 6,340 ha and there are around 100 km of marked hiking trails. Until recently, statistics on the number of visitors in the SMNP were inaccurate and based exclusively on the sale of park entrance fees. Thus the volume of tourist traffic was estimated at the level of ca. 450 thousand visitors annually.



Map 1. Location of Stołowe Mts. National Park and sensors within

Methods

The Monitoring System of Tourist Traffic (MSTT) in the SMNP consisted of the following specific objectives: 1) Qualitative monitoring using questionnaire-based data collection of visitors' motivations and preferences; 2) Quantitative monitoring using 38

infrared sensors ("Eco-counters") to count tourist traffic at the entrances of marked hiking trails within the SMNP border. The majority of sensors were installed at the most popular areas within the SMNP, namely at the "rock-cities" of Szczeliniec Wielki and Błędne Skały. The automatic counts of visitors were performed in 2017, and these data were aggregated into daily, monthly and annual reports, taking into account the direction of the visitors traffic on the studied hiking trails, i.e., entries only (IN), exits only (OUT) and total passings (IN+OUT).

Results

In 2017 there were 847,500 visitors recorded totally (entries only) in the entire SMNP. The highest number of visitors were observed in the summer months (July = 190,600 and August = 189,900), which accounted for 45% of the total number of annual visitors in SMNP (Fig. 1). In May and June there were 163,200 (i.e., 19% of annual visitors number) and 130,900 (i.e., 15%) total visitors recorded respectively.

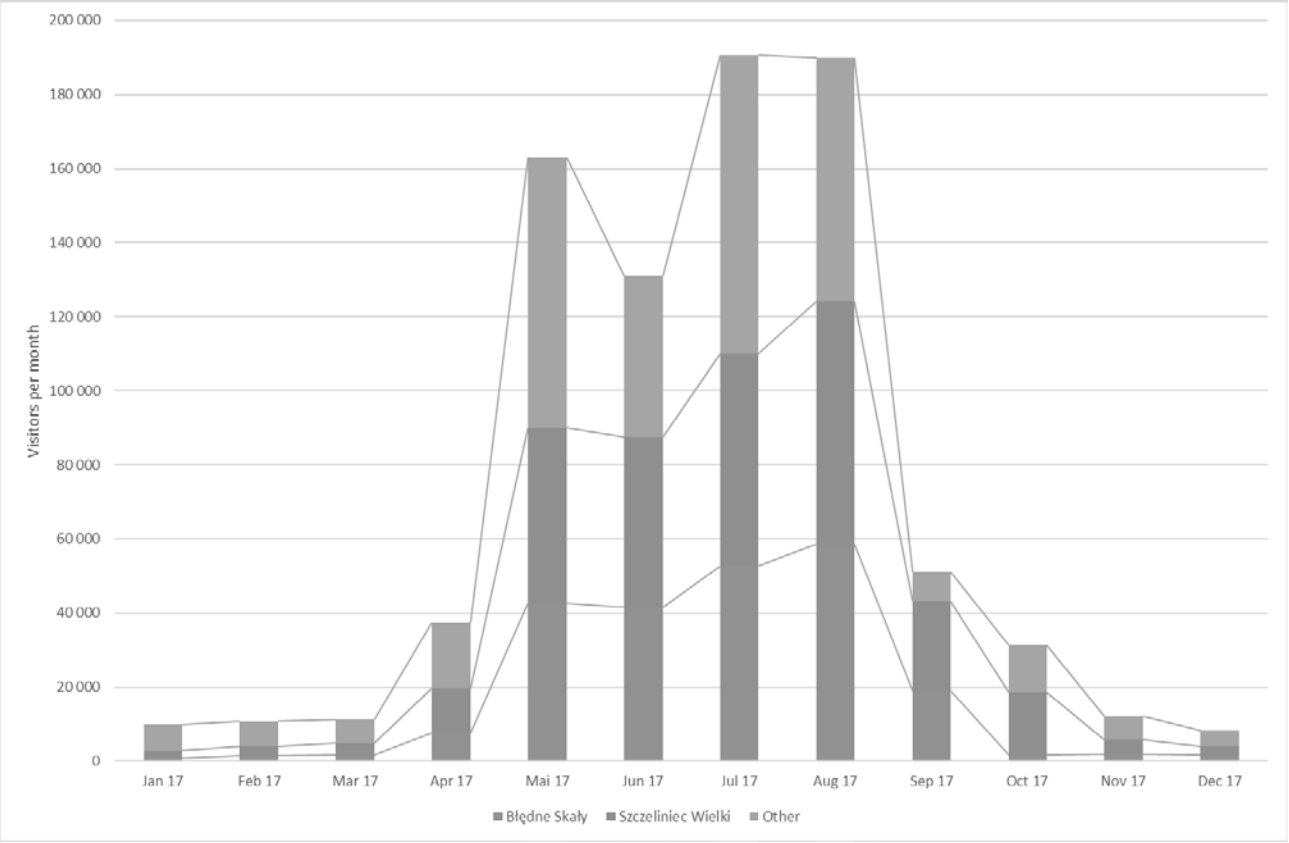


Fig. 1. Monthly distribution of visitors in the Stołowe Mts. National Park (SMNP) in 2017

Seasonal variability of total number of visitors' entries in SMNP allowed delimitation of the tourism season into three periods, i.e., high, medium, and low tourist season. High tourist season was established from May to August. Medium tourist season was established for September, October and April with about 40,000 visitors per month. Low season was represented by the period from November to March with approximately 10,000 visitors per month. Daily numbers of visitors varied substantially. The maximum daily number of visitors exceeded 10,000 on: the 18th of July (14,700), the 1st of May (13,100), the 2 of May (13,100),

the 14 of August (12,200), the 13th of August (11,200), the 15th of August (10,500) and the 15 of June (10,000).

Spatial concentration of the highest tourist traffic was related to the main tourists' attractions in the SMNP. Approximately half of the total visitors' counts were recorded at the summit of Szczeliniec Wielki and the area of Błędne Skały. The number of visits recorded in those two locations was 283,200 and 231,200, respectively in the chosen period. Other attractions within the SMNP borders were less visited: i.e., Narożnik summit (18,700), Radkowskie Skały area (15,200) and Karol's Fort (8,600). The number of visitors' counts compared between the sensors from different locations allowed a spatial calculation of the visitors' frequency in certain areas of the SMNP. The data from the infrared sensors was verified by ticket sales and direct counting. The estimated error is about 10-15%.

The questionnaire survey was conducted within the two most visited spots in the SMNP, namely in the area of Szczeliniec Wielki and Błędne Skały. The survey was conducted in 2015 and 2016, where 998 questionnaires were completed and summarized. The first results revealed relationships between tourist motivations and visit durations in the SMNP, in association with their place of residence. Leisure tourism was the primary motivation to visit the Park for all respondents. Visitors arrived to SMNP from remote regions and stayed in the Park on average from 4 to 7 days. Secondary motivation to visit the Park was to admire the wilderness and pursue active tourism. Tourists visited the SMNP most frequently in the summer (68%) and in spring (37%). This result was confirmed via qualitative monitoring by means of pyro-electric counters.

Conclusions

The Monitoring System of Tourist Traffic (MSTT) developed in the SMNP enabled multidimensional analysis of tourist traffic in that protected area. Additionally, the MSTT became a significant tool in the tourism management in the national park. The main conclusions from the projects are:

- Tourist traffic in the SMNP is characterized by high temporal and spatial variability, including high short-term variations that exceed tourist capacity index;
- Visitors in the SMNP can be divided into three groups: 1) single visitors (20-30 years old) whose main focus while visiting the Park is wilderness, and for whom accommodation location is more important than its standard of quality. The members of this group value high flexibility in planning outdoor trips; 2) families with children whose main focus is "familiary" accommodation, including family-friendly facilities and entertainment; 3) the seniors, who value the comfort and the convenient location and facilities at their accommodation. The main aim of recreation for this group is to rest, take care of their health (motivations related to health treatments and prophylaxis).

Follow-up

The results of the questionnaire survey will be used to prepare recommendations for local tour operators and policy makers in order to create a more suitable tourist offer in the SMNP and its vicinity. Further work using the results of qualitative monitoring conducted by means of the pyro-electric counters will lead to creation of the SMNP visitors' model that will help in forecasting the visitors flows and tourist traffic in the Park. Additionally, the model could

be useful for estimation of illegal dispersion of tourists outside the marked trails within the SMNP.

Acknowledgements

This research has been conducted in cooperation with Stołowe Mountain National Park, supported by Fundusz Leśny (12/2017/DNiPK/UAM

An assessment of interrater reliability from the System for Observing Play and Recreation in Communities (SOPARC) in urban parks in New York City

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SOPARC reliability is affected by features of the target area and by contextual conditions present at the time of observation.

Observations made in playgrounds, during the weekend, or in areas with consistently high user counts, had lower reliability scores.

Introduction

Systematic observational studies in open environments such as parks and playgrounds can be challenging because of the lack of objective measures to quantify visitor characteristics and behavior. Since its introduction in 2006, the SOPARC protocol (Systematic Observation of Play and Recreation in Communities) (McKenzie et al. 2006) has provided an answer to those challenges. SOPARC is based on momentary sampling through periodic and systematic scans of pre-delimited target areas. It provides a consistent method to count large groups of people while they are taking part in often highly dynamic activities without placing a burden on participants (Cohen et al. 2011).

After a period of training, reported overall interrater reliability at counting people in parks using SOPARC has been consistently high (Banda et al. 2014; Chung-Do et al. 2011). However, there is a lack of understanding of how SOPARC reliability might be affected by the factors such as time of day, presence of organized activities or type of target areas, could affect reliability and agreement between observers. This variance might be exacerbated when trying to record combined user attributes such as age and gender or age and physical activity, measurements that have traditionally drawn lower reliability scores (Floyd et al. 2011; Chung-Do et al. 2011; Floyd et al. 2008).

To address this gap, we examine the extent interrater reliability varies across various types of target areas and contextual conditions using 3390 paired SOPARC observations in New York City parks.

Methods

Data gathering

SOPARC observations were taken in 20 New York City parks within a larger study of Physical Activity and Recreation of Children in Communities of Color (PARC[3]). The PARC[3] research team selected a total of 167 target areas within the parks. These included playgrounds, swings and water features, sports courts, and fields. Trained observers used a modified SOPARC to characterize park users according to gender, age group, ethnicity, and phyiscal activity. Each target area was observed four times between April and June 2017 and four times between July and August 2017. Visits were repeated twice for each weekend day during each season and observations were hour-long taken at 10:00, 15:00, 16:30, and 18:00. A total of 4725 observations were taken in pairs. From those observations and following McKenzie's et al. (2006) method, those with at least one person counted by at least one of the raters were analyzed (n=3390).

Measures of reliability

Based on the 3390 paired observations we computed the mean of counts of park user stratified by age and gender. Intraclass Correlation (ICC) was used to determine the reliability between the two observers. A variant of the overall proportion of agreement between observers was also computed. In areas with at least one observer reporting more than 10 people, a 10% discrepancy was allowed and coded as agreement (McKenzie et al. 2006).
Both reliability indicators were analyzed in diverse observation (day of week, time of day, and round of SOPARC), target area (e.g., playgrounds, sport courts, etc.) and diverse contextual conditions (target areas, extent of formal and organized activities, extent of shade cover).

Statistical analysis

Mean counts by gender and age and ICC scores are reported in Table 1. Additionally, we regressed the odds of two observers agreeing on the number of people present in a target area, under each different observation condition. Binary logistic regression models were fitted to estimate the effect of observation conditions on the observers' agreement. Marginal means representing the chance of the two observers agreeing on the number of people in the target area while adjusting for all the contextual variables of the target area are reported to facilitate interpretation (Table 1).

Results

General interrater reliability for the 3390 paired observations was excellent (ICC=0.941). The difficulty of trying to assess gender and age at the same time however decreased reliability of the observations to a range between 0.81 (male 5 to 10 years) and 0.91 (female teenagers). Reliability consistently decreased when observing target areas early in the day (10-11am), target areas where an informally organized activity was taking place, and when observing basketball courts. On the other hand, reliability was consistently better in the afternoon (6-7pm), and in completely shaded areas (except for 5 to 10 and teenage boys).
Analyzing the adjusted marginal means on agreement between observers shows observations made during weekends were significantly less reliable at counting children of both genders from 0 to 10 years old. Having informally organized activities in the target area also was significantly associated with higher reliability when counting both boys and girls between 5 and 10 years old. Counting teenage boys in informally organized activities on the other hand scored lower reliability than in areas without organized activities.

In terms of types of target areas, playgrounds were found to be the areas where reaching agreement was difficult. Reliability when counting children for both genders and between 0 and 10 years old was significantly higher in all areas that were not playgrounds, except for basketball courts in the case of males age 5-10. For teenagers, reliability was significantly lower in swing areas in the case of girls, and in basketball courts in the case of boys. On the other hand, counting girls in basketball courts and teenagers in "other areas" was associated with higher reliability scores.

Table 1: Reliability measures for observation of children in distinct target area conditions.

		0 to 4						5 to 10						Teenagers					
		Female			Male			Female			Male			Female			Male		
	N of scans	Cpo	ICC	Agree[1]	Cpo	ICC	Agree[1]	Cpo	ICC	Agree[1]	Cpo	ICC	Agree[1]	Cpo	ICC	Agree[1]	Cpo	ICC	Agree[1]
Day of week																			
Weekday	2528	0.48	0.86	0.89	0.43	0.84	0.89	0.83	0.84	0.84	1.24	0.78	0.78	0.49	0.93	0.91	1.48	0.85	0.82
Weekend	862	0.70	0.84	0.84*	0.77	0.85	0.83*	1.25	0.83	0.77*	1.72	0.86	0.73*	0.50	0.84	0.92	1.48	0.91	0.81
Time of day																			
10-11am	239	0.38	0.43	0.77	0.40	0.65	0.78	0.55	0.36	0.73	0.98	0.23	0.67	0.12	0.57	0.92	0.52	0.37	0.83
3pm-4pm	1011	0.47	0.87	0.90*	0.47	0.82	0.89*	0.90	0.78	0.85*	1.35	0.84	0.79*	0.44	0.93	0.93	1.36	0.90	0.85
4.30-5.30pm	668	0.53	0.84	0.87*	0.45	0.87	0.88*	0.78	0.80	0.82*	1.19	0.81	0.75*	0.58	0.92	0.89	1.76	0.82	0.81
6-7pm	1471	0.61	0.89	0.89*	0.61	0.87	0.87*	1.10	0.91	0.82*	1.51	0.88	0.77*	0.55	0.89	0.91	1.59	0.89	0.80
Round																			
1	1011	0.54	0.87	0.88	0.51	0.85	0.86	0.89	0.86	0.82	1.40	0.82	0.77	0.50	0.93	0.91	1.55	0.90	0.80
2	995	0.52	0.85	0.88	0.50	0.85	0.88	0.92	0.80	0.82	1.34	0.74	0.75	0.55	0.89	0.91	1.53	0.86	0.83
3	875	0.51	0.87	0.89	0.53	0.86	0.87	0.92	0.84	0.84	1.30	0.85	0.77	0.49	0.90	0.90	1.46	0.88	0.83
4	509	0.60	0.84	0.87	0.56	0.83	0.88	1.10	0.87	0.82	1.45	0.86	0.75	0.36	0.91	0.93	1.29	0.76	0.82
Formally organized				0.88			0.87												
N	3346	0.54	0.86	-	0.53	0.85	-	0.95	0.84	0.82	1.36	0.81	0.76	0.43	0.86	0.91	1.49	0.87	0.82
Y	65	0.08	-	-	0.03	-	-	0.24	-	-	2.31	0.64	-	3.68	0.97	0.74*	1.58	0.76	0.78
Informally organ.																			
N	2803	0.65	0.85	0.88	0.63	0.84	0.87	1.12	0.85	0.82	1.42	0.81	0.76	0.49	0.92	0.91	0.91	0.84	0.85
Y	877	0.02	-	-	0.01	-	-	0.11	0.30	0.90*	1.28	0.77	0.80*	0.45	0.78	0.90	4.19	0.80	0.76*

Shade																			
Sun	1354	0.63	0.82	0.86	0.58	0.82	0.87	1.07	0.85	0.81	1.35	0.82	0.75	0.50	0.92	0.90	1.24	0.83	0.82
Mix	1653	0.50	0.86	0.90*	0.49	0.84	0.87	0.93	0.78	0.84*	1.30	0.79	0.79	0.53	0.90	0.92	1.51	0.91	0.83
Shade	1143	0.44	0.87	0.88	0.43	0.87	0.88	0.79	0.87	0.81	1.44	0.76	0.74	0.45	0.93	0.92	1.84	0.84	0.80
Facility type																			
Playground	809	1.06	0.81	0.79	1.10	0.82	0.78	1.79	0.83	0.72	1.81	0.85	0.70	0.31	0.81	0.90	0.16	0.73	0.94
Basketball	379	0.00	-	-	0.01	-	-	0.09	0.74	0.96*	1.39	0.69	0.74	0.36	0.87	0.96*	4.48	0.78	0.59*
Baseball/Handball	1120	0.03	0.96	-	0.03	0.83	-	0.12	0.61	0.92*	0.49	0.81	0.88*	0.83	0.93	0.93	1.73	0.81	0.82*
Swings	508	0.82	0.85	0.86*	0.59	0.80	0.88*	1.34	0.86	0.78*	0.92	0.83	0.85*	0.82	0.92	0.83*	0.33	0.87	0.93
Water	237	0.50	0.91	0.92*	0.56	0.87	0.87*	0.95	0.84	0.85*	1.16	0.86	0.79*	0.26	0.85	0.92	0.20	0.80	0.93
Other	337	0.24	0.78	0.94*	0.23	0.72	0.93*	0.48	0.41	0.89*	1.61	0.82	0.77*	0.69	0.93	0.92	1.01	0.86	0.83*
TOTAL	3390	0.54	0.86	0.88	0.52	0.85	0.87	0.94	0.84	0.82	1.36	0.81	0.76	0.49	0.91	0.91	1.48	0.86	

Cpo. = average counts per observation

1. Marginal means from binary logistic regressions. Relaxed rule agreement between observers (10% rule)

* Significantly different from reference category. P<0.05. Reference category is always the first category of the nominal variable.

- Insufficient sample size (less than 20 observations per cell)

Discussion

The SOPARC protocol continues to show high reliability across diverse target areas and contexts. Paired observers reached consistent agreement across all categories of gender and age. Similarly, consistent excellent agreement (ICC>0.75) was achieved throughout the majority of target area types and observation conditions. The findings demonstrated that specific attention should be given to observations of large numbers of people, as all observations counting an average of more than 3 people per target area had significantly lower reliability. Other factors such as time of the day and types of target areas should also receive greater attention during training of SOPARC observers. Particularly, observation of playgrounds, with their often-intricate designs and consistently high number of children, should be improved to ensure better reliability.

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New methods for monitoring and management of visitors in recreational and protected areas: lessons learned, benefits and concerns 1

Using Flickr images to assess how visitors value and use natural areas: lessons from a popular natural area on the Gold Coast, Australia

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Introduction

Social media is big including in terms of the amount and type of data available and the number of people posting. For example, the image sharing platform, Flickr, has >75 million users and >6.5 billion publically available images. The metadata associated with these images includes who posted them (user names), when (time and date), text describing the images and geographical information either as geodata and/or text. Metadata from platforms including Flickr have been used to assess total visitation to parks globally (Woods et al. 2013), nationally (Henrikki et al. 2017), and within parks (Walden-Schreiner et al. 2018). These studies found that, although Flickr users represent a small subsample of visitors, their patterns of use can reflect those of the broader visitor community (Henrikki et al. 2017; Walden-Schreiner et al. 2018).

Most previous studies of Flickr analysed metadata and not the content of the images. But the images provide an additional rich source of information including which aspects of the areas visitors value enough to record and share, and how those images are valued by a broader community on the website itself (Richards and Friess 2015). The images can also reflect the sociocultural values of the area such as aesthetics, existences, recreation use, culture and history, as well as the personal history of people in the images. While data on these types of cultural ecosystem services have been hard to collect in the past, they are critical for management including when seeking social licences for changes in use (Chen et al. 2018).

To evaluate the benefits and limitations of using Flickr images to assess visitor use and sociocultural values we are conducting research in a range of popular natural areas. This includes the Spit, an area of beaches, dunes and forest separating the ocean from a major estuary, in the rapidly growing urban city of the Gold Coast, Australia.

Methods

Metadata of images tagged “The Spit” and “Gold Coast” on Flickr was downloaded including user name, title, tags, description, date and time taken, geodata, number of views and a link to the image. After capping the number of images per user to 10, to ensure we did not over represent prolific posters, the metadata for the 493 images was used to determine when people visited including time of day, week day, month and years. Where geodata was available, we also mapped where the images were taken using ARC-GIS.

The content of the images was analysed using 74 categories relating to: (1) where it was taken; (2) when taken; (3) what natural features were in the images; (4) type(s) of recreation activities shown; (5) details of people in image including group size and age; and (6) what built features were shown. The text in the tags was also coded into similar categories, and the number of views compared among images differing in content.

Results

The images show a range of sociocultural values for the Spit, predominantly aesthetics with natural open landscapes including the ocean (70%) and beach (62%) dominating images. Images of recreation activities were also common (58%), but despite the southern section of the Spit containing a range of hotels, a theme park and restaurants, the images self-identified by Flickr users as from the Spit, Gold Coast, focused on nature based recreation. This included water based activities (40%), such as boating including motor craft (17%) and sailing (10%), along with surfing, fishing and swimming. Images of land-based recreation included walking, sightseeing and walking dogs, among others. Sunrise and sunset as well as mid-afternoon were the most common times to take images, with the area popular year round reflecting the suitability of a subtropical climate for nature based recreation.

There were few or no images for some other activities know to occur on the Spit. This included mountain biking and running despite their popularity on the Spit, and no images of activities such as gay cruising or illegal camping. There were also very few images of individual animals or plants indicating that these were not as highly valued among Flickr users of this area.

Discussion

The results highlight the importance of the Spit, Gold Coast for its sociocultural values including aesthetics and recreational use. They also demonstrate some of the benefits of social media platforms for managers including that data has already been collected, is often publically available and covers a range of locations and activities. There are limitations, however, as data may be sparse for some locations, particularly less popular parks and/or activities. The data only represent a subsample of visitors, and hence the patterns of use and values represented in the images are shaped by both the type of visitor posting them and the focus of the website. Finally there can be privacy and ethical issues highlighted recently in public debate about the use of data from Facebook and Strava.

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A management perspective on using Public Participation GIS to monitor visitors

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Academics have frequently used and endorsed the Public Participation (PP)GIS approach for national park management. However, the decision-support potential of PPGIS is mostly described in academic literature, and there is only little evidence of formal agency adoption beyond preliminary PPGIS trials. Globally, Finland has been one of the leading countries in adopting PPGIS, and it has been shown that impediments to adopting place-based tools exist in Finland as well. The explanations as to why regional and environmental planning agencies have not adopted PPGIS methods in their planning processes often point to a lack of government commitment to public participation and consultation in general, as well as lack of skills and institutional motivation to use the data effectively (Brown 2012; Brown & Kyttä 2014; Kahila-Tani et al. 2016). These issues are, however, researchers' interpretations of the constraints and there is a lack of studies investigating managers' willingness and readiness to adopt these methods. Therefore, to promote PPGIS methods to be spread from academia to practise, it is important to study the impediments to the adoption of PPGIS in the public sector.

In this study, we assess the potential of PPGIS approaches from managers' perspectives in the context of visitor use planning in national parks. The aim is to increase the understanding of how the PPGIS method could aid the planning for visitor use in parks and related recreation areas. The research questions of this study are (1) How do the managers of Parks and Wildlife Finland plan the visitor use of national parks, and how could place-based information on visitor experiences support these planning practices? (2) How would managers prefer implementing place-based monitoring of visitor experiences? (3) What are the attitudes of the managers with respect to place-based planning practices?

Interviews with park managers

This research is based on ten semi-structured interviews with representatives from Metsähallitus within its Parks and Wildlife Finland unit. The interviews took approximately one hour each, and focused on visitor management of national parks and the available information related to visits to parks. Moreover, managers were asked to evaluate the usefulness and benefits of place-based information on visitor experiences, based on six thematic maps representing visitors' experiences in Oulanka National Park, one of the most visited parks in Finland. The maps were created based on spatial data collected in Oulanka National Park in 2014 (Pietilä & Fagerholm 2016; Pietilä 2017), depicting the spatial distributions of use, outcomes of visits, special places, visitor perceptions of the negative impacts of tourism (such as littering or crowding), sites where visitors felt unsafe, and development needs regarding the park's infrastructure.

Results and discussion

The potential purposes of place-based monitoring

Managers considered their main tasks related to visitor management to be coordinating visitor use across and within the parks, and optimizing the conditions that visitors encounter in parks. To serve visitor coordination, place-based data could help to define recreation

opportunities from the perspectives of visitors, and could inform where possible conflicts between different types of users take place. To optimize the conditions in the parks, PPGIS could highlight the possible differences in opinions that visitors and managers have with regards to site conditions, enabling the targeting of management actions to the sites most critical to visitor satisfaction. Moreover, managers had some interest in integrating PPGIS tools with the Limits of Acceptable Change (LAC) framework, which would improve the preciseness of this practise.

Implementing place-based monitoring

Reflecting on the maps that illustrated place-based data on visitor experiences, managers prioritized mapping the most concrete spatial attributes which are closely linked to planning site management actions. These attributes represent visitors' perceptions of the negative impacts of tourism, sites where visitors feel unsafe, and development needs regarding the park's infrastructure. From a technical perspective, managers suggested a place-based mobile phone application in which customers could map the above-mentioned attributes while visiting the park.

Attitudes and challenges

This study showed that the managers of Parks and Wildlife Finland are eager to understand customers' experiences and wish to include visitor perspectives into park management. This finding is contrary to suggestions that the lack of commitment to public participation and consultation in general would hinder applying PPGIS methods. According to this study, the challenges related to using place-based data are more connected to handling and taking advantage of the already existing visitor data, and the possibility of integrating the "new type of data" with existing monitoring processes that have received an institutionalised position. Moreover, even though only a few managers raised the issue related to technical challenges of analysing PPGIS data, beyond creating visual presentations, these are potentially important when integrating PPGIS data into planning processes. Therefore, there is a need to further develop professional analysis interfaces that can automatically quantify those spatial attributes that are evaluated to improve the management of outdoor recreation in parks.

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How can we use social media to know more about visitors to natural areas?

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Introduction

Visitation to natural areas is increasing, with millions of visits each year to protected areas globally. A range of methods has been used to monitor these visitors including on and off site visitor surveys, track counters, and camera traps, but these methods can be expensive and provide limited spatial and temporal data (Wood et al. 2013). An increasingly important alternative source of information about visitors is available from social media in the form of user created content (Wood et al. 2013). Millions of people use platforms like Facebook, Instagram, Flickr, Twitter, and Snapchat with billions of posts every year (Kwak et al. 2010; Hausmann et al. 2018), including information about park visits (Wood et al. 2013). Social media data can be used to know more about visitors, such as temporal and spatial patterns of use based on the text, geodata and images posted on these platforms, with much of the data publically available, topical and increasing dramatically (Di Minin et al. 2015; Hausmann et al. 2018). This talk presents the results of a bibliometric analysis of current research on the use of social media to monitor tourism and recreation including in natural areas. Specifically, it assesses: (1) the extent of research on social media, on social media and tourism/recreation, and social media, tourism/recreation and natural areas. This includes assessing (2) when it was published, (3) where it was published, and (4) what disciplines publish on this topic.

Methods

A bibliometric analysis of the research on social media and visitation to natural areas was conducted using the Scopus database of academic publications on 20 March 2018. First, we searched for all publications on social media using the search terms (TITLE-ABS-KEY ("social media" OR flickr OR instagram OR facebook OR panoramio OR snapchat OR twitter OR "volunteered geographic information" OR mapmyfitness OR strava OR gpsies OR geocaching OR wikiloc). We then did a second search adding the terms (AND TITLE-ABS-KEY (Touris* OR Visit* OR Recreation*)) to assess information about social media and tourism. Finally, to focus on research in natural area tourism, the following terms were added: (AND TITLE-ABS-KEY (Park OR Protect* OR Reserve)). We only included journals and conference papers published in English. The number of papers per year, and the most popular journals and disciplines for each of the three searches were extracted from Scopus and analysed in Excel.

Results

The academic literature on social media is large with 54,999 papers and conference proceedings on social media in Scopus (Figure 1). The earliest paper was published in 1941, but the growth in the literature has been exponential since 2008 with 10,521 papers published in 2017. The most popular journals were from computing science, psychology and medicine, including the Association for Computing Machinery International Conference Proceedings Series (1033 publications), Ceur Workshop Proceedings (972), Computers in Human Behaviour (855), Plos One (418), Conference on Human Factors in Computing Systems

Proceedings (380) and Journal of Medical Internet Research (380). Overall, 49% of the social media literature was in computer science journals and 30% in social science journals.
The social media literature for tourism and recreation is much smaller, with only 2,002 publications, just 3.6% of the social media literature (Figure 1). The first paper was only published in 1992, and although publications in the field are increasing, the increase is not as dramatic as that for social media overall. The top five were in computer science, medicine and tourism including Association for Computing Machinery International Conference Proceedings Series (35 publications), Journal of Medical Internet Research (35), Tourism Management (30), Ceur Workshop Proceedings (22), and Plos One (19). The most common disciplines were computer science (39%), social science (31%) and business, management and accounting (24%).

The literature on natural areas was even more limited with only 108 publications, 0.2% of social media literature, with the first paper in 2002. Plos One (4 publications), Applied Geography (3), Journal on Protected Mountain Areas Research and Management (3), Journal of Outdoor Recreation and Tourism (3) and Scientific Reports (3) with the remaining journals having on or two papers. The most common disciplines were social science (32%), environmental science (27%), business, management and accounting (21%) and computer science (21%).

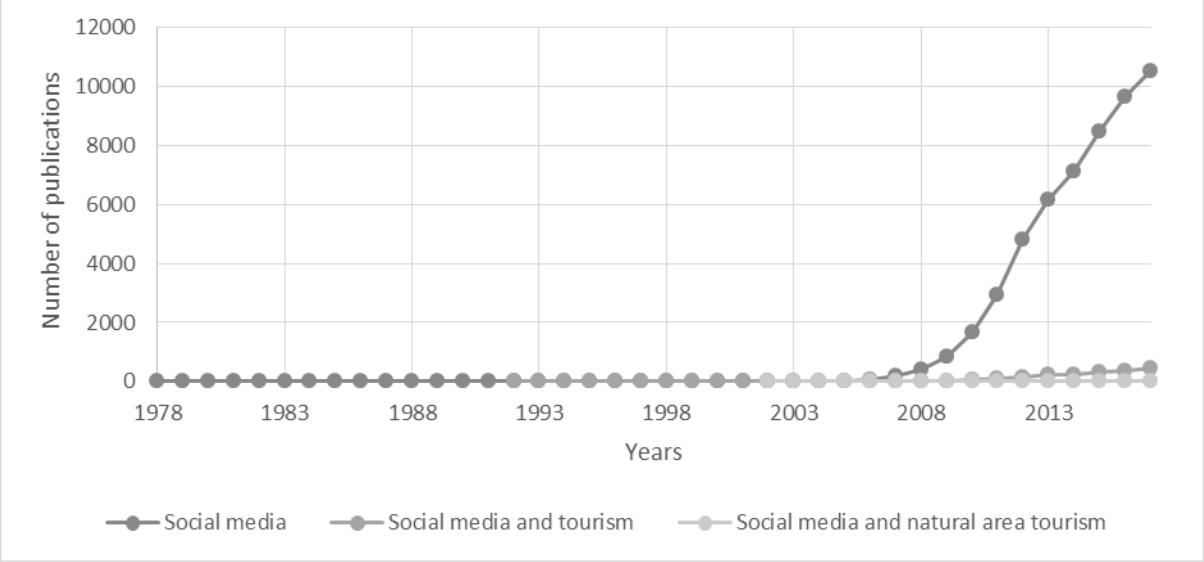

Figure 1. Number of publications per year on social media in general, on social media and tourism/recreation, and on social media and tourism/recreation in natural areas in Scopus.

Discussion

The interest in social media is massive, including in the academic literature, increasing dramatically from 2007 following the launch of several key social media platforms such as Facebook (2006), Twitter (2006), Flickr (2004), Panoramio (2005) and Mapmyfitness (2007). Most of the academic focus has been in the areas of computer science, with other disciplines slower to engage with the effects of social media. For natural area tourism and recreation this is even more apparent, with very few studies despite the obvious benefits of using social media data for monitoring visitors and assessing issues such as how they value protected areas. However, it is possible for managers and researchers to catch up on the social media tsunami by benefiting from the results of the broader tourism and recreation literature. This

includes learning more about the benefits and limitations of social media data for monitoring visitors, such as which platforms and what types of data (text, image, geodata, video, etc.) are most appropriate to use for which questions and why. In the future, the analysis of social media data is likely to affect the monitoring and management of protected areas, just as it affects nearly every other aspect of our lives.

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Monitoring Walkers and Hikers of Madeira Island through web-share services

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Introduction

The popularity of nature-based tourism, recreation activities and natural parks visitation is increasing exponentially worldwide. In Europe, this trend is clearly visible and research on this matter is urgent and of the utmost importance.

The extensive use of recreational and protected areas coupled with the current global tourism trends, demands for rapid and high-quality information on users and visitors, preferably on a low budget. New methods have been developed to fulfil this need, using Web 2.0 and web-share services platforms (PPGIS/GIS) that are frequently connected to APPs and social media. Seeing as these platforms are easily available and both geographic data and social media data are produced voluntarily by its users, it can be used to collect valuable content in an inexpensive way (Pickering *et al*., 2018).

The island of Madeira (Portugal) is one of Europe's main insular touristic destinations, holds a Natural Park which occupies 2/3 of its area. Hiking is the most popular way to visit the park, where the visitors can choose from 28 official paths recommend by the local government and many more recommended by local municipalities. Despite the evidence that nature-based tourism is increasing in Madeira, especially in its main attractions e.g. *Levadas* and *Veredas* (Madeira´s hiking trails), the characterization and monitorization of this touristic product has never been done properly. Sadly, unlike other countries where nature tourism/ecotourism is a well-established touristic product with proper monitoring and developing strategies, little is being done concerning this phenomenon in Portugal (Nogueira Mendes *et al*., 2012) as well in Madeira.

The establishment of a reference situation is therefore the next logical step to take to solve this information gap. To achieve such goal several actions would be required, namely counting and profiling users and monitoring paths impacts and accessibility. Also, it would be significant to identify users' preferences and major incoming markets of Levadas and Veredas hikers. The aim of this study is to explore whether web shared data can be used with the purpose of identifying users' country of residence and compare it with the official touristic data regarding incoming markets of Madeira.

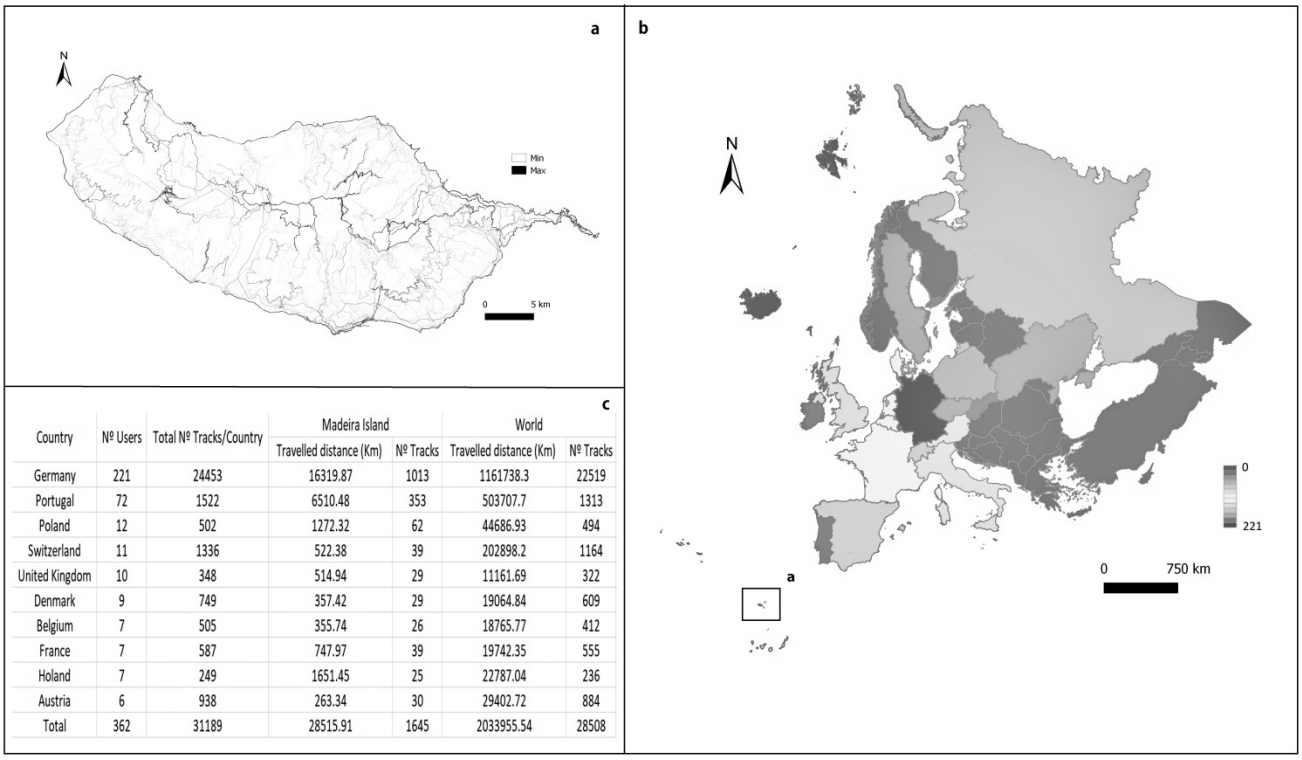
Methods

Following the approach of Nogueira Mendes *et al*. (2014), systematic queries were done on GPSies.com to collect all the GPS tracks available for pedestrian activities on Madeira Island. On a second stage, dedicated searches were done on all GPSies users identified in the first dataset to gather all their GPS tracks. Country of residence, favourite activity, total number of tracks uploaded and date of registration for each user was register. All tracks were later converted into shapefiles into different two datasets and analysed within GIS. Track

information for both datasets included track and user name, length, suitable activity, date of upload and others in a total of 15 different characteristics

Results and Analysis

Overall, 32787 tracks were collected, from 385 users of 20 different countries with a mean of 85 users per country, 16 tracks per user and maximum of 1774 tracks from a single German user. In total, users have upload 29911,94 km of tracks on Madeira island with a mean per hike of 17,16 km. Concerning the rest of the world, together these 385 users have upload 2.221.718,73 km of tracks.



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Country	Nº Users	Total Nº Tracks/Country	Madeira Island		World	
			Travelled distance (Km)	Nº Tracks	Travelled distance (Km)	Nº Tracks
Germany	221	24453	16319.87	1013	1161738.3	22519
Portugal	72	1522	6510.48	353	503707.7	1313
Poland	12	502	1272.32	62	44686.93	494
Switzerland	11	1336	522.38	39	202898.2	1164
United Kingdom	10	348	514.94	29	11161.69	322
Denmark	9	749	357.42	29	19064.84	609
Belgium	7	505	355.74	26	18765.77	412
France	7	587	747.97	39	19742.35	555
Holand	7	249	1651.45	25	22787.04	236
Austria	6	938	263.34	30	29402.72	884
Total	362	31189	28515.91	1645	2033955.54	28508

Figure 1 a) Intensity of the tracks on Madeira's Island; b) Number of users per country; c) Summary table of the top 10 countries on our search

On Figure 1 a), we can clearly recognize many of the emblematic paths of Madeira as is PR1. *Vereda do Areeiro* and PR6. *Levada das 25 Fontes*. Besides the Levadas and Veredas trails, some noise is also detected. There are tracks that are either too long or that cross non-walking areas, others follow the main roads of the island, which is acceptable since submitted information is 100% voluntary.

When comparing the top 10 Countries from GPSies users of Madeira Island with the local statistics from Regional Directorate of Statistics significant differences are found. Our data suggests that Germany and Portugal are the main contributors of hikers, with the United Kingdom placing in fifth place. The same pattern is not observed from the data provided by the regional statistics directorate, where the UK places first as the foreign country which contributes most to the tourism and stays in Madeira Island, followed by Germany and France (Direção Regional de Estatística da Madeira, 2017a, b), suggesting that hiking is not the main activity/motivation for UK visitors of Madeira. This activity seems to be more important for the new incoming markets, such as Denmark and Poland that appear on our top 10 of users' country of origin suggesting that these are not the typical tourists of Madeira,

matching to the growing of nature-based tourism in the island providing new and relevant data.

Conclusion

Further work must be done, to understand if the objective can be fulfilled. Since it is not possible to verify whether the users correspond in fact to the niche of hikers and walkers of the island, fieldwork is the only tool which will allow more conclusions to be obtained. For that reason, to be able to corroborate the data gathered are surveys are being conducted to the users/visitors of the most emblematic and used paths of the natural park of Madeira.

Nevertheless, despite the noise on the information and GPSies.com being a platform with more potential for investigation in Europe, we believe that the results obtained with this work can be very interesting.

To conclude, we trust that this work can contribute to the beginning of a serious monitorization of all the paths of Madeira. It provides the regional government, the park authorities and other stakeholders the first insight into what is really happening on the *Levadas* and *Veredas* of the natural park of Madeira.

Acknowledgments

This paper was made possible with the support of CICS.NOVA - Interdisciplinary Centre of Social Sciences of the Universidade Nova de Lisboa, UID/SOC/04647/2 013, with the financial support of FCT/MCTES through National funds.

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VGI crowdsourcing of recreational use patterns and experiential place values for national park planning in Denmark

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Introduction and study purpose

A growing number of studies are exploring new participatory mapping approaches focused on visitor monitoring for protected area planning and management. Such participatory mapping approaches make use of different types of Volunteered Geographic Information (VGI) derived from e.g. public participatory GIS (PPGIS) and social media activities. In general, the potential of such approaches are believed to be promising in terms of revealing recreational use patterns and experiential place values. In addition, studies have documented good accordance between social media activities and official visitor counts, highlighting the potential of rapid and inexpensive social media based visitor monitoring for protected areas (Wood et al 2013, Levin et al 2017, Tenkanen et al 2018, Walden-Schreiner et al 2018). However, challenges and limitations of such data sources have also been identified including issues of representativeness such as digital divide (Goodchild 2007) and missing socio-demographic information, upload errors and mapping errors, and diverging patterns between social media and officials statistics in less visited areas (Levin et al 2017; Tenkanen et al 2018). In general, there seems to be a call for more empirical studies exploring VGI approaches for visitor monitoring in protected areas.
This study seeks out to explore and discuss the potential of VGI approaches by triangulating findings between three PPGIS surveys with different sampling strategies, and findings from a social media VGI study of Flickr photos. Finding from all four studies are focused on a fjord landscape in a new national park situated in Roskilde, Denmark.

Elaborated case presentation

The case study area is a fjord landscape of Roskilde (water area of 60km^2, 99km coastline). The fjord is a key part of a new national park (2015) around Roskilde city called 'Skjoldungernes Land' with a clear reference to the Viking age. The part of the Fjord included in the park is well-known for its rich water bird life and the Viking ship museum. National parks in Denmark are rather new (first national park inaugurated in 2008), and they are generally characterized as rather multifunctional cultural landscapes with multiple ownerships and relatively low protection. Besides the fjord, the national park in Roskilde includes woodlands, farming landscapes, cultural heritage, urban areas, and outdoor museums.

VGI approaches

This study makes use of data derived from four different VGI approaches. The four approaches are all summarized in Table 1 with focus on both methodological issues and a brief description of highlights and problematic issues.

Table 1. Overview of visitor-based VGI approaches in the study area (Roskilde Fjord). *data collection is still ongoing and hence the number of participants and mapped places are the minimum. **Harvested Flickr data will need cleaning of upload errors before summarizing.

Study #	Source	Focus	Sampling	#respondents	Mapped places (and routes) in case area	Highlights	Problematic issues
PPGIS #1	Extract from national panel survey	Waterside and water-based recreation	Participants recruited through a panel (gender and age representative at regional level)	93	119 (20)	Recreational use patterns and main activities	Representativeness concerns related to recruiting from a panel. Sampling size. No international tourists
PPGIS #2	Extract from national crowd-sourced survey	Marine recreation (specialized activities)	Participants recruited by invitations to organized users, i.e. members in (clubs) and self-organized members (facebook groups)	96	170 (13)	Recreational use patterns and spatial data on a diversity of marine activities (sailing, kayaking, surfing, hunting, fishing, etc)	Representativeness concerns (age and gender). Sampling size. No international tourists
PPGIS #3	National park survey focused on eco-tourism develop-ment	Mapping of self-expressed experience qualities and park narratives (qualitative PPGIS)	Local users recruited by invitations through national park media, and through local associations	69*	261*	Spatial perceived attractions as 'favorite places', 'places you would show to a guest', and 'the heart of the park' enriched by elaborated argumentations (open questions)	Representativeness concerns. Sampling size. No tourists.
Social media VGI	Flickr	Digital photos	Extract of geocoded photos from the Flickr API	(**)	(**)	Spatial patterns of actual visitation. Content analyses of experiential place values (photos and tags). Temporal data.	Representativeness concerns. Possible misinterpretation. No socio-demographic data. No division between locals and tourists.

Results and conclusions

Recreational use patterns

Overall the four VGI approaches seem to confirm each other in identifying the main recreational use patterns in terms of visitation hotspots and cold spots in the study area. Mapping of places from all VGI approaches are foremost clustered in waters near recreational harbours next to urban communities, as well as clustered along accessible parts of the coastline (public roads/trails, viewpoints, and boat jetties). However, deviations

between the VGI approaches were also present. No official visitor information is available; hence it's not possible to compare these results with external data.

Experiential place values

The extracts from the crowd-sourced national PPGIS survey on marine recreation (PPGIS #2) revealed a diversity of marine recreation activities on the Fjord. Furthermore, the qualitative PPGIS approach (PPGIS#3) highlighted bottom-up perceived attractions by rich individual place-based expressions and narratives which overall was somewhat comparable to content analysed categories of photos from Flickr.

Planning implication perspectives and conclusions

We argue for the need for building a rigor, scientific, and trustworthy visitor monitoring system of Danish national parks. Such a visitor monitoring scheme is needed in order to secure the basis for a balanced use and protection planning, as well as securing a base for evaluation of the multiple planned programs focused on increasing and improving nature-based outdoor recreation and nature-based tourism opportunities in the coming decades. Danish national parks are challenged by being complex cultural landscape conglomerates consisting of different ownerships, land uses and attractions which are not easily monitored by a single methodological approach. Ideally such a future visitor monitoring scheme will need to cover multiple different visitor monitoring and mapping techniques in order to produce reliable and valid visitor information. We argue for the use of social media VGI and PPGIS in this work. VGI approaches cannot stand alone, but will be able to provide a much needed overview of visitor use patterns and experiential place values. Furthermore, this study shows how using multiple VGI approaches makes it possible to conduct cross-analyses and thereby more reliable results, which is severely needed in times of missing official visitor data of Danish national parks.

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Assessing visitor spatial behaviour in mountain protected areas with crowdsourced photos: Examples from Argentina and Australia

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Introduction

Mountain summits, valleys, lakes, and glaciers are often desirable destinations for a range of nature based tourism activities. However, these ecosystems are particularly sensitive to visitor impacts due to factors such as cold temperatures and limited soil cover and low diversity, slowing recovery from disturbance (Barros et al. 2013; Leung et al. 2011). Effective management of prominent mountains including those conserved within protected areas requires information about the spatial and temporal patterns of visitor use, yet these data are often limited (Newsome et al. 2012). Data on visitors use can be collected using direct observation, trail counters, visitor passes, camping logbooks and personal tracking technology. However, due to constraints such as limited funding and staff, and the remote nature of many mountains, crowdsourced data is starting to be used to complement other sources of visitor data (Levin, et al. 2017). Crowdsourced data includes geotagged photos publicly shared through social media sites such as Flickr. Geotagged images can serve as proxies of visitor numbers, as well as reflect spatial and temporal variation in visitor use. This study explores how geotagged photos on Flickr can reveal spatial and temporal patterns of visitor use for managers of mountain protected areas.

Methods

The study was conducted in two remote protected areas of high conservation value: Aconcagua Provincial Park in the Argentinean Andes, and Kosciuszko National Park in the Australian Alps. Each park is named after a prominent peak, e.g. the highest summit in the Southern Hemisphere, Mt Aconcagua (6962 m a.s.l.) and the highest summit in Australia, Mt Kosciuszko (2228 m a.s.l.). Both parks collect on-ground visitor data. In Aconcagua this includes entry permits and registration books at the main entrances providing data on the number of visitor-days, locations and activities. For Kosciuszko visitor data are collected at entry gates, through park surveys and point counters on roads and trails. These data highlights the popularity of the parks with approximately 40,000 people visiting Aconcagua annually and more than 2,200,000 visits to Kosciuszko in 2016.

Metadata for Flickr photos were obtained using an application-programming interface to select all geotagged photos within park boundaries taken from 1 November 2010 to 31 March 2016. Metadata for the photos included location (longitude and latitude), the date when the picture was taken and uploaded, and user details. Analysis of the metadata was conducted in SPSS and ArcGIS, as well as the distribution modelling software MaxEnt to assess the associations between visitors' spatial distribution and environmental and infrastructure factors.

Results

A total of 981 photos for Aconcagua and 5985 photos for Kosciuszko posted by 130 and 316 users respectively, were downloaded from Flickr. Spearman's rho analyses revealed a significant correlation between the total number of visitors and the number of photos on Flickr for Aconcagua in main tourist season. Also, Flickr data showed clear seasonal differences in visitation, which is consistent with on-ground data. For instance, 80% of Aconcagua photos were taken in the warmer months when there is easy access to the Park. Photos in Kosciuszko showed differences in the popularity of particular locations between the winter ski-season and summer public holidays.

Flickr photos also revealed important spatial patterns with the Kernel and MaxEnt distribution models predicting high use near visitor centres and main trails in both parks (Figure 1). For Aconcagua, winter months showed that visitor use was restricted to the main road and visitor centre, while in summer areas of high use included two main trails to the summit of Aconcagua. For Kosciuszko, photos were concentrated in ski resorts in winter while in summer trails around the Kosciuszko summit were more popular.

MaxEnt models also provide insights into factors influencing visitation patterns. For instance, during the summer in Aconcagua the most important explanatory factors predicting use were formal trails (permutation importance of 81%) followed by buildings (9%). During winter months, buildings (64%) were most important followed by informal trails (11%). In addition to infrastructure, some environmental variables such as slope contributed over 30% to the model, with more photos on gentle slopes in valleys. Similarly, for Kosciuszko in summer, the most important factors were hardened (27%) and unhardened (11%) trails followed by roads (17%). Winter months in Kosciuszko indicated ski trails (22%), roads (22%) and ski resorts (21%) were most important, but not environmental factors.

Discussion

Results demonstrate how social media data complement on ground visitor monitoring, providing spatial and temporal information on visitor use for site-specific and park-level management of protected areas (Hausmann et al., 2017). Flickr data were an effective proxy for visitor counts as well as providing detailed information about spatial and temporal patterns of use. The ability of social media data to highlight patterns of dispersion and hotspots demonstrates its potential for other areas where there is limited or no data on visitor use, including remote areas. Further analysis including of the content of the photos could indicate not only were photos were taken, but also which aspects of the parks visitors value.

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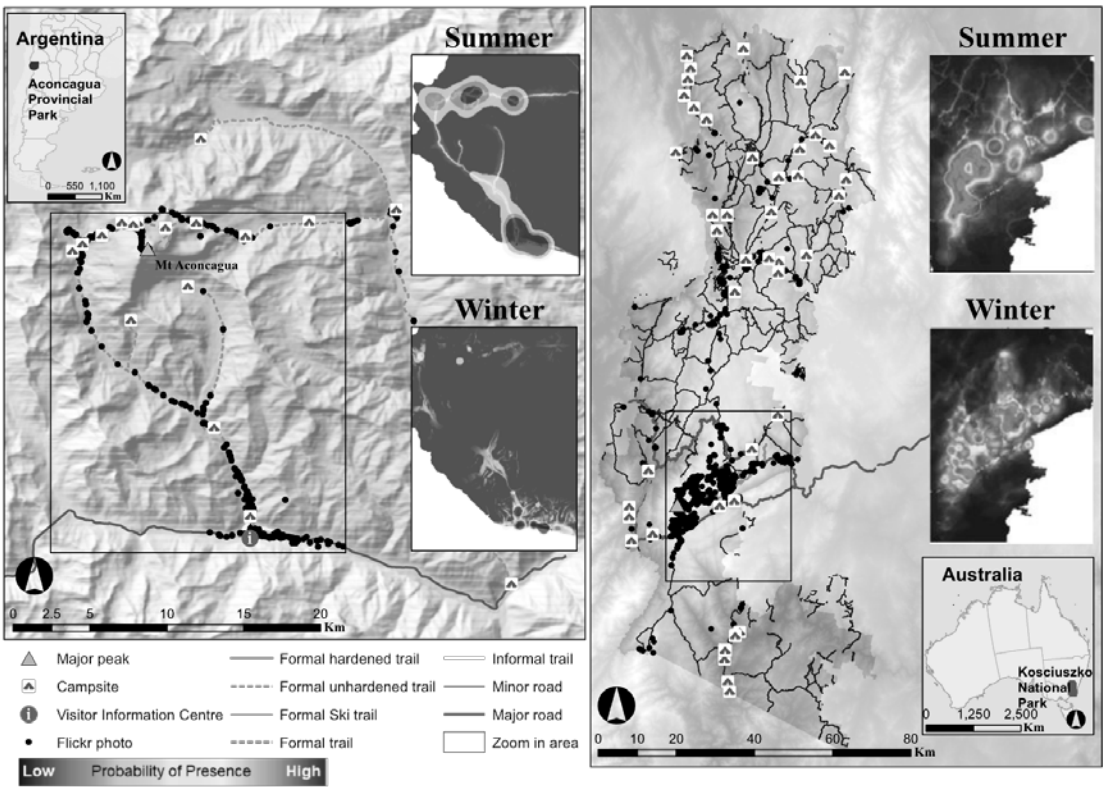

Figure 1. Location of Aconcagua Provincial Park and Kosciuszko National Park showing Flickr photo points. Zoom in area for both parks shows the Kernel density analysis over the MaxEnt visitor usage probability models based on presence of photos.

Outdoor sports and environmental controversies

Collaborative management methods for outdoor sports in the Vanoise National Park

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The Vanoise National Park (PNV) was created in 1963. Following a new law in 2006, a territorial project, the charter, was drafted and then approved in 2015. At the end of this process, only two municipalities adhered to the charter. Political relations between the structure and the territory strongly deteriorated, leading to a boycott of the governance bodies by the local mayors. An audit-mediation process was launched, supported by the Savoie County Council, to identify ways to emerge from the crisis. 17 projects were identified as requiring collective management to restore dialogue. Among these 17 projects, one that was validated involved the cohabitation between outdoor sports and biodiversity.

The PNV's special regulation, laid down in the decree of 21 April 2009, allow many types of outdoor sports and recreation, individually, collectively or competitively. Some can be practiced freely, while others are governed by specific regulations or are only possible with an individual authorization. Finally, the charter prohibits some new activities such as base jumping, canyoning, or the usage of drones. Recent changes in some sports including in their popularity requires the PNV to strike a balance between a policy of welcoming new activities inside the Park while balancing the risks incurred for the character of the Park and the tranquility of its wildlife.

Regarding free flight in particular, a collaborative process was launched in 2010, in order to establish regulations for flying over the heart of the Park by non-motorized aircraft such as paragliders, hang-gliders and gliders. Following discussions with local clubs and the federations concerned, regulations were adopted in 2011 and have been applied since. It authorizes free flight and gliders to fly over certain sites in the heart of the Park during certain times. The regulations also authorize paragliders to take off from specific summits to enjoy mountain flights, providing that a previous individual authorization has been issued. In addition to the regulations, a system was also designed to be based on partnership agreements between the local paragliding clubs and the Park in order to maintain a close relationship (activity reports, practitioner awareness raising, information on site, etc.). Only the Aussois paragliding club signed this agreement. In the field, Park employees witness violations of this regulation by paragliders and glider pilots fairly regularly. The Park's objective is therefore to form or re-form relationships with the local actors (clubs and federation) in order to propose a collaborative management of the sports in its territory.

In this paper we assess the consultation process implemented by the PNV including focusing on the environmental management of outdoor sports and of free flight. In recent years, consultation has become the key word in environmental policies (Beuret and Cadoret, 2010). This evolution in public action has been illustrated by a change in the spirit of democracy (Blondiaux, 2008), giving new importance to citizens' participation versus representation. Consultative management can be defined as "a process in which the actors commit to manage together one or several properties, spaces or territories that they share or to influence the acts or decisions that have a determining impact on the future of these common goods" (Beuret, 2006, p. 73). Having fueled specific environmental controversies, outdoor sports have not

escaped from this development of consultation (Mounet, 2007). At the local scale, a wide range of initiatives have been undertaken to attempt to reconcile use without having recourse to authoritative arbitration (Rech and Mounet, 2014).

As we have shown (Gayte et al., 2003), the implementation of collaborative management consists in moving away from a conflictual situation towards the construction of spaces for negotiation in which the actors cooperate together, "accepting to make concessions towards their partners in interaction if necessary " (Friedberg, 1993, p. 157). One of the prerequisites to this approach is the analysis of the logics of the actors present, in order to reveal the conflictual elements but also the possibilities for agreement. According to Friedberg (1993, p. 22), organizational analysis is a prerequisite for any action of change, since it represents a diagnosis that makes it possible to help the actors concerned "to better situate themselves in their field of action and to better measure its constraints." These analyses therefore make it possible to propose mediation solutions to the managers of protected spaces.

The methodology involves semi-directive interviews with sports and tourism actors. The themes addressed in the interviews focused on the activities developed by the actors, their strategic positioning, the relationships they have with the other actors in the territory, their perception of the effects of human presence on the wildlife, their acceptance of the regulations, and their opinion of the actions deployed by the Vanoise Park.

In the framework of this paper, we will present the results of the analysis of the logics of the actors.

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Snowmobiling and free riding in the Jämtland mountains, Sweden

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Introduction

A large body of international research has shown that stakeholder conflicts remain an important obstacle to the sustainable management of landscapes, including those of high natural value (Adams et al., 2003; Manning, 2011). There are several dimensions to the multi-functionality of landscapes, often apparent when multiple land uses overlap in the same area as well as when multiple interests in the same use-practice emerge. This may lead to conflicts over land use with one example being snowmobiling and free riding outside the trails (Vail & Heldt, 2004). This project investigates conflicts over land use in the context of the Jämtland mountain region, Sweden where tensions due to snowmobiling and free riding are increasing. The study takes a planning and management perspective. The research questions are:

- How is snowmobiling and free riding considered by planning, management and other stakeholders?
- What kind of developments can be identified; why?
- How are different planning and management strategies regarding snowmobiling and free riding discussed or implemented?

The increasing popularity of snowmobile tourism and outdoor recreation contributes to local and regional growth, but there is nonetheless a need for balanced resource uses (Heldt & Heldt Cassel, 2007). In the Jämtland mountain region, the snowmobile club in Frostviken has launched a project to provide special areas for free riding of approximately 30,000 hectares while also seeing to the preparation of trails. One of the project's partners is the *Swedish Environmental Protection Agency*. The goal is to promote sustainable tourism where the development of snowmobiling activities would be done with consideration to environment and stakeholders. The project stems from increased pressure (e.g. conflicts between users, security issues and wear on nature) due to snowmobiling off the trails. The challenges at stake are many: landowners have complained of destroyed forest plantations, there have been incidents and accidents, drivers have lacked knowledge etc.

Conflicts can be defined as goal interference attributed to the behavior of someone else – as is the case with free riding. Conflicts can arise when different types of land use interests are pursued at the same time in the same landscape. Although landscapes can accommodate different types of land users without creating a conflict, this can change if: (1) land-users change their behavior or activity, (2) land users increase their use in time or space, or (3) new land-users appear in the area. In addition, conflicts can arise if a resource is depleted or if regulations or perceptions change.

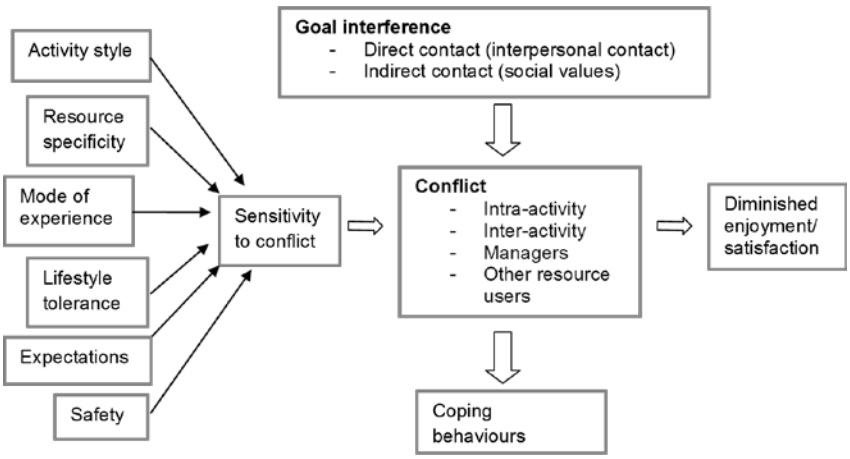

Figure 1. *Conflicts in outdoor recreation* (adapted from Manning 2011, p. 216).

To handle conflicts, it is critical to look at the specific process through which particular conflicts arise. Stakeholder conflict has received significant attention in tourism and outdoor recreation research, often explored through the theoretical lens of sociology (e.g. Ewert et al., 1999). In such context conflict has been described as a struggle between individuals or groups, often due to limited access or rivalry of opportunities over resources. Manning (2011) has synthesized this research into a model of participant and stakeholder conflict (Figure 1).

Method

This study serves to examine the dynamics of conflict behind snowmobiling and free riding in the mountain region of Jämtland, Sweden. The study consists of a web based survey that generated responses from 862 snowmobilers in the region in 2015. Organizations and snowmobile clubs distributed the survey through social media. In 2015, twelve semi-structured interviews were carried out with fifteen representatives from the public sector and the tourism industry. Moreover in 2018, additional interviews will be conducted. The study is also based on information found on webpages and in local media.

Results

According to the survey, a majority of snowmobilers value free riding as important (16%) or very important (58%). The respondents of the survey regard free riding established on public land as positive. However, snowmobilers are unsure if such areas would actually be large enough; there are different opinions regarding the benefits of having free riding areas. Some of the respondents believe that the state should provide with such areas and not just leave the responsibility to the private landowners. Some of the respondents say free riding areas would help reduce conflicts related to reindeer husbandry and nature conservation. At the same

time, there is anxiety that concentrating snowmobiling to delimited areas would disturb the local population. Nevertheless, free riding also creates contradictions within the user group itself or as one of the respondents stated in the survey: "*Some do not respect the ideal work of the snowmobile clubs and destroys for everyone else*." Finally, restrictions of movement due to nature conservation leads to conflict according to snowmobilers.

The interviews reveal, among other things, that free riding has increased in the region. This cause conflicts. There has been a change over time; from being a mean of transport, the snowmobile has become the main activity in itself. The snowmobile is also an identity marker of the landscape and represents an important financial resource. Safety is an increasingly important issue. Zoning regulation is regarded as one tool to handle conflicts but a holistic approach will have to prevail over individual solutions.

Conclusions

Handling conflicts is of special relevance for authorities at all levels involved with questions of planning and management. The same goes for stakeholders with special land use interests in the Jämtland mountains, such as those involved with reindeer herding, tourism, outdoor recreation, conservation and energy production. There has been a new development of snowmobile activities for planning and management to handle in the Swedish mountains, not least in terms of conflicts but also because of security issues e.g. avalanches. From the model presented above, one can get a deeper understanding of the conflicts and the reasons behind them. Nevertheless, more knowledge is needed about the different strategies of planners, managers and other stakeholders as well about the users and the underlying social motives behind their attitudes and activities. To handle conflicts related to snowmobiling and free riding will require continued dialogue, negotiation and further research.

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In-depth knowledge of visitors: a key element to awareness raising in the context of environmental controversy in protected areas.

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The practice of outdoor sports has massively increased since the end of the 20th century. According to a survey lead in France in 2011, 25 million people practice an outdoor activity (Thiery, 2013). However, as practitioners seek contact with nature, their activities bring them to the great outdoors where the increased human presence is causing more pressure on the environment, including on wildlife.

Contrary to obvious impacts such as those caused by infrastructure (ski lifts etc.), it is difficult to comprehend the impact of the activities themselves (Mounet, 2007). This is especially true for wildlife since responses to disturbance include a modification of habitat use and physiological and behavioural responses (Marchand et al. 2014), consequences that are not necessarily observable on the spot but also not observable at a shorter term. Indeed, impact studies often represent a long and costly process which implies that factual data on wildlife disturbance are not always available to recreationists. Nonetheless scientific uncertainty, or at least perceived as such, represent a source of power in the arguments of those who refuse the exclusions from the sites of practice in the context of a controversy between visitors and land managers (Mounet, 2007). This can be illustrated by this quote found on the ski touring website *skitour.fr*: "Someone who skies past a capercaillie probably disturbs it. But it still has to be proven that flying away 5, 10 or 20 times in winter can be harmful to the animal".

Fortunately, there are also, and probably to a larger extent, ski tourers who are more sensitive to wildlife. However, since recreationists are often self-organized they are very difficult to count, to know and to reach, making it challenging for land managers to raise awareness among visitors, and thereby to reduce the potential for controversy.

This talk offers to present the early results of a research lead in three French alpine mountain ranges of various protection statuses with summer and winter recreationists. The aim is to gain in-depth knowledge of these visitors to understand which factors determine their perception of wildlife disturbance. This expertise of visitors will allow managers to improve the actions implemented on the territories and to target them better with awareness-raising campaigns.

Numerous factors will be explored during the course of this research, however for the purpose of this talk, we will focus exclusively on the reasons listed by practitioners as their main motivations to practice the activity and whether or not they believe they can be a source of disturbance for wildlife. The cross-analysis is expected to reveal the following results:

- There are four types of motivations: sport and physical involvement, contact with nature, hedonism and self-growth.
- Visitors who are mainly motivated by the contact with nature will tend to be more aware of wildlife disturbance while the others might not consider their practice as a source of disturbance.

The data that will be presented was collected with ski tourers and snow-shoers during winter 2018 through a questionnaire survey. Data collection took place in natural areas of high human pressure: A Natural Reserve, a Game Preserve, and ordinary nature. Amongst other

topics, the survey questions (1) the involvement in the activity, including the motivations (2) visitors' attitudes towards wildlife in general, including perception of wildlife disturbance. In order to assess the motivations and the attitudes and perceptions we used two scales. The first scale was adapted from Ko et al.'s (2008) consumer motivation in action sports participation. As for the second scale, it relies on Fulton et al.'s Wildlife Value Orientation scale (1996) and on the work of Sterl et al. (2010) on ski touring and attitude towards environmental management in Switzerland.

The questionnaire (q=82) was presented and self-administered to hikers on six sites in three different mountain ranges: Aiguilles Rouges (Natural Reserve), Bauges (Game Preserve), and Belledonne (ordinary nature). The sites were chosen because they are the starting and/or returning points of ski touring itineraries of various levels of difficulty, allowing us to be in contact with hikers of different profiles. 700 questionnaires were collected between January and May 2018.
Expected results include a strong correlation between motivations and the perception of disturbance. Besides, strong interrelations between sociodemographic data (in particular gender, geographical origins, education and profession) and the above mentioned variables should also be expected.

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Riding horses in protected areas – heritage and/or harm?

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Key words: Iceland, equestrian tourism, protected areas, riding trails, natural and cultural heritage

Introduction

Is a trail a scar on the face of earth? Alternatively, is it a wrinkle formed by the experience of lives and land? The answer is in the eyes of the beholder. Riding, as other modes of travelling has impacts that various stakeholders interpret differently. To a rider the existence and condition of the trail signals whether the terrain is passable. A historian may see the trail as heritage; testimony of travel through the ages and an equestrian tourism operator may see it as an opportunity to offer an authentic experience of riding a traditional trail. On the other hand, a nature conservationist may see the trail as harm, as an open sore in the vegetation cover that can bleed soil in the wind and rain, contributing to further erosion. A park warden may see the trail as means of managing the land use of different recreationists in the conservation area.

This paper explores these and other positions through the case of horse riding in Icelandic national parks. The attitude and experiences of managers, horse owners, conservationists, other residents as well as domestic and international riders towards horse-tourism, natural and cultural heritage conservation and the different kinds of riding trails were investigated.

Horses and equestrian tourism in Iceland

The horse is not indigenous to Iceland, it was brought to this mid Atlantic, volcanic island just below the Arctic Circle in the 9th century AD. It was up until the 20th century essential for travel and transport in a rugged, roadless landscape and hence traditional trails across the highlands are still known, visible and valuable as archeological evidence of national history (Björnsson et al. 2004).

Riding is a popular sport in Iceland and the number of horses per person is higher than in most neighbouring countries (Sigurðardóttir & Helgadóttir, 2015b). Horse husbandry still includes the practice of raising foals in herds with the mares, which means that grazing horses are a prominent feature in the rural landscape, both in pasture at the farms and in some areas in the commons or highland pastures (Helgadóttir, in press).

As in many other leisure economies, Iceland has seen a rise in the horse population from a low point in the period after industrialization (Sigurðardóttir & Helgadóttir, 2015b). The increased popularity of equestrianism has led to increase in domestic tourism while the phenomenal growth of international arrivals leads to an increase in the number of horse trips taken by international tourists as well.

Horse tourism is a well-established tourism sector, 15%-20% of international tourists go on a riding tour during their stay in Iceland. Among domestic horse owners long riding in the highlands over the summer months, bringing all their horses along is a popular activity (Sigurðardóttir & Helgadóttir, 2015b). Horse tourism is a form of nature tourism (Hall & Boyd, 2005) which means that riders wish to visit areas of natural beauty, preferably far from the madding crowds. Staying away from the traffic of motorized vehicles is important and

riding on trails made over time by horses are important quality factors for equestrian tourists (Sigurðardóttir & Helgadóttir, 2015a).

Riding in natural settings and protected areas

Equestrian tourist preference for trails described above, puts pressure on the national parks and protected areas as these have limited vehicle traffic and are of particular aesthetic and experience value for visitors. Hence, it is important for the sustainability of equestrian tourism to investigate issues relating to this growth and to what extent it jeopardizes the traditional ways of travelling by horse in Iceland.

The use of land and environmental issues of horse keeping and riding has been a subject of considerable research in recent years in some parts of the world, particularly in Australia and America, where the horse is an introduced species. Examples of such research conducted elsewhere do therefore exist but such research is scarce in Iceland (Schmudde, 2015). Iceland is however a particularly interesting case as although the horse is introduced, the introduction happened much sooner than in the aforementioned cases, or about a 1000 years ago (Björnsson et al. 2004).

Research among guests in short and long riding tours in Iceland, indicated a considerable importance of riding trails on their experience. However guests were more concerned about the length than the safety of the trails (Sigurðardóttir & Helgadóttir, 2015a). Despite the above-mentioned research, considerable information is lacking on the experience and opinion of stakeholders regarding the existence and development of riding trails in natural settings including protected areas in Iceland.

Methodology

The research is longitudinal and mixed method. It draws on surveys of tourists, both international and domestic on the quality of the equestrian tourism experience and their attitudes toward riding in national parks and protected areas. Semi-structured interviews with equestrian tourism entrepreneurs, horse farmers and nature conservationists were used as well as participant observation on long riding tours with own horses. The participant observations are also auto-ethnographic in nature as the researchers are horse owners, who have long experience of travelling by horse in a group of peers.

Concluding remarks

Despite the high volume of horse traffic in Iceland compared to neighbouring countries, the environmental impact of horse riding in Iceland is under-researched. Even less research has been conducted on the social and cultural dynamics relating to horse tourism in national parks and protected areas.

This research addresses this knowledge gap by posing questions about how stakeholders interpret national parks and protected areas as sites for equestrian tourism, and to what extent this is a part of current leisure activities of local inhabitants and international guests and a venue for activities of businesses in equestrian tourism.

The delimitation of this study excludes an important stakeholder group that is other recreationists in the national parks and protected areas. A future research direction is focusses on land-use conflicts of different recreationists as riding trails are commonly used by practitioners of other kinds of recreational activities as hiking and biking.

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Nature sports and environmental impacts : what do participants think?

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Introduction

Nature sports category (Audinet, Guibert, Sebileau, 2017) corresponds to a real practice of the French people, not necessarily dominant, but widely diffused, although in an unequal way. The 2016 Sports and Nature Recreation Barometer shows that 76% of French people aged 15 to 70 report having practiced such activity in the 12 months preceding the survey. These practices, whose evolution goes hand in hand with that of tourism (Thomasset, 2017), have an environmental impact cited by many authors (notably Bessy and All., 2008). But what do the participants themselves think? What activities do they identify as sports and nature recreation? What opinions do they have about the effects of the practice on the environment? Our presentation will report on a survey to better understand it (2016).

Method

An online questionnaire survey was conducted as part of a work with master students, teaching support on the theme "sport and sustainable development" (November 2016). This survey was constructed on the basis of respondents' actual sports practices, their opinions of their relationship to the environment, their perception of a few practices considered as « nature », and 5 motivations that pushed them to practice. The diffusion was carried out over a period of 3 weeks.

Results and discussion

The survey received 1179 usable responses. From these, a panel of 600 respondents was selected, to create 6 groups of 100 respondents (50% women and men, 100 practitioners with less than 3 hours of sport per week, 100 between 3 hours and 6 hours, and 100 to over 6 hours per week). The method used here is to compare at equal sizes the average volumes of weekly sports practice and gender, mirroring the responses obtained. This survey is not intended to be representative of a population, but compared to reconstructed samples.

Hierarchy of representations on the environment

Studied by Lykert's scaled responses (from "strongly disagree" to "strongly agree"), the opinions tested show a consensus that "An outdoor sports participants must be environmentally friendly in which he practices "(average of 4.77 out of 5 possible), and a disagreement on the fact that" nature sports practitioners abuse natural areas "(2.20). For most opinions, gender and sport participation rates appear to have relatively moderate effects on the 18 opinions offered.

Hierarchy of practices perceived as nature sports recreation

18 sporting activities (trail, sailing, climbing, running, ...) were proposed to the people surveyed, with the question "In your opinion, are the following sporting practices, nature sports ? » The answers are again proposed in Lykert scale. The hierarchy is not significantly different according to gender and rate of sport, which suggests that the images of these sports of nature are quite divided.

Practice motivations

Finally, 5 modalities of motivation were proposed, in the form of questions measured again in Lykert scales. For example, "When I practice, what I'm looking for is to become one with nature (to feel in communion with it)". We find that the order of motivations is psychological, then physical, then social, and finally technical, communion with nature being the least motivated motivation by the practitioners themselves. This hierarchy of motivations is finally the most surprising data of our research.

Conclusion

This study finally shows contrasting effects. On the one hand, we have a shared vision of what nature sports are, whether we practice them or not. On the other hand, differences of opinion about the environmental impacts of these sports exist, with a link to the experience of the practitioners, without this link being very marked. Does this mean that practicing or not practicing a sport of nature does not radically affect the perception of its effects on the environment? Such a conclusion is premature as many other factors can affect the perception of practitioners. This shows that this type of survey is only a tool to target other investigation needs, probably more qualitative, like the interviews conducted by Audinet, Guibert, Sebileau (Ibid.).

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New Directions in Sustainable Recreation Research: Results of a U.S. National Assessment and Multi-stakeholder Workshop

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Introduction

Protected areas provide countless benefits to people seeking opportunities for recreation, outdoor experiences, connections to nature, and natural resources for everyday needs. Unfortunately, the capacity of U.S. public land management agencies to provide opportunities for these experiences has declined while the number of visitors to U.S. public lands has increased and become more culturally diverse. Most visitor use management and monitoring frameworks and tools currently used in the U.S. were developed prior to recent changes in recreation and tourism patterns, and are not responsive to the many ways people use public lands. Recreation managers and the scientific community are struggling to keep pace with these rapid changes, and there is an immediate need to address these changes and overall sustainability of outdoor experiences on U.S. public lands. Since protected area tourism as well as the sharing of management tools and solutions are international issues, we are seeking input through participation at the MMV9 conference.

In 2017, a group of 14 U.S. public land managers, researchers, and non-governmental partners from around the country started an effort to convene key players in outdoor recreation to take a holistic look at outdoor recreation management through a social-ecological sustainability lens. The goals of this effort were to identify current gaps in recreation management and research, identify new and emerging tools and processes for managing recreation, build a research agenda to develop and evaluate new tools and concepts, and cultivate a community of practice. First, the group launched an online assessment of recreation and tourism management challenges and information needs, which was distributed through national and international professional networks. The group then organized the Sustainable Recreation Research Workshop of outdoor recreation practitioners, researchers, and tourism providers to Golden, Colorado in April 2018 for three days of discussion that led to the development of research priority areas, working research papers on key topics, and a community of practice.

In this presentation, we will present the assessment and workshop results and open the opportunity to broaden collaboration internationally. The primary objectives of this presentation are to (1) present findings of the survey and workshop related to information needs and priority research areas, (2) gain feedback on these outcomes from an international audience, and (3) expand international collaboration toward meeting these information and research goals. Results we will share include themes of management challenges and information needs which emerged from the assessment and the Sustainable Recreation Research Workshop.

Methods and Results

Through a multi-step process, we engaged a wide range of public land managers, researchers, and private sector stakeholders to identify thematic areas for future research needed to improve the sustainability of recreation and other outdoor experiences. This process began with a recreation and tourism research assessment, using a snowball sampling approach, in which 146 respondents explained their management challenges and ways to address these challenges through an online survey platform. Respondents included researchers from universities and land management agencies, public land managers, policy makers, and non-governmental organization and private industry professionals with outdoor recreation and tourism management expertise. Approximately 30 of these responses came from individuals working outside of the U.S.

During the workshop, 88 participants identified management challenges and subsequent information needs. These were grouped into thematic areas, which included: (1) defining and operationalizing sustainable recreation; (2) recreation and tourism impacts and ecological integrity; (3) collaboration, partnerships, and stewardship; (4) innovative approaches to financing recreation and assessing economic benefits; (5) expanding opportunities to new recreation visitors; (6) tools and approaches for recreation and tourism management and planning; (7) emerging recreation technology and trends. Workshop participants discussed these seven thematic areas and began to outline plans to implement new research needs within each theme as well as methods for collaborating across themes.

Since the workshop occurred, participants have continued to elaborate thematic areas, collaborate on a series of working papers and research articles, and develop a community of practice around outdoor recreation and tourism on U.S. public lands. This collaborative process continues to provide a space for recreation and tourism professionals both in the U.S. and internationally to contribute their thoughts on how nature-based recreation and tourism might be managed more sustainably.

Next Steps

Results and ideas presented here are part of an on-going effort to expand and update research related to visitor use management by bringing together researchers, managers, industry associations, advocacy and user groups, and other stakeholders to discuss the future of sustainable recreation and tourism management. Specific products in progress include a focused agenda for recreation research, a series of working papers to stimulate new discussions, a special edition of a journal, and the continued building of our community of practice. We are also working to maximize our capacity and reach through briefing papers and press releases targeted to agency leaders and policymakers.

Considering the increasing international movement of people both for livelihoods and leisure, as well as existing transfer of knowledge and management models between continents, working through recreation and tourism management issues internationally is crucial to the long-term sustainability of protected areas. We aim to build this on-going effort through international collaboration.

Regional parks and territorial organizations for sustainable development

Carrying out both management of visitors and socio-economic development in a labelled protected area: the role of a Regional Nature Park (RNP)

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Introduction

Natural areas are often settings of diverse activities, either productive ones or leisure ones. Furthermore we talk here about inhabited areas. Hence the relative stakes are numerous and contradicting : to protect nature and landscapes, to maintain or to develop the human social and economic activities. Management of these areas is then organizing and designing policies and action devices which fit. Protected areas are governed by various forms of organization in Europe, which are more and more considered as being instruments for protection of the environment but also for regional development (Mose 2016). In France the Regional Nature Parks (RNPs) are managed by groups of local communities, hence they stem from bottom-up processes, but they are also endowed with statutory missions. Since the origin of RNPs (1967) these missions are equilibrated between protection and development (Marsat 2009).

The subject of our analysis concerns the management of the site "la Chaîne des Puys". It is a volcanic area located in the Auvergne (France). Its summit and emblem, the Puy de Dôme is labelled as « Grand Site de France », and the whole site candidates to be on the Unesco World Heritage List. Finally it is included in a much more extended volcanic area, labelled as RNP (Parc des Volcans d'auvergne). This RNP, as organization, is in charge of leading the management of the site.

Here the main tension occurs between the leisure activities of visitors, and the protection of environment and also other economic activities. The visits endanger quality of the milieux (erosion, stamping on flora, disturbing fauna). Labels (Grands sites de France, Unesco) will cause enhanced frequenting of the site. Inversely protection of the site may include ban of accessing some parts of the site, hence limitation of leisure and tourism activity. Other tensions occur, like the ones between leisure practices and agriculture or forestry.

Methodology

The communication tells an analysis of the way the RNP of the Volcans d'Auvergne carries out its integrating remits. It is based on three main empirical sources : 1- the telling of her activity by one of the authors, who is in charge in the RNP, 2- the documents which set the diagnoses and the frames of management of the site, and 3- the observation of the on-going processes by the other author.

The conceptual framework of this analysis is the theory of paradox (Poole et Van de Ven 1989; Smith et Lewis 2011). Coping with opposite stakes and objectives, interaction may take diverse forms, some of them (in italic, below) relate to what can be called "*paradoxical management* » (Josserand et Perret 2003) :

- Calling-off of one of the items : either by effect of force or power, after conflicting or resigning, or by the *change of the objectives* of any stakeholder (especially after some change in its representation, that is after *re-framing*) , or through any *innovation* which changes the objective features of the problem
- Trade-off, or long term sharing, by which none of the stakeholder realizes totally its objectives. For example it may be a partition of the area (zoning).

- Finally the dynamical process of *dialogue* between the actors, of « *round trips* » between opposite situations, may favour the previous cited forms (reframing, innovation, trade-off).

Results

The studied management system of the site shows some distinctive features. The action led include : laying out, protecting or restoring the milieux, monitoring visitors, regulating sport events, driving stakeholders, coaching (farmers, owners, …), valorizing heritage, educating the public. The stakeholders and their main objectives are diverse as in other sites, with some particularities (complex landownership, proximity with urban area, interest of local great businesses…). The frames for this management are particularly numerous: objectives and constraints of Natura 2000, of the procedure "site classé", of RNP, management plans of Grand site de France, of Unesco WHL.

Regarding the requirements of the Unesco WHL, no new organization was created for the management of the site; the decision was to rely on existing actors. An agreement links the main institutional actors. In parallel a trust was built by big local firms in order to bring also support and financial means.

The action of the RNP integrates protection and development, with a potentially exemplar balance. The opportunity of more tourism is acknowledged: *"it lacks a real project of tourism development in the site…"*. But this is expressed mainly in terms of better coordination, more than quantitative growth, and in a vision of *protection* of the places "*…out of those dedicated to tourism"* : we identify here an example of "trade-off", by splitting the area. More generally a "differentiated management" of the site is being carried out.

Finally, inside of the RNP, the action oriented to the professional actors of development is achieved by two different internal teams, who *converse*: the one dedicated to the site, and the other dedicated to economy and tourism.

Conclusion

In conclusion the case presents interesting particular features: the peri-urban context, a policy seeking well-known labels, the existence of the trust of local businesses, and a particular form of governance, where the RNP applies a "paradoxical management".

On the side of the theory, the case suggests that "paradoxical management" of the tension "protection-development" may refer to *a mix of solutions* : some *trade-off* (splitting the area, limiting activities), some *innovation* (including lay-out which changes locally some features of the problem), some *re-framing* (through teaching professional actors of tourism), and some *dialogue* (in particular inside of the RNP).

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Issues on Footpaths Linking Attractive Public Open Spaces in Hokkaido: from the Perspective of Recreational Use of the Countryside

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Introduction

In Japan, projects to create footpaths started in various places on the model of British footpaths, which have been expected to be new resources for local vitalisation (Hirano et al. 2012). The movement has become active in Hokkaido since the early 2000s, where more than 200 courses extend through 40 or more municipalities today and footpaths by making most of natural environments and scenic views constitute part of regional resources for tourism.

Preceding studies on Japanese footpaths have been associated mostly with research on their effectiveness as a tool for regional development and local vitalisation (Hirano et al. 2012). Meanwhile, related studies have clarified historical backgrounds and legal systems of footpaths in Britain (Hiramatsu 1995; Ota 2009; Ota et al. 2011).

The right-of-way on the public footpath is legally guaranteed in Great Britain, whereas no such protection is provided by law in Japan. For this reason, it is difficult to maintain the continuity of a route which needs to be extended across private land, and to design effective courses by linking attractive public open spaces. However, no studies have approached issues about actual utilisation of public open spaces such as urban parks.

In this light, to clarify actual situations of footpaths running through public open spaces in Hokkaido and problems concerning creation, management and maintenance of footpaths, this study examined reference materials of footpaths in Hokkaido and carried out their field research, hearing survey to their operators, and questionnaire survey to footpath users.

Methods

To understand current situations of footpaths in Hokkaido, this study selected Hokkaido's 19 major footpaths running through public open spaces. To examine one of major issues in creating a footpath, that is coordination with a landowner, selected three footpaths among them were investigated as for their land use, land ownership, and status of permission for passing of the land. Furthermore, to comprehend issues of footpaths from the viewpoint of recreational users, a questionnaire survey was carried out to users of footpaths in Hokkaido. A total of 830 question forms were made available at the starting point, and respondents were required to send back a reply card. The total number of respondents who replied to the questionnaire was 112.

Results and discussion

Field research and hearing survey

Footpaths in Hokkaido have been developed and operated in various locational conditions by public and private organisations under a variety of utilisation systems (Figure-1). Among them, most are pastoral and natural types of footpaths by taking advantage of Hokkaido's rural landscapes and natural environments.

Hokkaido's three typical footpaths were examined regarding the state of their land use. In the case that an organisation of courses management was an NPO, or an administrative body together with locals, public spaces such as urban parks, rivers and roads, which basically require no agreement, occupied a high proportion in area. In the meantime, footpaths developed by footpath organisation members extended over a wide area of private agricultural land owned by the members, but nearly the half was still public land such as road sites.

In our research, the number of landowners was not so many but oral and written agreements with them were not necessarily reached so smoothly. Rather, the difficulty in reaching agreements seemed to be reflected in the use of more public land for the course setting.

In this study, some public spaces such as rivers, seacoasts and urban parks are regional resources themselves. Because sites owned by operators and local resources are linked and strolled around, public spaces available to anyone including roads were made most of. A primary reason for this is an attempt to build a course by minimising the use of private land which presented difficulty in coordinating with landowners.

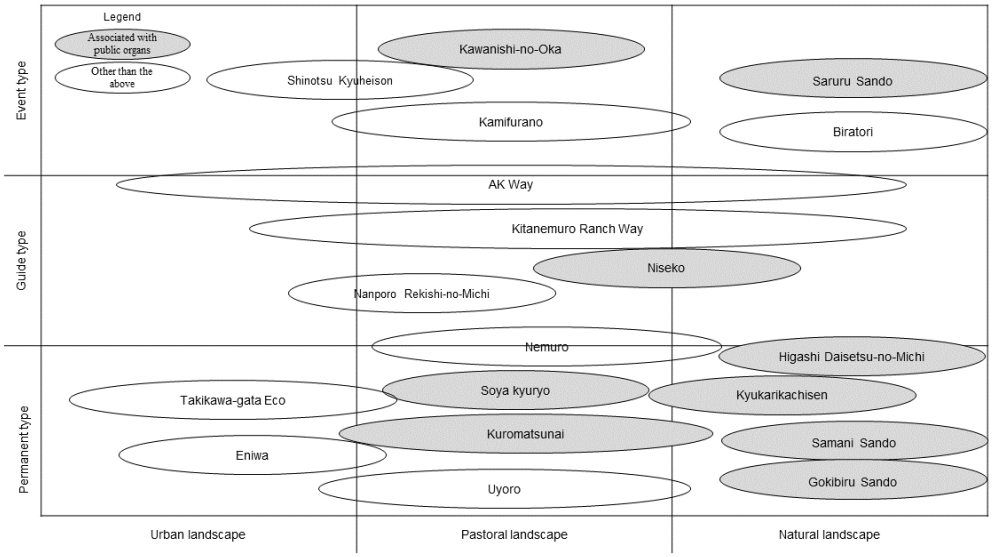

Figure-1 Classification of major footpaths in Hokkaido

Questionnaire survey

A questionnaire survey was carried out to footpath users in Hokkaido, asking them about problems they thought in the use of footpaths. Our survey result was compared with the result of similar questionnaire survey conducted in Britain as a model country of footpath development. The British survey referred to was the Scottish Recreation Survey which was carried out in Scotland, the region similar to Hokkaido in terms of area, population and climate

As many as half the number of users of Hokkaido footpaths were aware of some problem or other, more than the number in Scotland. Most of problems in Hokkaido were obscure signposts and course layout, and difficulties in walking on overgrown paths and boggy

ground. Users in Scotland regarded restrictive signs and locked gates as problems, which were pointed out by few in Hokkaido.
Most users replied that they had not changed their route. The users in Hokkaido footpaths changed their route because they found it difficult to walk through (6%) or the course layout was obscure (6%), but few answers of this kind were given by Scotland users.
A high proportion of respondents in Scotland had knowledge about the regulations accounting for 73% of the total whereas less than half or 42% of the Hokkaido footpath users knew of the code of a footpath they used.

Conclusions

To develop an attractive footpath by linking regional resources, the effective use of public open spaces is a major issue to be coped with.
Definite procedures and rules for placement/management of a footpath as well as the permission for passing of public open spaces, have yet to be formulated. Although there are procedures for installation and maintenance of signposts in building a footpath in public spaces, the clarification and systemisation of criteria of permission is still an issue to be dealt with. In order to newly create or continuously operate a footpath, a system to effectively use public open spaces and to share important agreements is urged to be formulated as well as a clear definition of a footpath.
Problems pointed out by users included maintenance of footpath courses and improvement of signposts. It is essential to install plain signposts, to suggest and publicise common regulations and moral standards, and to share course-particular notices.

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Approval of Black Forest National Park by local companies

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Background and Motivation

Besides their character as nature protection sites, National Parks are often expected to have positive outcomes on the economic development of the region they are situated in. So far the main literature is on the economic impact on tourism and mainly concerned with the degree of revenue and employment generated by tourist spending (Mayer & Job 2014). The main industries that are analyzed for such calculations are hospitality and transportation as well as the corresponding downstream industries. Another major concern of nature protection sites is the approval by the local community. Here, the main research is concerned with the degree of approval by the local community and possible explanations for variations in such evaluations as well as managerial implications to shape these evaluations (Oldekop, Holmes, Harris and Evans 2015).

Looking at these two streams of inquiries, namely economic impacts and local approval of a nature protection site, the main interest of this research is a) the amount of approval by local companies and b) explanations for the variation of such approval.

This research contributes to the existing research in multiple ways. First, the analysis is not only related to tourism-specific industries but investigates the whole corporate sector surrounding a protected area. Second, this research is not only limited to financial effects but also covers non-financial effects. Third, the subjects under investigation that provide approval are not the local community but the local corporate sector.

Empirical Site and Method

Situated in Southern Germany and established in 2014, Black Forest National Park is the second-latest of sixteen National Parks in Germany. The local enthusiasm and resistance for the establishment of the Park varied across communities. Not only citizens felt skeptical about the establishment but also voices out of the corporate sector expressed their concerns. Besides the concerns of negative effects on the local logging industry, also a more general concern of "backwardness" was expressed. The fear was that a nature protection project would be at odds with the image of an "innovative region in the digital age" as the local industry whished for to be seen like.

This site specific history pushed the idea to investigate the amount of approval by local companies and possibilities to explain the variation of such approval. In order to develop a meaningful questionnaire and to get access to the local companies, the local Chambers of Industry and Commerce were contacted. Luckily they supported the project and together a questionnaire was developed.

Items were constructed to measure the dependent, independent and moderating variables. The sole dependent variable was "popularity of National Park". In order to explain the variation of the expressed approval the following independent variables on corporate characteristics were constructed, see content in the bracket for the rationale to include the variable:

- "ecological orientation" (The more ecologically oriented, the more in favor of a nature protection project)

- "business success" (The more business success, the more in a mindset of "National park as an opportunity")
- "relevance of innovation" (The more innovative, the less in favor of a project associated with concerns of backwardness vs. the more innovative, the more open to a new project)
- "relevance of quality" (The more quality-oriented, the more in favor of the high quality brand 'National Park')
- "degree of internationality" (The more international, the more in favor of the international brand 'National Park')
- "employee orientation" (The more employee-oriented, the more in favor of an area they can experience after work)
- "benefits from National Park" (The more benefits, the more in favor of the entity responsible for the benefit).

To control for further influencing factors, the following four moderating variables were constructed: "industry", "size", "ownership", proximity" (see Figure 1 for the resulting model).

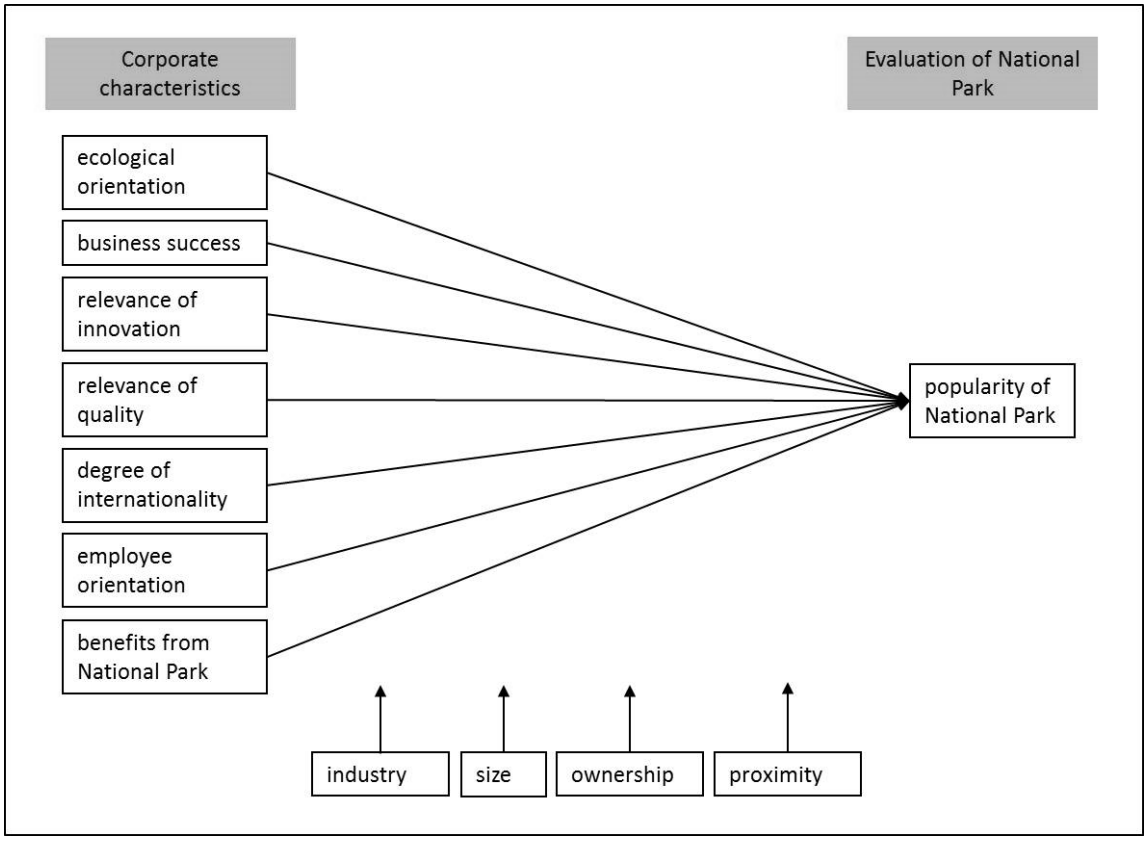

Figure 1: Model of National Park approval by corporate sector

The final online questionnaire was distributed by the Chambers of Industry and Commerce to all companies within a 25km circle around the National Park boundaries that provided an email address and allowed to be contacted. Data collection started end of 2017 and lasted with one reminder until beginning of 2018. In total 3.848 companies were contacted of which 108 replied which yields to a response rate of 2.8 %.

Findings and Discussion

Currently the data analysis is conducted.

As we do not have the results yet, we can not elaborate on theoretical or managerial implications. However we expect that this research contributes in several ways. First, this kind of research lays the ground for a National Park to strengthen the ties with the whole local economy. Such investigations deepen the knowledge about each other and provide opportunities to promote mutual benefitting relationships. For example, corporate volunteering activities of local companies in cooperation with the nature protection site can be an innovative possibility to supplement sole "touristic interactions" with a nature protection site. Secondly, researching beyond sole financial effects provides alternatives to promote and justify nature protection towards the local economy and beyond. In case a protected area is also supported by businesses with desirable characteristics, the protected area is not only justified by increased tourism spending but could also be justified by increased attractiveness for businesses operating in that region.

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Negotiating co-existence in multifunctional landscapes: trails as facilitators for communication

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Trails are important elements in natural and cultural landscapes, and many ancient pathways have developed into routes of great significance for recreation and tourism in contemporary societies (Timothy & Boyd, 2015). However, international research on recreational trails is somewhat limited. Results from a systematic quantitative literature review of 195 articles in scientific journals reveal that research on trails for tourism and outdoor recreation in non-urban settings to a large extent is carried out by natural scientists, and the focus has mainly been on environmental and managerial aspects of trail use. The review identifies gaps in trail research, especially in a socio-cultural context on topics such as heritage, public health and conflict management (Godtman Kling, Fredman & Wall-Reinius, 2017). Table 1 displays the spread of the researched study topics in the reviewed articles. In order to identify how the study topic varies over time, the table also contains the time-periods when these topics were published.

Table 1. Study topics of the reviewed publications and variation over time

Study topic	**Total**		**Time-period (%)**		
	Publications	**%**	**1970-1999**	**2000-2009**	**2010-2016**
Environmental protection	70	35.9	41.4	29.2	39.4
Trail management	47	24.1	13.8	34.7	19.1
Planning and design	22	11.3	10.3	4.2	17.0
Economic impact	17	8.7	6.9	11.1	7.4
Conflict management	11	5.6	10.3	5.5	4.3
Heritage	10	5.1	6.9	2.8	6.4
Public health	10	5.1	6.9	5.5	4.3
Interpretation, education	7	3.6	3.4	5.5	2.1
Tourist attraction	1	0.5	0	1.4	0

Trails in the landscape can be used as a tool to handle conflicts between different user groups (Jackson, Haider, & Elliot, 2003). However, research on trails as a conflict management tool in land use conflicts is limited (Godtman Kling, Fredman & Wall-Reinius, 2017). Research has mainly focused on trail conflicts between different recreation activities or groups and within recreation groups, and less on how trails can handle conflicts between different users in the landscape.

Against this background, this study explores the role of recreational trails as a potential tool for managing conflicts in a multifunctional landscape. The results are derived from a case study of the southern Jämtland mountain region in Sweden, an area where conflicts of interests exist. There are several different interests and perspectives on how such mountain

landscapes should be used. There are conflicts both between actors that use the landscape for various purposes, such as between tourist entrepreneurs and reindeer herding companies or between hikers and mountain bikers; but there are also conflicts between different governance levels, for example between government agencies and local population (Godtman Kling, Wall-Reinius & Fredman, 2017).

The case study area has also experienced changes in land-use, mainly due to an increasing number of visitors that engage in various outdoor recreation activities (SEPA, 2014). Stakeholders in the area argue that conflicts of interest regarding trails mainly relate to erosion, worn trails, fragmentation of landscape, disturbance of reindeer and reindeer herding, and displacement of wildlife as well as unsuitably located trails (Wall-Reinius et al., 2018). It is therefore a challenge in this area to balance multifunctional use in ways that combine sustainable livelihood for local populations, recreational use, local business development, and reindeer herding, as well as national environmental goals related to conservation of both the natural and cultural environment.

This study examines the recreational trail as an applied example where actors in the mountain landscape 'negotiate' and collaborate. Through the recreational trail, dialogue and discussions are made possible among stakeholders. Trails can therefore function as facilitators for communication, and thus enhance the possibilities of building trust and promoting collaboration between actors. In connection to nature conservation, tourism interests, land use by local communities, including reindeer herding, the role and function of the recreational trail becomes central and can thus constitute a conflict management tool.

Researchers of this study have worked closely with stakeholders in the area by organizing workshops where issues regarding the land-use in the area have been discussed. Results from the study show that creating platforms for collaboration and dialogue are important for increasing the understanding between different interests represented within stakeholder groups. Such platforms can therefore be highly valuable in handling conflicts regarding land-use (Wall-Reinius et al., 2018).

This research contributes to the existing literature on handling multiple land-use interests, and adds to previous knowledge by taking on a rather new approach; that of the recreational trail as a facilitator for communication.

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Socio-environmental conflicts in the *Cerrado* Protected Areas *of Chapada dos Veadeiros*: a discursive treatment of tourism and development in Brazil

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Visitor flow to Brazilian national parks (NP) has rapidly increased in the last decade (300%). NPs are cornerstones of nature conservation strategies as well as important tourist destinations. This is particularly important in the Brazilian countryside, where commodities' production, such as mining, agriculture and cattle breeding compete with nature-based tourism, creating impacts on the *Cerrado* biome (the Brazilian Savanah), a world *hotspot* for conservation priorities (Myers et al., 2000). Since the 1970s, this biome has suffered an intensive land conversion, from natural vegetation to commodity production. Studies show that deforestation in *Cerrado* has been faster and larger than in the Amazon (Reis *et al*, 2017). Moreover, over 60% of the Brazilian production of soybeans grow within the *Cerrado* region, which also hosts large deposits of minerals, such as niobium, iron, manganese, tin, gold, ornamental stones, among others, which are globally important Brazilian products.

Tourism compete with such industries in the surroundings of protected areas. Such conflicts normally involve residents, visitors, entrepreneurs, and governmental and non-governmental agencies. Nature conservation and commodities' production became competing discourses in various Brazilian protected sites' contexts. Recent reports show that in 2016 there was an intensification of socio-environmental conflicts in the Brazilian Savanah. For instance, Fazito *et al* (2016) describe the manipulation of the sustainability discourse to displace tourism and implement mining in the regional development policies of the *Espinhaço* Range Biosphere Reserve.

The critical literature on tourism development would benefit from a discursive treatment of development policy contexts (Bianchi, 2009), and more specifically in protected sites' regions. To respond to this agenda, this ongoing research aims to analyze the socio-environmental conflicts between tourism and mining in the town of Cavalcante, in the state of Goiás. The case study area is located within the UNESCO's *Cerrado* Biosphere Reserve, in the border of the *Chapada* of *Veadeiros* National Park (CVNP), whose area was recently expanded from 65,000 to 240,000 hectares.

In order to address the proposed objective, we employed a Foucauldian Discourse Analysis method, seeking a deeper understanding of the empirical reality and its complexity. Studies have demonstrated that it is a successful research technique to analyze conflicts underpinning policy-making in development contexts because it helps incorporate the hidden power-play behind the development rhetoric (Hewitt, 2009). Following Hajer's (2006) recommended steps for conducting such analysis, data collection started in June 2017 with a desk research and three fieldwork visits to develop a global view of the conflicts. A longer fieldwork is planned for August. Semi structured in-depth interviews were conducted with other researchers, experts, environmental activists, members of the tourist industry and the affected communities in order to identify the conflicts and draft a first timeline of the important events

that resulted from such conflicts. To triangulate data, we assessed documentary evidence, such as legal and official documents, meeting minutes, international institutions' and academic documents.

Preliminary results

Initial analysis highlighted the threats to biodiversity caused by commodities' production, which accounts for the deforestation frontier and other impacts in the region. Thus, there are different possibilities of development and land use in the study region, such as agriculture, cattle breeding, tourism, mining and dams. However, two events illustrate why mining in the town of Cavalcante emerged as a critical case study: mining industry interests have interrupted the attempt to establish two other parks in 2013, and mining sites were left out of the recent expansion of the *Chapada dos Veadeiros* NP (2017). In contrast, the opening of another gate to the national park continues to be debated between different stakeholders, especially the ones interested in tourism. We have mapped the stakeholders and their political capital to enrich the timeline of important events that guide the discourse dynamics and interests behind the competing discourses of mining and nature-based tourism in the region. The tourist flow to the region has increased in the last decade together with the applications for mineral research. A large part of the park is located within the boundaries of Cavalcante, that also hosts the largest mineral deposits of the region (among them manganese and tin). Cavalcante is a historic mining town, with a population of 9,829 inhabitants and an area of 6,953.7 Km². It hosts an important former *quilombo* (fled slave settlement), named *Kalunga*. Figure 1 shows the location of the park with its expansion and the polygons of application for mineral research in Cavalcante (areas where mining and conservation interests overlap are highlighted).

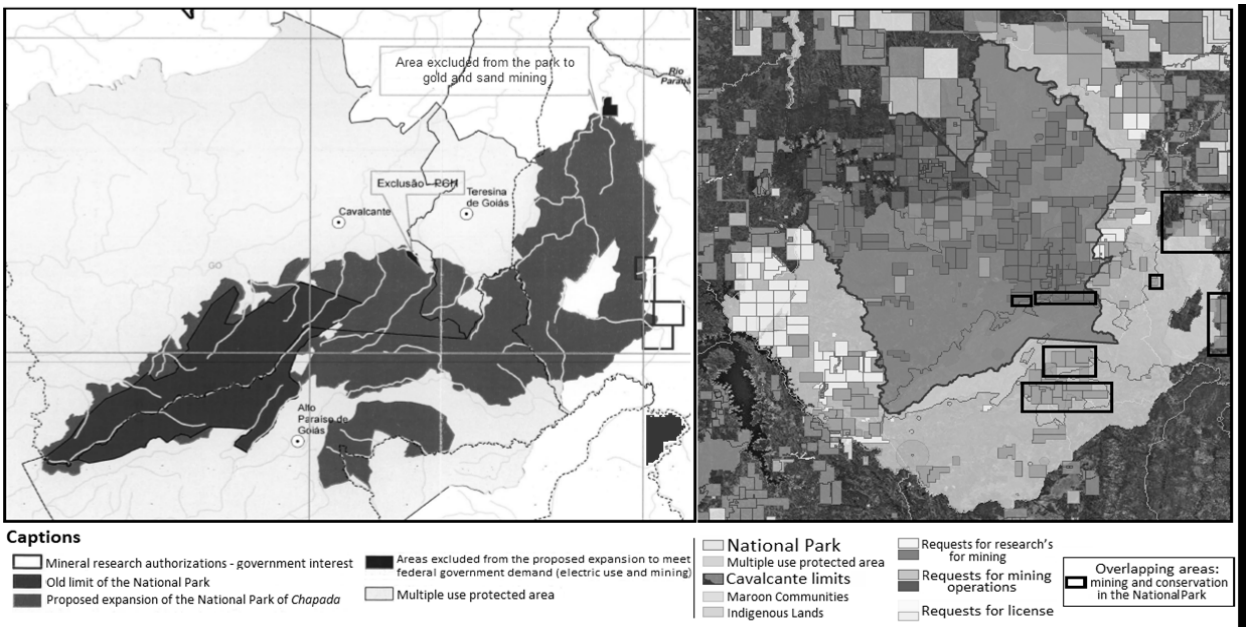

Figure1: Location of the recently expanded Chapada dos Veadeiros NP and the polygons of mineral research applications.

Source: Adapted from the Brazilian Ministries of Environment and of Mining and Energy, 2017.

Our planned actions for the coming months are a complementary desk research and another extended fieldwork visit, in which we intend to deepen data collection and analysis. We have planned to conclude this research in November 2018.

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From canyoning to agritourism and cultural tourism. The diversification in lower or mid-altitude ski resort, French Alps

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The diversification of tourist activities in small, low altitude resorts has long been a major concern for these locations, especially since the 1990s (Messador, 1996; Bourdeau, 1993; Helion, 1999; Guérin, 1989) and still now (Tuppen & Langenbach, 2015; Marcelpoil, 2011; Jorand, Mao, Biard, Obin, & Suchet, 2009; Gauchon, 2012). Compared with their high-altitude counterparts, many such resorts might be considered as intrinsically more diversified, benefiting from both a summer and winter season. However, the risk of inadequate or irregular snow-cover in winter has proved a limiting factor on development. In contrast the inherent beauty of the natural landscape and the attractiveness of traditional villages, surrounded by forests and pastures, provide a setting particularly conducive for outdoor recreational leisure activities. Taking account of these factors, many resorts have attempted to reinforce their family image, catering for a wide age-range and a variety of interests of which many do not have a sporting character. Activities and facilities for young people (such as safe ski-lifts) have become especially popular. The result is a proliferation of activities, especially in summer but also during the winter.

As in most resorts, upgrading of skiing facilities is commonplace (renewal of chair-lifts, the introduction of snow-making equipment even in modestly-sized resorts), as are attempts to appeal to a wider range of winter-sports enthusiasts (based around cross-country skiing, snow-shoe trekking and tobogganing, for example). Skiing areas reserved for young children and families have multiplied. In terms of widening the appeal of such resorts, opportunities for other outdoor activities are also proposed, ranging from signposted walks to visits to local monuments or sites of interest. Visitors are encouraged to discover local traditions and folklore and holiday periods such as Christmas and the New Year are strongly promoted as festive seasons.

The summer is characterised by a proliferation of outdoor pursuits, whether of a sporting character (mountain biking, paragliding, rock-climbing, tennis, golf, canoeing, fitness classes) or of a more recreational nature (hiking, horse and pony riding). In addition, a range of farm visits, cultural excursions, thematic courses and visits to improve understanding of the local environment are frequently on offer, as well as a series of daytime and evening fetes and entertainments. For these resorts and their surrounding areas, the mountain can be seen as a reservoir of under exploited resources, with a personal character, where history and culture constitute a potential competitive advantage, compared with high altitude resorts, (François, 2007). Similarly, resorts have increasingly become important outlets for a part of local agricultural production (wines, fruits, cheeses, jams and honey), which can further add to their tourist appeal. These mountain environments also represent a particular challenge for the sustainable development of sites (Clarimont & Vlès, 2007; Suchet and Jorand, 2008). Considerable research is currently underway into these issues (François, 2007, 2009; Jorand and al., 2009).

Resorts at this altitude have also become more diversified through the development of their residential function, particularly where they are located in relative proximity to urban centres such as Grenoble, Chambéry or Annecy (or even centres further afield such as Lyon, Geneva and Nice). Two forms of residential growth are evident, the first induced by retirement migration and the second related to the possibility of benefiting from an adjacent and large labour market while living in rural surroundings. The small resort of Lans-en-Vercors which is a short distance from Grenoble illustrates this principle.

A number of examples may be used to explore the issue of diversification in more detail as well as some of the problems it poses. Suchet, Jorand and Raspaud (2010) have studied the village of La Chapelle, but other case studies such as Font d'Urle and Saint-Pierre-de-Chartreuse, illustrate more successful diversification (Jorand and al., 2009). Font d'Urle is a small ski resort, in the Vercors, an area which held several events during the 1968 Winter Olympics in Grenoble. There is no permanent glacier on the Vercors plateaux, so the Vercors might be considered as one of the most weather dependent areas of the Alps. This has not prevented, however, the extensive development of cross-country skiing which is considered, as at Font d'Urle, to be of a high quality . The Vercors can be considered as a vast cross-country area linking the main resorts of Autrans, Meaudre, Lans-en-Vercors, complementing the emphasis given to downhill skiing at Villard-de-Lans. At Font d'Urle, different stakeholders have combined to develop sports and outdoor activities in a sustainable manner. In particular, the local authorities of the Drôme department have given a major priority to promoting and planning such activities over the last decade. Saint-Pierre-de-Chartreuse , lies at a crossroads between the Alps and the Jura Mountains. The Chartreuse Massif is close to Grenoble to the south and Chambery to the north. In winter, Saint-Pierre-de-Chartreuse and other ski centres in the same area, provide 64 ski runs and 255 km of cross-country skiing and snowshoe trails (Sénil, 2004). In summer, as elsewhere in the Alps, a wide range of outdoor pursuits is proposed (for example, climbing, caving, canyoning, mountain biking, paragliding, donkey rides, and horse riding) by a variety of professionals who generally reside in the town. However, they rarely work together on such projects, using their own informal power to develop their businesses. The result is a lack of co-ordination and an absence of clarity in the image transmitted to tourists. At the same time, Saint-Pierre-de-Chartreuse, due particularly to its proximity to Grenoble, is an example of a resort which has also grown as a residential centre and which attracts a large number of day visitors.

Why Count? Best practices in the field of data collection to preserve and manage natural areas 2

Visitor counting combining new technologies; PIR & LoRa with Arduino

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More research is needed to test the approach

The nature area 'Het Renkums Beekdal' in the Netherlands consists of a linear north-south valley with fringing forest on the hills to its East and West, with a modified, canalised watercourse that now runs in two separate streams on each side of what was once the flood plain (which is now a marshy wetland). The visitor centre lies on the edge of valley. The managers of the area are struggling to find an efficient way to keep track of both the number of visitors and their spatial distribution in the area. Previously they have tried to count the visitors manually by using volunteers, which yielded meaningful results but which was time and cost intensive. They don't have the financial resources to be able to use most of the currently available methods, so they therefore need new cost-effective technology that can count the visitors effectively and accurately. We therefore searched for open source methods and new techniques.

The Long Range (LoRa) network is a relatively new low cost technology that can be used to transmit accurate data from sensors. LoRa is one of the leading technologies that is used for building the Internet of Things (IoT) in a worldwide network. The industry claims a range of the LoRa gateway of 15 km. In this experiment, the open source The Things Network (TTN) was used as the network provider. According to the industry the benefit of this technique is that it combines long range, low power consumption and secure data transmission. Although the LoRa technique offers considerable potential, it also offers challenges. The research question is: 'What is the optimal means for applying the LoRa system to the task of counting the visitors in the Renkums Beekdal natural area, at the lowest possible cost?'

Method

A method has been developed for counting visitors by combining new technologies using Pyroelectric InfraRed (PIR) sensors together with so-called LoRa. The optimal way of using this new technique should be defined. First of all, sensor components had to be selected, which should be connected with the LoRa gateway. We installed the LoRa gateway on the roof of the visitor center in the valley. The Adafruit Feather M0 LoRa chipset was selected. The Adafruit Feather M0 LoRa, which is a Arduino based board includes a HopeRF96 LoRa enabled radio chip. Additional feathers are a micro USB connector and a plug for a Lithium Polymer battery, which can be charged from the USB. At a cost of 40 Euros the board is not only a complete package but also relatively cheap. The HC-SR501 PIR sensor also was selected as it is cheap, widely available, and allows for sensitivity tweaking on the sensor. As the sensors were placed in an outdoor environment, a waterproof and less vulnerable case also was created. To test the data management process in order to record and save the visitors data, several steps were taken. The Adafruit chipset was prepared by connecting it (by hand soldering) to the PIR sensor and the TTN network with a wire bridge and also connecting it with the antenna. Every complete package sensor was then registered in the TTN network console. The most important step was programming the Adafruit using open source Arduino IDE since it defined the data form from the sensor. The programming also included the selected spreading factor and the battery consumption. Finally, the LoRa gateway was adjusted in high sensitivity. To test the accuracy of the PIR sensors, we counted the amount

of visitors manually for two locations in the area on one day during the testing period in July 2017.
In order to visualize data interactively and to show data in a map format, the open source Grafana dashboard was selected, using open source InfluxDB as data storage. To keep data flowing, the open source node-red server was installed and was required to be running constantly on a computer in an online mode.

Results

From the original 15 locations spread around the natural area, only 3 sensors were operational because of a fault in the soldering. The Adafruits were able to connect over a distance of only 2.68 km from the LoRa gateway, because the amount of forest and hills in between sensor and gateway were limiting factors. The accuracy of the sensor was calculated for two locations. The average accuracy of sensor 1 was 60% and it increased to 83% when the false positives were removed. Sensor 2 had 62% average accuracy and it only had one false positive with no visitors crossing. The PIRs causes a considerable number of false positives due to wind. The effect is further amplified when the sun is shining.
Because the batteries had to be recharged after 10 days, the testing period was very short. An average amount of 64 visitors a day were counted in that period: when the 60% accuracy was applied to the original data, and when potential double-counting was taken into account (the same person can be counted by two sensors if they are close to each other). We couldn't give an answer to the spatial distribution of the visitors in the area, because we only had results of 3 sensors.
In the context of the disappointing results, the method with open source programs and the LoRa technique could not be considered optimal. However, the costs are low. Using open source programs the one-off cost of the method is € 3200,- including the purchase of a LoRa gateway, antenna and 15 sensor packages. In theory, the managers could have an overview of the number and distribution of the visitors using the open source programs; in reality it did not prove possible to install these programs on the their computer, but only on the computer of the student involved in this study.
The effectiveness of this approach could be improved adding a small solar panel to the sensor. It will increase the costs but also the battery life as the battery is automatically charged when enough solar power is generated. Purchasing a more accurate PIR sensor will also improve the results. Finally, in this experiment the forest and hills limited the range of the LoRa gateway. The range will probably be better if there is a clear line of sight between sensor and gateway.

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Complex surveys for monitoring climbers in Mt.Fuji, Japan

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Introduction

Mt Fuji boasts the Japan's highest mountain. The mountain is one of the symbols of Japan and it is a cone shaped stratovolcano. It has been serving as a source of Japanese art and culture as well as Japanese way of worshipping the nature since ancient times. In 2013, such values were recognized and Mt Fuji was listed as one of the UNESCO's world cultural heritage cites. But, the World Heritage Committee advised the Japanese government improve the conservation efforts for the future when the resolution was reached. Also the Japanese government is required to submit "a State of Conservation Report" by February, 2016. The one of the reasons for such requirements mentioned above is the large number of the climbers. Mt Fuji opens only during the summer. During just two months, nearly 300,000 people visit Mt Fuji. During the peak time, as many as 10,000 people visit the mountain in a single day. The main purpose of the climbers is to see the sunrise from the top of the mountain. The extremely crowded mountain top before the dawn is ordinary scene of Mt Fuji during summer. Such a situation could potentially damage the value of Mt Fuji as the world cultural heritage cite. The World Heritage Committee pointed out that "Visitor Management Strategy" should be laid out in order to limit the burden on the mountain for the future. The Japanese government listened to the advice and decided to lay out Visitor Management Strategy that includes the process of determining carrying capacities for the upper access routes that will help realizing the desirable style of Mt Fuji accents. In order to do that, the government needs to investigate and research the current state of the mountain by collecting and analyzing objective data. Laying out strategy is done mainly by Shizuoka prefecture and Yamanashi prefecture where the mountain is located in. This research was conducted in order to collect and analyze necessary data for strategy mentioned above.

Methodology

This investigative research used the following methods:
1) Questionnaire Survey
2) GPS Logger Survey
3) Count Survey
4) Camera Shooting at Certain Locations

Questionnaire Survey: We conducted face to face random sampling surveys with adult climbers who just climbed down the mountain. At surveys were conducted at the every 5th station, which is a starting point where all the main 4 trails begin. The samples collected are the followings: 2812 (10days) in 2015, 3130 (10days) in 2016, and 2755 (6days) in 2017. GPS Logger Survey: We asked adult climbers that were about to begin ascending at the begging of the each of the 4 trails that begins at the 5th station to take a small portable GPS logger with them. The logger recorded the location information at 5 second interval. We collected the loggers when they got back down to the 5th station. The samples collected are the followings: 535 (5days) in 2015, 585 (5days) in 2016, and 587 (4days) in 2017. Count Survey: We counted the number of visitors by placing an infrared counter device at the 8th stations of each of the 4 trails. This was conducted for 24 hours a day about 2 months between 2015 and 2017. Camera Shooting at Certain Locations: Yoshida trail and Fujinomiya trail have relatively more climbers. We placed 2 weather proof and also night

time cameras at each of the 2 trails mentioned above. The cameras photographed climbers passing through at certain intervals. This was conducted for about 1 month between 2015 and 2016.
We designed an investigation section to each trail based on the area. We measured and speculated the climber density, climber speed, and the time it took for a climber to walk through a certain section by using the results from GPS Logger Survey and Count Survey. Such information mentioned above was measured and speculated for each investigation date, time, and section. We also analyzed the results from Questionnaire Survey and Camera Shooting in order to determine the levels of standards for safe and comfortable climber density when climbing Mt Fuji.

Results

The investigations revealed that only under a certain condition, a climber density rose to the level where climbers crash and fall or get injured. Specifically, such an event only occurred in only 2 trails. Also, a dangerous situation was occurring at a certain section at a several hours before the dawn on a day when the number of climbers were relatively higher. After that, we found out the causes of such “Bottlenecks” in each trail. In Yoshida trail, bottleneck was being caused by a narrow trail. In Fujinomiya trail, bottleneck was being caused by climbers ascending and descending were going through there at the same time. Based on the 3 years of accumulate data, we also were able to speculate the number of climbers per day that is needed in order to cause traffic outside bottlenecks because of the traffic in bottlenecks lasting longer than 1 hour. Such number is about 4000 climbers for Yoshida trail and about 2000 climbers for Fujinomiya trail. The result of this investigation is included as desirable numbers of climbers in the “Visitor Management Strategy” which is to be presented to the World Heritage Committee. Also each measure for dealing with the traffic in bottlenecks (e.g. creating a crowdedness calendar showing which date, place and time would be crowded) was determined based on the results of this investigation.
This investigation is a rare large scale investigation in Japan. This investigation utilized various methods to find out climbers’ behaviors and awareness and monitored this single mountain for 3 years. Also, we did not just collect the data, but also we used the results of this investigation to come up with strategies and measures for improving the situation. In that sense, this survey can serve as a reference for other monitoring investigations for popular mountains in Japan and even in foreign countries.

Predicting visitor densities in protected areas – rules of thumb for managers based on GPS-tracks

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Introduction

In many nature areas the dual mandate to protect natural values and provide opportunities for visitors to enjoy the area might lead to potential conflicts (Reed and Merenlander 2008). Recreation can have a negative impact on biodiversity values (Larson et al 2016). However providing access to protected areas is important to build support for an effective conservation policy (Thompson 2015). Therefore managers need to plan actions with care and involve stakeholders in their decision making (McCool 2016). To make adequate choices, managers need to know where biodiversity values coincide with visitor use (Hadwen et al. 2007, Wilson et al 2004) and what the impact of their actions will be. Therefore the need to understand which features of the landscape and path network will determine the temporal and spatial distribution of visitors (Hammit et al. 2015).

Visitor densities tend to be very heterogeneous in nature areas (Hammitt et al. 2015, Marion and Farrell 2002). They are dense at the entrance or parking lots as they act as gates for the area (Beunen et al. 2008). From these gates visitors disperse into the area using the path network. Their distribution will reflect the choices they make during their visit (Wolf et al. 2015). These choices are a function of the environment surrounding the visitor, the personal aims and interests of the visitor and the way they interact (Meinig 1979, Helbing and Molnar 1995). As all these features will interact during a visit it is difficult to identify which features account for differences in visitor densities (Shoval et al. 2010).

The aim of this conference paper is to derive rules of thumb for managers to predict how far visitors will enter the area and where visitor densities are high. We will use statistics to predict what features of the path network and landscape characteristics determine visitor densities in the area. We used a large dataset of GPS tracks from walkers and dog-walkers that has been collected during the PROGRESS research project for monitoring purposes in the New Forest (UK, Edwards and Smith 2011). GPS tracking is a common method in recreation studies (Beeco and Brown 2013). However, GPS studies have focused on its utility for monitoring visitors and not on understanding what drives visitor patterns and densities (Beeco et al. 2014).

Method

The dataset has been collected in the New Forest during spring 2004 at 41 parking lots and contained 1563 GPS tracks and 110505 single data points. The data points of each track were used to derive the expected route of a visitor in three steps. First, outliers were deleted. In the second step data points were snapped to the path network. In the third step we used a travelling salesman's route algorithm to derive the most likely route from the itinerary information of the tracks. Finally a manual check was executed. The expected routes of all tracks were combined to create a map of the expected visitor densities in the area.

The input variables of the statistical model contain several maps: path network including path type, parking lots, vegetation map, slope of the area, the openness of the landscape based on

Viewscape (Meeuwsen and Jochem 2013), traffic noise and a map with compartments that are enclosed by tarmic roads (Henkens et al. 2006).
After an exploratory data analysis, a Cubist regression tree has been built to select a small set of important explanatory variables that are related to visitor densities in the New Forest area. This set has subsequently been used to build statistical models (e.g. logit-regression) to link various dependent variables (e.g. probability of road crossings) to environmental characteristics (e.g., openness, path type).

Results

The data preparation of the GPS tracks lead to the deleting of 5% of the single data points and a final dataset of 1553 routes. The statistical model showed that distance to parking lot is an important factor for predicting visitor densities (e.g. Meijles et al. 2014, Zhai et al. 2018). Other important factors are path type, vegetation type and openness. The regression tree did not select slope as an important factor and although the exploratory data analyses indicated noise as an important factor in the combined model it was not selected as one of the top variables.
The analyses also showed that tarmic roads act as a barrier for visitors and the probability of visitors to cross a road depends on the landscape setting and type of visitor. In open landscapes the visitors tend to cross roads less often than in more closed landscapes (Figure 1). Also dog-walkers tend to cross roads less often than walkers.

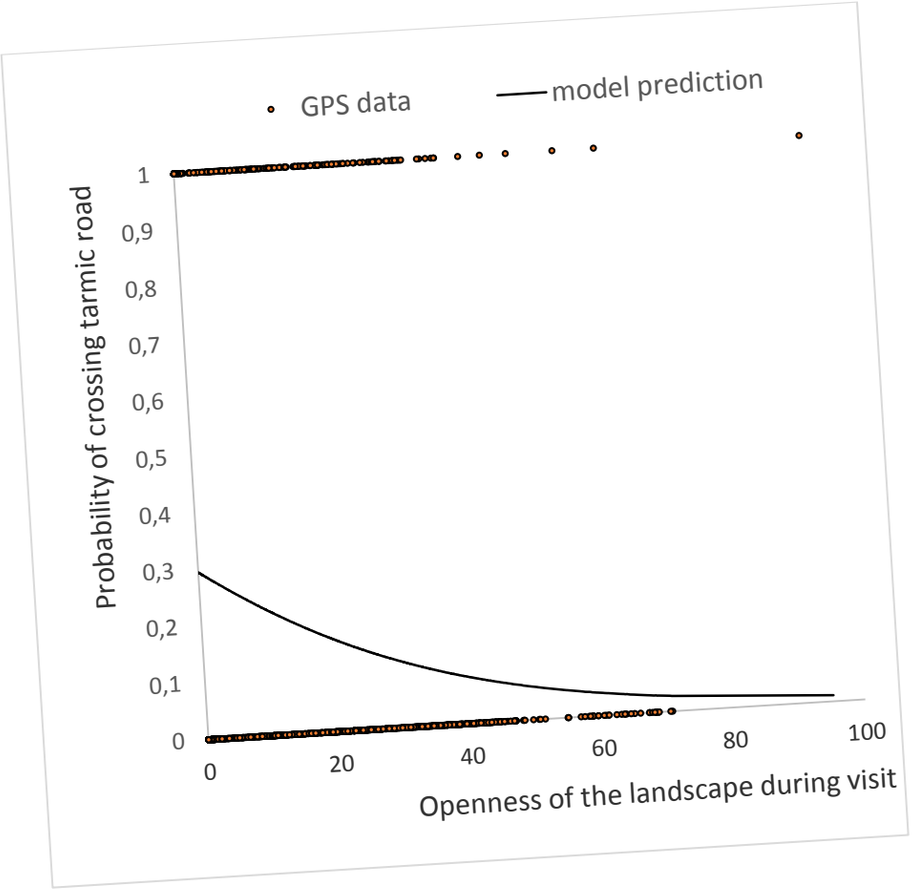

Figure 1 Change of visitors crossing tarmic roads in relation to openness of the landscape.

Discussion

For this study we used an already available dataset of GPS tracks. We used this set to understand what drives visitor patterns and densities in nature areas (Beeco et al. 2014). Understanding these drivers is important to derive rules of thumb for mangers to predict the impact of their actions.

The model showed that openness is important to predict visitor densities as well as the probability of visitors to cross roads. For managers this information can be used to guide visitor patterns depending on the sensitivity of nature values. Designing crossings of the path network and road network in an open landscape will result in lower visitor densities on the other site of the road than designing these crossings in a closed landscape.

Another factor that is important for managers is the so-called penetration distance of visitors into the area (see Hornigold et al. 2016). In our dataset we tried to find a relationship between path density and the penetration distance. This was not significant, so visitors tend to go into a certain direction regardless the number of crossings with other paths. However, our dataset did show a difference in penetration distance between dog-walkers and walkers. Further analyses are needed to provide guidelines with respect to the impact of the openness of the landscape on the distance people enter the area.

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GPS-Based Visitor Monitoring in Protected Areas Using Mobile Tracking Application Data – A Case Study in Black Forest National Park

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Introduction

With increasing visitor numbers and the diversification of recreational activities in protected areas (PAs), careful visitor management is required to avoid potential visitor conflicts as well as exceeding the carrying capacity of an area (Meijles et al., 2014). To preserve the area's resources and to ensure a positive visitor experience, detailed information about visitor behavior is needed to understand how the visitors' spatio-temporal concentrations and distribution patterns affect the area and to develop appropriate visitor guidance measures (D'Antonio et al., 2010). However, since efficient visitor monitoring techniques are challenging and laborious, many PAs lack comprehensive data on their visitors (Wolf et al., 2012).

Today, due to the progress in information and communication technologies and widespread mobile internet use, new, innovative approaches involving secondary crowdsourced volunteered geographic information (VGI) data are emerging (Hennig, 2017). Within a master's thesis in cooperation with Black Forest National Park (NP) in Germany, the potential of using such publicly shared location-based, user-specific data to monitor different visitor groups was investigated. The still very young national park has only recently approved a new official trail network, closing many formerly operated paths for touristic use, which made it all the more relevant to explore the visitors' exact spatial behavior within the existing trail network. It was thus examined to what extent using online available GPS-tracked routes via mobile applications is applicable and beneficial as an alternative, cost-effective method to provide data for visitor monitoring in PAs.

Methods

In a first step, various internet platforms were screened regarding the data availability of GPS-tracked routes by different user groups. After the sports tracking provider *Strava* [www.strava.com] has been proven the most suitable for our purpose, 486 GPS tracks within the Black Forest NP were downloaded for further analysis, distinguishing between the user groups mountain biking (MTB), road biking, running and hiking.

Using statistical evaluations of the non-spatial data, qualitative visitor information as well as temporal patterns of recreational use were investigated in detail. Assessing the visitor demographics allowed to classify visitors into tourists and residents (i.e. living within a 25-km radius around the NP). The temporal behavior of each visitor group was evaluated according to season, day type (weekday vs. weekend/holiday) and time. Average track distance, speed and duration of stay were analyzed, as well.

The spatial data was examined with GIS. Density analysis was used to identify general visitor hotspots. For a more detailed visualization of visitor distribution patterns within the trail network, a raster-based analysis was carried out to determine more and less intensively used path segments. This allowed to generate a heat map with high and low visitor use of the trail network.

Results

Data analysis showed that 56% of the data available originated from MTB. Besides, about 25% of the data covered road biking and 16% running tracks. Hiking activities (3%) were hardly available. The gender distribution was one-sided with 94% of the users being male. Most data originated from activities on weekends in late spring and summer, especially around midday hours. The analyzed users generally visited the park only for a limited time, extending their workout beyond the NP borders. The available user information further allowed to make visitor-specific observations. For example, it was demonstrated that a significant number of residents visited the park after 5 pm on weekdays, concluding a comparably high activity by after-work-visitors.

Spatial analyses demonstrated that certain areas of the NP were clearly more visited than others by the separate user groups, with some highly frequented trail sections by mountain bikers and visitors on foot alike (see Figure 1). Distribution patterns partly differed according to season, day and visitor type. Besides, especially mountain bikers were shown to employ trails not intended for cycling use, thus potentially representing a concern for resource change and diminished visitor experience. The accuracy and detail of GPS data generally also allow to identify off-trail movement deviating from any existing path infrastructure (D'Antonio et al., 2010). In this study, however, the only "off-trail" behavior in the park was illustrated to take place on formerly used trails not compliant with the new trail network anymore.

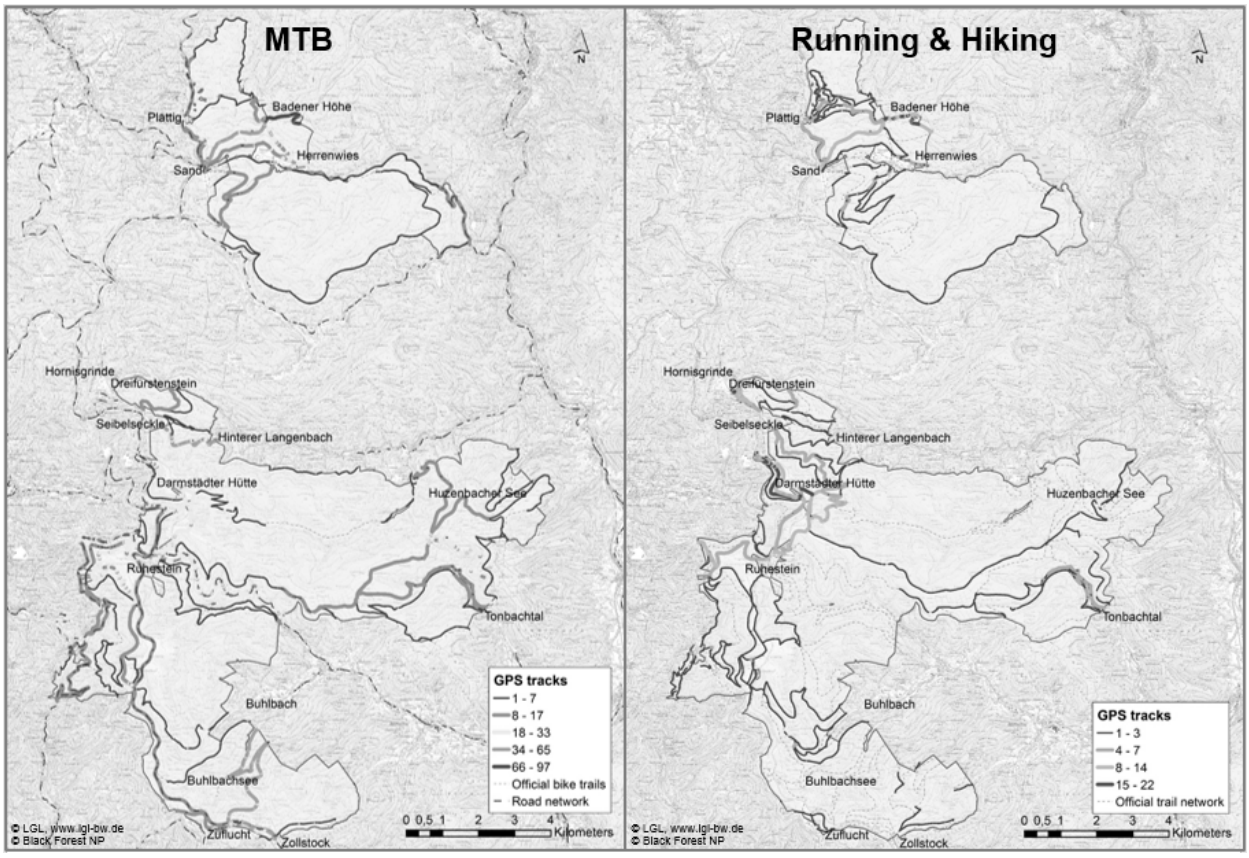

Figure 1: MTB and running/hiking use intensity of the official trail network in Black Forest NP. MTB use is depicted on official bike trails only, as well as on roads.

Discussion

The findings of the study demonstrated that valuable information can be derived from publicly available data, in this case providing a baseline assessment for Black Forest NP to help see how use patterns and resource conditions might be changing (Meijles et al., 2014). The data not only reveals closer information on the visitors themselves, but also allows to understand and anticipate some of their typical spatio-temporal behavior patterns and concentrations according to different sports activities. This knowledge can help PA managements to take preventive decisions related to designated trail management (D'Antonio et al., 2010). Further practical implications can be deduced, for example where to strategically place automatic visitor counters to determine use levels or where to place infrastructure. The data gathered on online GPS tracking depositories is thus suited for adaptive management, long-term monitoring and planning.

Still, the methodology is subject to certain limitations. The accessed track files on *Strava* proved to be fragmentary, not containing exact time information and therefore hindering specific analyses such as of the location and duration of breaks. Besides, the data and results originated from sports tracking application users only, who are generally assumed to be rather young, male and athletic (Francke & Lißner, 2017), and were thus not representative of the overall visitor distribution in the park. Nevertheless, a detailed differentiation of user-specific behavior could be deduced from the data, providing a realistic impression of cycling and running activities in the area. Combining this information with other monitoring data can help to get a more comprehensive overview about user preferences and to detect conflict potentials.

The applied approach can be a useful tool for PA management. It allows to easily acquire up-to-date temporal and spatial information about visitor behavior in possibly all PAs worldwide. More research is needed, however, to develop standardized methods and procedures. If appropriately used, though, the substantial amount of available online data represents a crucial information asset for PA management which can effectively complement data from traditional monitoring techniques and thus allow for a sustainable recreation and resource management.

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Monitoring Visitor Numbers with Computer Vision

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Every day, a large diversity of visitors is encountered in protected areas - dog walking locals, hiking tourists or trekking bikers. Knowing their quantities and economic impact provides valuable arguments in favor of designating parks and, thus, helps to conserve our planet's biosphere. Furthermore, nature-based tourism and outdoor recreation help to develop regions of the rural periphery. To quantify visitation, a long list of methods and instruments is available to our domain (see CHESSFORD & MUHAR, 2003). Nevertheless, each tool comes with specific pros and cons, e.g. false triggers due to wildlife or lack of detailed information about the visitors. At the same time though, each visitor group has specific economic characteristics and demands, as well as corresponding ecological impacts.
Utilizing cameras to count visitors has proven to be accurate, traceable and rich in features (ARNBERGER et al., 2005). However, extracting data from the imagery manually consumes large resources, limiting the utilization of camera observations to short-term monitoring projects. In this work, we apply and test computer vision to characterize visitors at the *Biosphere Reserve Schorfheide-Chorin* in Germany in an automatic manner.

Convolutional Neural Networks

State of the art algorithms, such as *convolutional neural networks* (CNN), are not only well-known for speech recognition and mastering the game *Go*, but also for solving image classification problems. Therefore these machine-learning algorithms are utilized in autonomous cars, earth observation and other fields to detect objects (ZHANG et al., 2017). They empathize visual perception using layers of locally-sensitive, orientation-selective and connected neurons. At first, these neurons are randomly initialized. Then, the software architecture is trained on specialized *graphical processing units* (GPU) using a large number of samples. Hereby the weights organize autonomously. The resulting rule-set then can be exported and deployed by others. It is interesting to stress, that while training costs large computational resources, predicting with the model is less intense. As many CNNs are protected by intellectual property rights and developing a new one was outside our scope, we utilized a system available under public domain. *You Only Look Once* (YOLO) has been developed by REDMON et al. (2016). Their CNN is very efficient and handles variable image sizes. Most important though, it generalizes well into new domains, as it was trained with millions of images in hundreds of categories queried from the Internet (REDMON et al., 2016). Among these categories are, for example, *backpacks*, *bicycles* and *dogs*, which help to characterize visitors segments (see figure a+b).

Field Experiment

The experimental set-up was installed at the *Chorin Abbey* within the *Biosphere Reserve Schorfheide-Chorin*, located 60 km northeast of *Berlin*. To identify visitor characteristics and their economic impact, a combination of field observations and the collection of imagery were conducted in the field. Therefore, a low-cost setup consisting of a *RaspberryPi 3*, a corresponding *PiCam* and a Powerbank (20.000mAh) was utilized. The device was installed

diagonally five meters next to the census line at 1 meter height. Finally, the system was configured to routinely capture an image once every minute (time-laps).
By default, the CNN retrieved fair results. During eight hours of observation, 365 persons were determined by the visitor counter. Compared to a manual reference sample, hereby only 4.4% of all visitors were missed at 0.3 false positives per window. While the miss-rate is acceptable, counting one additional person every three frames erroneously is not accurate enough. A qualitative assessment was conducted to point out possible mistakes. The results show that (i) it is difficult to isolate individuals in crowded scenes (see figure c). (ii) Small people in the background were detected (see figure c), although they were not included in the reference data, as we did not expect YOLO to be that sensitive. Last but not least (iii), bright tree trunks with a significant contrast to their environment sometimes were classified incorrectly as *person* in otherwise blank images. The most interesting about the pre-trained CNN, however, was its variety of detected objects. 17 *backpacks* were detected (82.4% accuracy). These, together with solid shoes, for example are an indicator for hikers. Also 8 *bicycles* were found in the image archive, whereof 75% were classified correctly. It has to be mentioned though, that one false positive was actually a wheelchair. Unfortunately, no dogs were observed, but nevertheless, this class is available in YOLO without the costs of conducting any parameter optimizations. The following figure illustrates the CNN's capabilities. Even in crowded scenes, covered and cut off objects are detected well.

Figure: Bounding boxes around classified objects detected by YOLO

Discussion

The approach of applying computer vision proves capable for quantifying people, or as in our application, visitors of protected areas. However, it is mandatory to respect the legal framework when using cameras. In Germany for example, identifying individuals poses a threat to their personality rights. In our field experiment, visitors were informed by a sign about ongoing camera observations. Along that, legal issues can be circumvented by processing the images instantly, without backing them up. Otherwise the most crucial parameters are the camera lens, image resolution and distance to census line.
We found CNNs very promising for this domain, as they are capable of extracting specialized visitor characteristics. We also tested and compared two other technologies (*Change Detection*, *Histograms of Orientated Gradients*); however, CNNs resulted in the highest information gain (STAAB, 2017). The introduced CNN by REDMON et al. (2016) provides user-friendly access to this latest computer vision technology. At the same time, we want to stress its possibilities to be retrained - e.g. to add a specific object class. Thus, opposed to commercial visitor counters, herewith an open-source project is presented, which may be

developed further according to its operational purpose. Consequently, it is also possible to apply the methods onto imagery captured with motion triggered cameras (MILLER, 2017). Last but not least, it may be interesting to measure the distance between objects (i.e. dog and person as leash indicator). The methods were wrapped into an *R* package named *wuepix*, which ensures a consistent interface. It is public accessible online and can be downloaded via *https://github.com/georoen/wuepix*.

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New methods for monitoring and management of visitors in recreational and protected areas: lessons learned, benefits and concerns 2

Monitoring methods of winter backcountry recreation in a wildlife sanctuary

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Introduction

Wildlife management is an important issue in areas near human settlements and agricultural landscapes, such as the European Alps. In wildlife management, there are always questions such as whether populations of wildlife species are too large or too small and how livestock and predators interact (Robin et al., 2017). One management method for protecting wildlife populations is the definition of wildlife sanctuaries, which is accompanied by regulations that affect recreational uses, for example, in winter time snowshoe hiking or ski touring are only permitted on defined routes. The reason for such regulations is the high impact of backcountry winter sports activities on wildlife fitness, which has been proven in a broad range of literature (e.g. Ingold, 2005).

In the field of recreational activities, a rapid increase in snowshoe hiking and ski touring has been recorded in Switzerland. As a result, the number of Swiss winter sports enthusiasts aged between 15 and 74 increased by approximately 250% between 2000 and 2014, from around 70,000 to around 250,000 (Lamprecht et al., 2008, Lamprecht et al., 2015). It can be assumed that during the winter season, approximately 3,000 groups might be in the mountains on a winter tour on any single day. Current ZHAW research also suggests that the sharp increase in backcountry winter sports activities is moving these activities to other, even less frequented areas. For example, recreationists are spontaneously opting for alternative destinations or choosing to avoid routes in the future if the number of visitors on the planned route appears to be too high. This increases the area required for backcountry winter sports activities and as a result disturbances to wildlife are more likely and the undisturbed areas become smaller (Rupf et al., subm.).

In order to minimize the disturbance caused by skiers and snowshoe hikers, the Federal Hunting Ban Areas (EJBG) have a set of permitted routes approved by the competent cantonal authorities. The Federal Office for the Environment (FOEN) recommends the assessment aid for snow sports routes in protected areas for wildlife (Bolt, 2014), which has been used several times during its development and since its publication. While this method follows a pragmatic and objective approach, it is only partially accepted by snow sports representatives as a valid basis for negotiations on permitted routes.

In order to objectively assess the impact of backcountry winter routes and to increase acceptance of the results, the transparent recording of parameters such as the number of athletes or their area load is helpful. In this study we tested various different monitoring methods.

Methods and initial results

Data collection is still ongoing until end of May 2018. Therefore, in this abstract we describe the monitoring methods applied and our initial results. The final results will be presented at the conference.

The monitoring project was planned in collaboration with the cantonal authorities and was accompanied by stakeholder meetings. Additionally, information about the project was communicated to the public in newspaper articles as well as radio and local TV-broadcasts.

Table 1: Backcountry monitoring methods applied in the Kaerpf wildlife sanctuary, Glarus Switzerland; winter season 2017/2018.

Method	**Information gained**	**Advantages**	**Disadvantages**	**Experiences, remarks**
Aerial photos	Counts for specific and larger areas	Good overview of usage over a large area; non-intrusive	Dependent on diverse factors, such as snow conditions, weather conditions, daylight; only captures data since the last snow fall; no information on usage in forests; time-consuming analysis; for ski tourers, only descents could be counted	Orthophotos and oblique photos possible (oblique photos used in this study); airplane costs for oblique photos not prohibitively high
Automatic infrared cameras	Counts at specific sites (routes or smaller areas), type of activity	Additional information about the person, group, activities	Visibility of the camera; vulnerability to vandalism; time-consuming analysis; sensitive to data privacy; manual data collection needed; slightly intrusive;	Various incidences of vandalism occurred; blurring filter used; a machine learning photo analysis project is ongoing (blurring filter represents a challenge); data collection and functional check at the same time
Backcountry sports community websites	Possible routes in an area in addition to the officially communicated routes	Description of the route; non-intrusive	No visitor numbers available;	Valuable base information about the usage of an area
Cellphone usage data (in Switzerland)	Overall use of an area	Long analysis periods possible; non-intrusive; additional information about the visitors	Costly; no information about seldomly visited areas; min. grid cell 1 ha; min. visitor number 20; only aggregated data available	Not applied in this project; data availability differs in different countries
Local experts of backcountry winter sports and wildlife management	Subjective estimation of recreational use of a route or area and location of wildlife habitats area	Provides an overview of the different routes; experts are part of the project; non-intrusive	Uncertainty of the results	Even for experienced experts, difficult to estimate frequencies; widely varying estimations were made by the local experts

Passive infrared counters	Counts at specific site on routes	Long analysis periods possible; data transfer via GSM; remote functional check possible	No information about the type of activity; calibration counts needed; counts could be affected by weather conditions; adjustments required for snow depth; slightly intrusive	No functional problems occurred
Summit books	Counts at summits	Long analysis periods possible; cheap; sometimes additional infor-mation provided about the group; non-intrusive	Percentage of registrations is unclear; only on a few peaks	Very unreliable data; only available for very specific locations; the tradition of signing a summit book differs between peaks

As interim findings, we can state that the estimations of the wildlife habitat areas differed a lot between wildlife management experts and backcountry winter sports experts – the latter marked much larger areas whereas the wildlife experts indicated smaller and more detailed areas.
Compared to the passive infrared counter,, both groups of experts clearly underestimated the number of days of use in the low-level categories up to ten recreationists per day.
Due to the low-level usage of the area, as result of diverse applied monitoring methods, cellphone data could not be integrated in this monitoring project because of policies on data protection. Further analysis is still ongoing.

Conclusion

Optimally, in larger wildlife sanctuaries, the permitted route system for backcountry winter sports activities should be defined as the result of a participatory negotiation process. Of course, it is not possible to satisfy everybody's wishes, but the probability of a successful negotiation process is higher, if all stakeholders can rely on trustworthy figures for recreational usage. Based on this information, the impact of recreational use on different wildlife species and populations can be estimated and further management actions regarding the permitted route system can be planned with a majority of consensus.
We tested a variety of monitoring methods and found that a combination of methods needs to be applied to answer different questions about recreational usage. We received several critical responses to our visitor monitoring project and there were several incidences of different kinds of vandalism, especially to the automatic cameras.
The mixture of monitoring methods used did not include the application of cellphone usage data. However, in remote areas, such as the Kaerpf wildlife sanctuary that was examined in this project, cellphone usage data is very limited. Additionally, privacy policies will be an obstacle to apply cellphone data in large and mountainous areas with a poor network coverage.
So far, based on our results, we are convinced that it is important to integrate automatic counting systems in a visitor monitoring project even in large and remote areas, and especially in first campaigns. Based on these counts, it would be possible to develop visitor estimation models relying on other secondary data.

Acknowledgements

We would like to thank the Canton of Glarus, Department of Game and Fisheries as well as the Swiss Federal Office for the Environment (FOEN), Wildlife and Forest Biodiversity Section for their good collaboration and financial support. Additional thanks go to all other people and organisations who were actively involved in this project.

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The impact of hiking on visitors' consumer behavior on the French shores

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Introduction

Hiking is the most often reported physical activity among the French. The term itself implies a broad range of pedestrian activities of various length and intensity. Although many attempts have been made to understand its diversity, knowledge on consumers remains fragmented. Therefore, the territorial impact of hiking is a relatively untapped topic with particularly limited data on trails that are equipped with digitally available information for visitors.

Our study is part of the IMTERPED (Territorial Impacts of Pedestrian Activities) project funded by the "Fondation de France". The project focuses on innovations in the sector of coastal walking tourism and their socio-economic and socioecological impacts at five French coastal areas: Corniche de l'Estérel (Provence-Alpes-Côte d'Azur), Ile de Ré (Poitou-Charentes), Lac Léman (Auvergne-Rhône-Alpes), Presqu'île de Quiberon and Baie de Saint-Brieuc (Bretagne). The interdisciplinary perspective of the project provides a cross-understanding of coastal pedestrian leisure activities by adopting different, yet interrelated scientific approaches, such as historical, sociological, geographical, legal, political and artistic perspectives. In this context, the present communication focuses on the analysis of hiking's consequences on the leisure consumer behavior at coastal sites.

Problem

The many faces of hiking are cumbersome to capture owing to the heterogeneous nature of these activities: often self-organized, undocumented, etc. The several attempts of categorizing hikers provide only restrictive classifications of individuals without taking into consideration that one might act differently in different situations (for example an avid hiker might adopt non-typical behavior according to various situations, such as particular spatial settings, different travel party compositions, extreme weather conditions, etc.).

The present study offers a theoretically and empirically grounded approach of understanding the impact of spatial setting on hikers' consumption behavior. We propose to analyze combined causes instead of adopting a symmetric perspective of linear model's analyses(Ragin, 2008), as various factors are likely to influence behavior, such as personal attitudes, spatial planning, travel party composition, etc.

Our aim is to reveal how a particular spatial planning ("digital trail") influences hikers' consumption behavior and to analyze this within the complexity of its context. Therefore, we are not seeking to provide with another typology of consumers, but to understand consumptions at particularly equipped sites. Accordingly, we aim to understand the joint effects of a set of factors (such as the importance of pre-consumption cognitions and behaviors, prior visit experience, on-site circumstances and personal characteristics) have on "digital trail" visitors' consumption behavior.

Analytical framework and hypotheses

The figure below provides a general theory of visitors' leisure consumption at sites equipped with digital information resources. The model is based on the "General Theory of Tourism Consumption Systems"(Woodside & Dubelaar, 2002), adapted to the analyses of leisure activities starting from the tenet, that tourism and leisure are indistinguishable from one another, and thus, they are interpreted and analyzed along the same continuum (Carr, 2002). The model focuses on the direct and indirect relationships between the relevant variables for a discretionary visit to one of the coastal study sites. The one-directional arrows summarize our hypotheses regarding leisure consumption systems.

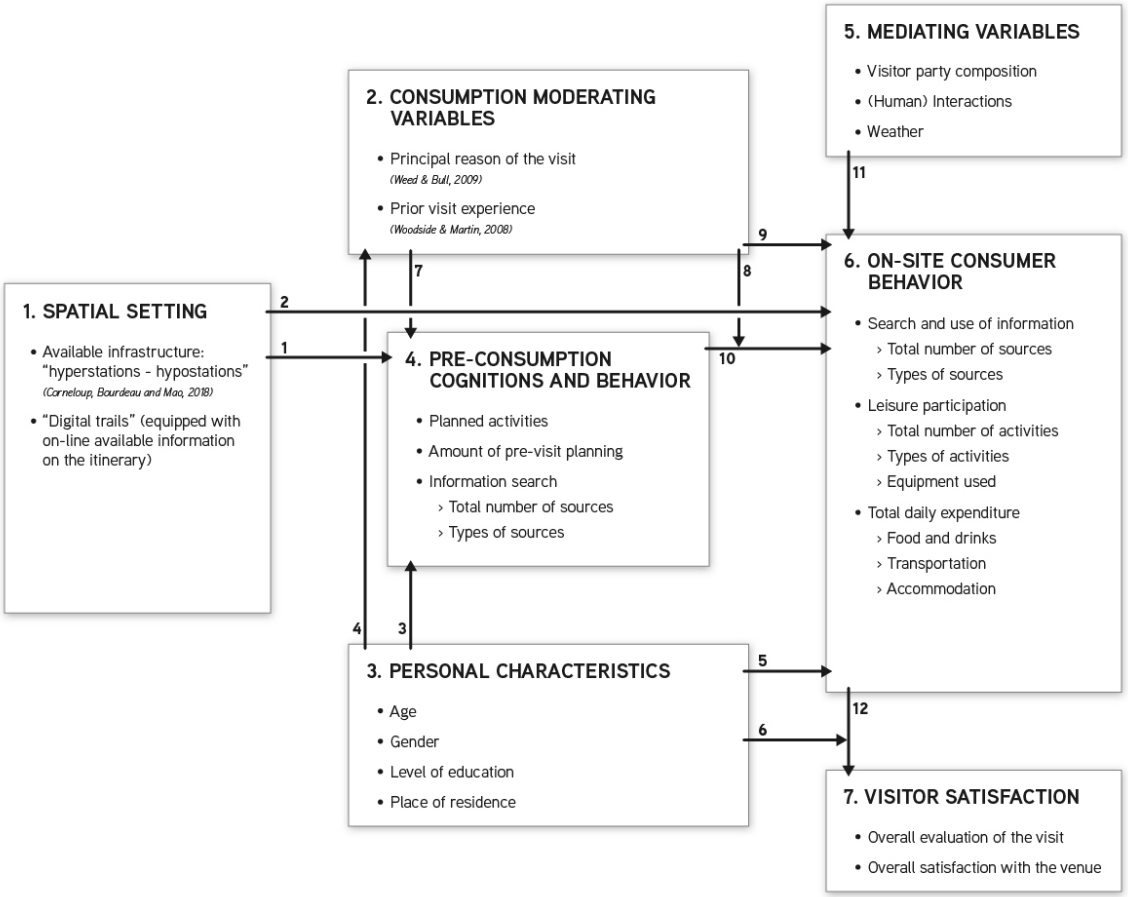

Figure - General theory on leisure consumer behavior at "digital trails" (Model based on Woodside & Dubelaar, 2002)

In this , various hypotheses - as presented in the figure - have been established based on the existing literature on factors influencing consumer behavior in a leisure setting, such as the effects of the prime motivation of the visit(Weed & Bull, 2009), prior visit experiences to the destination, age, gender and other demographic characteristics, etc.

Spatial planning of the territory - combined with other influences –seems to represent a determinant factor for consumers. Corneloup, Bourdeau and Mao (2018) distinguish 3 types of spatial planning according to the available tourism and leisure products and the stakeholders' (mostly marketers' and decision makers') intention on utilizing the territory. In this manner, taking French ski resorts as examples, they have identified nature sites with a high aspiration for tourism development, offering various tourism and leisure services, which they call hyperstations. Conversely, hypostations are mentioned, where the emphasis is

placed on practices in line with a relational and social ecology. In between the two extremes we find resorts which are seeking balance between naturalness and urbanity, territoriality and inhabitability, the wild and the domestic and tourism and recreation, striking a balance between the hyper-resort model and the immersion in alternative ecological practices.
A place, often observed from an ethnographical approach releases an atmosphere, forms situations and guides action, creates social links and interactions(Corneloup, Bourdeau and Mao, 2006, p.13).Starting from a spatial setting perspective, our analysis is aimed at visitors of "digital trails", that is a designated trail equipped with digitally available information about the itinerary. Therefore, our study takes an interactionist perspective with the objective to understand visitor experiences and consumption patterns at these specially equipped sites.

Methodology and Perspectives of the Study

Data is to be collected during the spring/summer period of 2018 using a mixed methodology: (1) a questionnaire is to be completed by visitors of the "digital trails" about their experiences and consumption in relation to the site, the visit and the pedestrian activity they are involved in. Quantitative data is to be completed by (2) semi-structured interviews with hikers, and (3) participant observation of the sites and visitors using "digital paths".
The survey instrument comprises of issues about the afore-mentioned variables including questions on pre-visit planning, cognitions and behavior, on-site experiences and activities and evaluation of the experience and the destination. Interview questions are to be specified after the first results of the survey with the aim to broaden our knowledge on emerging issues. For each field study, an observation guide is used including items about the spatial setting, particularities of the site and the visit and particularities about the observed populations.

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Looking back at recreational activities in protected areas using VGI from web-share services

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Introduction

Recent literature on recreational uses and Recreational and Protected Areas (R&PA) has shown that VGI from web-share services such as GPSies, Wikiloc, MapMyFitness or Flickr, among others can be used to map outdoor activities such as Mountain Biking (MTB) or Running and Walking. In addition they can be used to map spatial patterns of these activities in these territories (Nogueira Mendes et al 2012; Norman and Pickering 2017, Walden-Schreiner *et al* 2018). The massive use of these services, nowadays through smartphones, photographic cameras and affordable handheld GPS units, has been made available to protected areas' managers and researchers, thousands of tracks and points depending on which service or APP is more popular around each study area or country, leading to the development of new monitoring techniques.

Even in the case where issues of representativeness of these data sources can be raised – i.e. not all users or visitors use such devices or services, many do not upload their tracks or photos, and many of those that do it, do not share them outside their friends or family – the insights produced with these new monitoring methods are a powerful tool for R&PA management, even with the multitude of existing platforms.

Such data, due to the total amount of tracks/photos gathered, has been used to map favorite, informal or even illegal trails, which by itself is useful for recreational managers and planners, but less has been done regarding anything else than mapping uses at a point of time – usually when the data is collected or made available. Some of these web-share services are now over a decade old which might constitute a time series in terms of monitoring. Do these reflect any change in trail uses or visitors' distributions?

The objective of this paper is to explore if datasets from web-share services collected today can also reflect past changes in trails' use within R&PA providing a new added value to these data sources – the ability to look back in time.

Methods

GPSies, one of the oldest web-share services, set in Germany in 2006, holds over 5.3M tracks with a total amount of 515.85M km of which 64% belong to tracks that were uploaded and classified by their owners as suitable for "by wheels" activities (GPSies, 2018). Besides the ability to download up to 250 tracks from each query, this service allows track owners to register up to 95 individual characteristics for each track including country, track and user names, total length, positive altimetry, date of upload, etc. Following Nogueira Mendes *et al* (2014) tracks were downloaded through selective queries from Palmela, and Sesimbra (within Arrábida Natural Park - PNArr, Portugal) to ensure that all publicly shared tracks that crossed the study area (3510) were retrieved. All tracks that were classified by their owners as suitable for other activities besides MTB as well as tracks with extent above Percentile95 (> 124,507 km) were deleted reducing the final dataset to 2847 tracks submitted by over 448 users.

The dataset was then split by years according to the upload date and tracks submitted up to 2010 were merged due to their reduced number. Each sub dataset (holding from 209 to 674 tracks) was rasterized to a grid of 25 x 25 m and reclassified into 10 use classes and combined (using Combine from Spatial Analyst Toolset in ArcGIS 10.5.1) with the next year sub dataset, following Campelo and Nogueira Mendes (2016), producing 7 raster images later used to measure changes within use intensity through confuse matrices.
Results were plotted against the park management plan and the park roads and paths network, and later analyzed with the park rangers to be validated and explained under the objectives of this study.

Results and discussion

Use intensity within Arrábida for each year raster shows similar patterns, which is confirmed by the combined analysis. On average, 92,493% of grid cells had no change (i.e. use intensity in one year was exactly within the same use class of the next year), 3,897% were less used and 4,076% were more used than the previous year. When plotted against the road and paths network, small changes were detected. For example, one abandoned path taken by Macaronesian flora (the ecological climax of Arrábida's habitats) after the last big fire on the park in 2004 was less, and less used and also abandoned by mountain bikers (Figure 1a). On other hand, illegal trails used for downhill in Serra de São Luis (one of the highest points of PNArr) were more or less used depending on how much work was done by local bikers in order to keep the trail functional – cutting tree branches or clearing vegetation, etc. (Figure 1b).

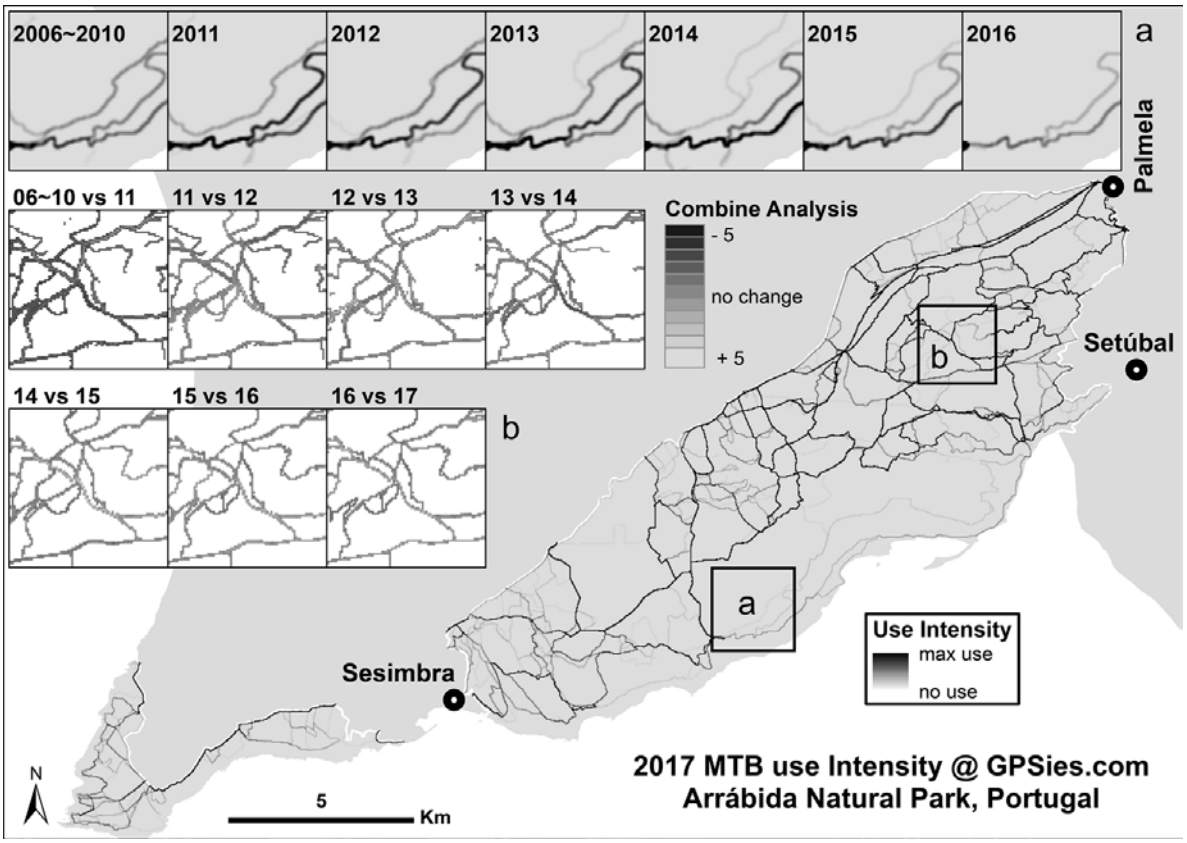

Figure 1 - Use intensity of MTB in Arrábida Natural Park, Portugal. a) detail zooms on an abandoned path. b) combined analysis of downhill on illegal trails.

Park staff reported that illegal rides and trails interventions have happen, and years of higher use resulted on more complains by land owners. Informal, illegal trails or trespassing, three of major conflicts of MTB within natural areas can be easily spotted and confirmed using these data sources.

Conclusions

The ability to look back to R&PA use trough web-share services may be limited due to such services characteristics discussed previously. Nevertheless, due the massive use of these services, results are easy and fast to achieve, making such data sources a valuable resource for managers and recreational researchers. Within public open share services like GPSies where most of the tracks can be linked to a single user, there are still other topics to be tested and explored, such as user's displacement for example.

As shown on previous works, detailed monitoring regarding spatial use of these territories can be made, especially for the most popular recreational activities such as MTB, hiking and nowadays trail running. Making use of Web2.0 and current ways of life where almost every outdoor activity is immediately reported on-line, could be fast and easy to access and identify for example new informal or illegal trails allowing quick action with all its advantages.

Acknowledgments

This paper was made possible with the support of CICS.NOVA - Interdisciplinary Centre of Social Sciences of the Universidade Nova de Lisboa, UID/SOC/04647/2 013, with the financial support of FCT/MCTES through National funds.

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Using volunteered geographic information to assess the visitor use of parks

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Introduction

With increasing numbers of people using parks for recreation, it is important to understand about when people visit, what they do and where the go during their visit. Trail counters are often used to assess visitor numbers and although quite accurate, these don't often provide managers with information about off trail use or what activities people are undertaking. With the increased popularity of social media, people are now sharing geodata about their visit to parks, including in the form of GPS route data on fitness websites such as Strava, MapMyFitness and Wikiloc. This type of volunteered geographic information (VGI) is starting to be used by researchers and managers to assess visitor use of parks (Senaratne et al., 2017). But which websites, what sort of information is available and what are the limitations of this type of data? We conducted three research projects to determine: (1) what types of VGI is available for different parks, (2) how does route data vary among websites, (3) how useful is this VGI for assessing visitor use across and within parks, and (4) how accurate is this data compared to trail counters.

Study Area

The three projects were conducted in south-east Queensland, Australia where there are a large number of parks including world heritage areas. Some of these parks are close to cities such as Brisbane where hiking, mountain biking and running are popular, while others are more remote and less popular.

Methods

The first project compared the number of routes for 40 parks to determine how much data is available and what park characteristics effected the number of routes posted on three popular websites: Strava, MapMyFitness and Wikiloc. The second project compared the amount and quality of route data from MapMyFitness, Wikiloc and GPSies for three parks ranging from urban to remote to see which websites provided the best data for overall use and which was best to asses off trail use. The third project focused on popular reserves close to Brisbane to compare differences in patterns of use by mountain bikers, runners and hikers based on route data from MapMyFitness This route data was also compared with trail counter data to assess the accuracy of VGI.

Results

Volunteered geographic information was available for 39 of the 40 parks assessed, with 23 parks having >50 routes, and over 8,500 routes for the region on MapMyFitness. Parks bordering urban areas had on average 3.5 times the number of routes compared to those further away ($P<0.05$). Of the three platforms, MapMyFitness was the most popular for urban parks with most routes posted in 2013-2014, but few in 2017. Wikiloc was more popular for remote parks, provided better data about off trail use and does not appear to be declining in popularity. Route data from MapMyFitness can be used to compare patterns of use among activities. For example, in large urban reserve network, mountain biking was more popular

than running and walking, with mountain bikers travelling further and using more parks. There were also differences in the total distance travelled, and which days of the week were popular among the three activities. Finally the route data was good at predicting the relative popularity of individual trails when compared with trail counter data ($P<0.001$, $R^2=0.681$).

Discussion

Volunteered geographic information from fitness websites provides useful information on the relative popularity of parks, the amount of on and off trail use, and on differences in the patterns of use among activities. Similar results have been found in the limited number of other studies using VGI to monitor visitors in natural areas (Campelo & Mendes, 2016; Heikinheimo et al., 2017; Lera et al., 2017; Norman & Pickering 2017; Santos et al., 2016). Route data can be sourced rapidly from many websites and provides a pre-existing data source for researchers and managers to evaluate visitor use within a wide range of parks. Understanding the benefits and limitations of VGI is important. For example there is variation in the popularity of websites, including among different types of users and for different types of activities, and in the number and types of routes available among parks. Also, VGI will not record use by visitors adverse to these types of technology and social media. There can also be privacy issues in using social media data even when it is publically available. Finally websites vary in popularity over time, they differ in the types of data posted and in the accessibility of their data to researchers and managers.

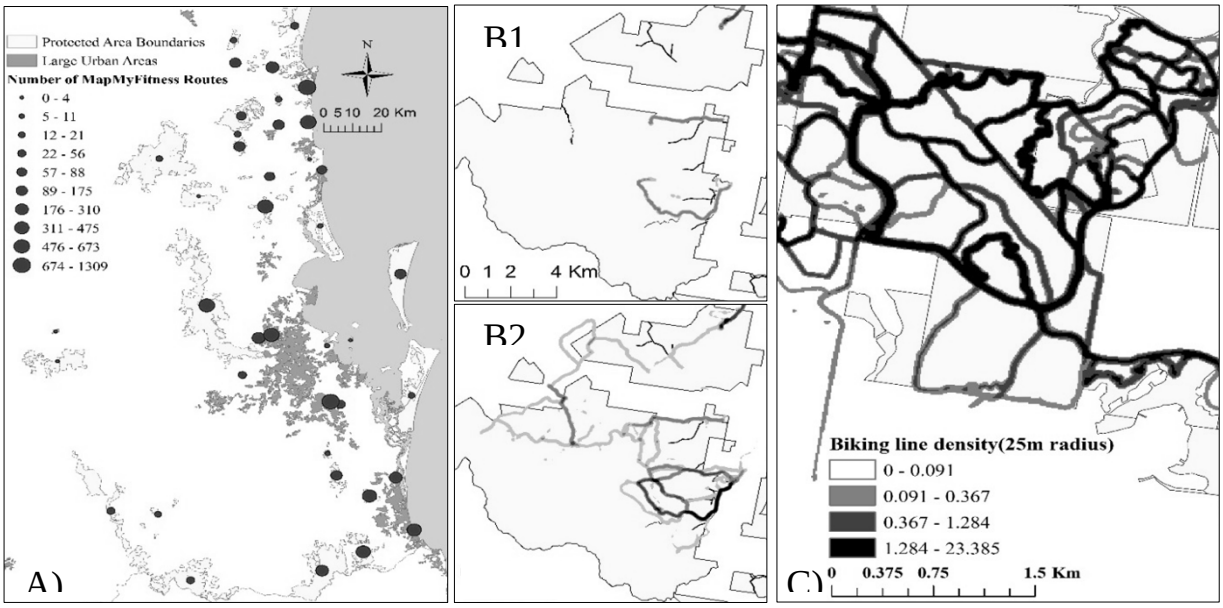

Figure One. Results from three projects assessing VGI data in south-east Queensland, Australia. A) The total number of routes from MapMyFitness for 40 parks. B) Spatial differences in off trail use based on route data from MapMyFitness (B1) and Wikiloc (B2) for Mount Barney National Park. C) Differences in the intensity of use of trails by mountain bikers in Daisy Hill Conservation Park based on route data from MapMyFitness.

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Multicriteria analysis a proposal of revitalization of the ancestral trails of the Serra da Estrela Natural Park (PNSE)

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Introduction

Ancestral humanization of natural spaces is a mark of the Mediterranean protected areas. The economic, social and cultural relations developed in these territories generated a patrimonial legacy that provides them singular landscapes with high biodiversity and established conservation status.
From the 1970s onwards, the demographic and socio-economic reconfiguration of these spaces has led to the decline of traditional structures and activities, compromising their role in regulating and balancing ecosystems.
More recently, touristic and recreational activities demand for natural spaces has been seen as an opportunity to revitalize these natural landscapes providing these territoires with new functionalities and allowing the maintenance of its historical meaning, while conserving their identity.
This study proposes the development of a methodology based on multicriteria analysis and Geographical Information System (GIS) that takes into account different levels and types of information, to design a recreational network for Serra da Estrela Natural Park suitable to accommodate both conservation needs and visitors and users demand.

Study Area

Created in 1976, *Serra da Estrela Natural Park (PNSE)* is the second largest protected area in Portugal. Located on the mountainous area of the *Cordilheira Central*, it has the highest altitude point (1.993 m) of Portugal mainland.
The patrimonial complex is composed by traces derived from quaternary period glaciations, as well as important elements of fauna, flora and exclusive endemism's being part of *Natura 2000* (PTCON0014) and RAMSAR reserves.
In the park area, territorial humanization is constricted by the presence of snow which imposed the development of less favourable agricultural practices, leading in its extreme to transhumance - seasonal movements of populations.
These movements contributed to the development of an extensive network of paths, has it happens in other European mountain areas known as *calles* (in Italy), *cañadas* (in Spain) and *Canadas* (in Portugal). These elements result from the traditional management and regulation of grazing, structured in the form of marked paths for the movement of cattle. Nowadays these movements subsist in a residual form, being carried out in a smaller scale and frequency which as lead to the decline and abandon of these structures.

Methodological Approach

A GIS based model was designed using a two-step approach (figure 1). Part I mixes users preferences (evaluated from Volunteer Geographical Information - VGI), environmental characteristics, historical cartography, land management plan, etc. (Bizarro *et al.*, 2016), and

Part II generates optimal paths according to a flexible multi-criteria analysis outputs, depending on stakeholders preferences.

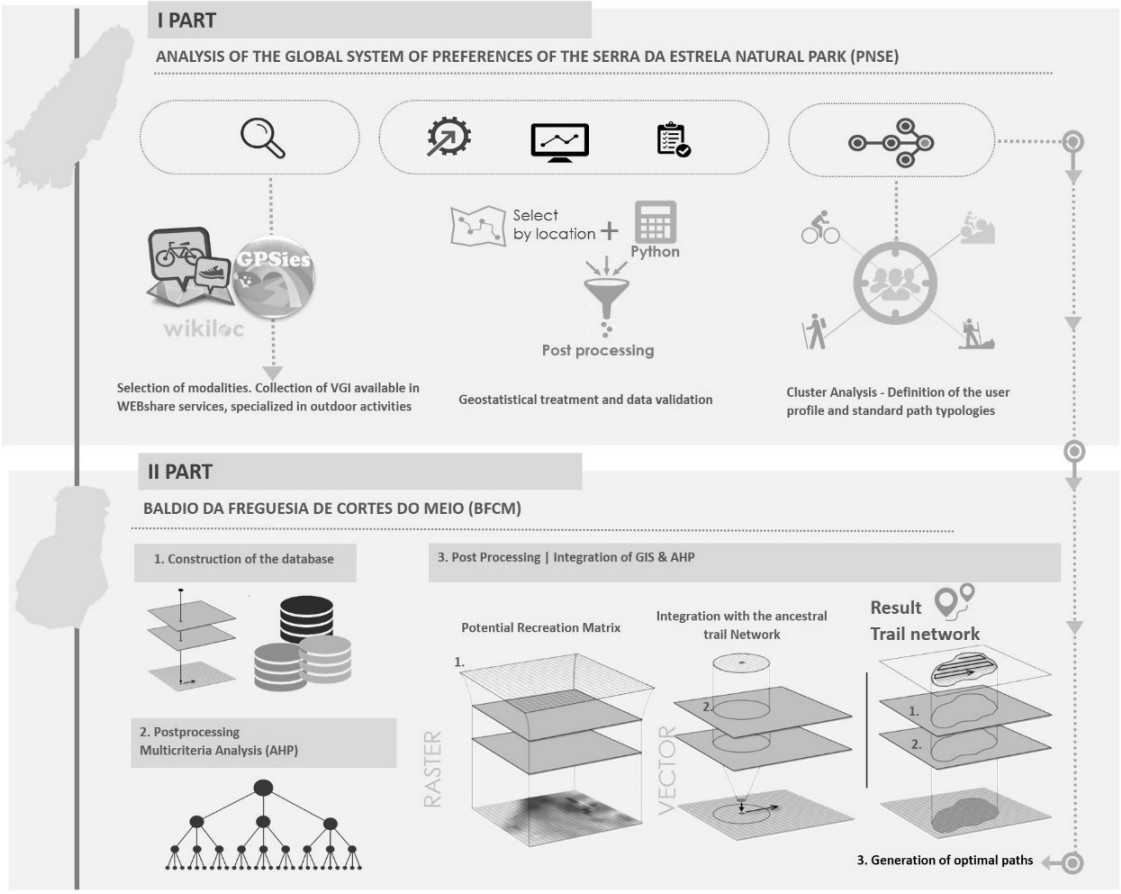

Figure 1 - Methodological Approach

First part focuses on assessing the overall diagnosis of user preferences (within PNSE) regarding the most popular outdoor activities. Inspired by Nogueira Mendes et al (2012, 2014) the diagnosis took into account the selection and collection of variables based on available VGI through on-line platforms for mountain bike, cycling, hiking and trail running. Subsequently, the collected information was integrated in a database for validation, statistical treatment and spatial modelling.

To conclude the first step, a cluster analysis allowed the definition of path typologies according to users' profile.

Thus providing a set of basic elements for the second part, developed at a higher scale consisting in criteria definition for obtaining pedestrian and cycle paths that enable the redefinition of the ancestral rails network in the community area of *Baldios de Cortes do Meio* (Bizarro, 2017). Besides the above mention elements other dataset were loaded, such as altimetry, land management plan, land use, etc. The key element of this phase is a multicriteria analysis, using the Analytic Hierarchy Process (AHP) method as a tool for defining criteria weights. These can be adjusted according to several criteria such as landscape, habitats sensitivity, activity, user profile, path difficulty or ease of access, etc. Then, through GIS integrated operations, it was possible to extract a grid of potential recreational value of the territory. In this coverage, each cell is assigned with a value expressing its suitability, which is then linearized through aggregation functions, hierarchizing the zonal value of each section of the pre-existing road network, according to its legal and recreational ability.

Conclusions

Tourism and recreation in protected areas is a growing global phenomenon demanding for better and quicker methods not only for monitoring but also to build a structured offer for visitors and users. Also the availability of information generated by the massive use of new technologies and social media, the incorporation of open source data and VGI, constitutes relevant and dynamic data sources, whose value and consistency should be reinforced.

Accordingly, the proposed methodological approach fits the actual needs for managing recreation and protected areas, providing a flexible and effective model that can be modified according to different users, objectives (ex. accessible routes for people with reduced mobility) and easily applied by different organizations to other territorial contexts, adapting to the existent demand.

Regarding the incorporation of the AHP method, it should be noted that this method has its own characteristics that guarantee consistency of decision processes, proving to be a suitable procedure for the proposed spatial analysis typologies.

For this specific case study, the option of establishing routes based on the revitalization of the ancestral road network reveals benefits in minimizing issues related to legal conflicts, safety and carrying capacity.

The proposed process enables the construction of an adaptive model for managing protected areas, which promotes the improvement of policy making ensuring its sustainable development.

Acknowledgments

This paper was made possible with the support of CICS.NOVA - Interdisciplinary Centre of Social Sciences of the Universidade Nova de Lisboa, UID/SOC/04647/2 013, with the financial support of FCT/MCTES through National funds.

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A decade worth of progress in the participatory monitoring and management of visitors in recreational and protected areas

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Introduction

Visitor monitoring in Recreational and Protected Areas (R&PA) has seen a rapid advancement in the implementation of new techniques and technologies over the past decade. This has dramatically increased our capacity to gain insights on the numbers, profiles, perceptions, motivations and expectations of visitors, and other critical measurements for R&PA management. This progress has however also raised questions about the niches which these new techniques and technologies fill, their benefits and the opportunities that arise, along with the concerns about employing them. Importantly, how well do these new techniques compare to traditional, more established forms of visitor monitoring? This presentation aims to answer some of these questions while providing an introduction and overview of the progress in participatory visitor monitoring techniques and technologies over the past decade with a focus on volunteered geographic information (VGI), public participation geographic information systems (PPGIS) mapping and tracking (GPS tracking). The authors present and evaluate these methodologies in the context of a literature review, empirical studies and by drawing from their combined knowledge of over 20 years in people monitoring to identify advantages and disadvantages compared to traditional techniques.

Volunteered geographic information (VGI)

R&PA visitor monitoring that relies on VGI capitalises on the data wealth contained in web 2.0, and mines on-line content in multiple formats of tracked movements, text, image, sound or video. Varied VGI platforms and services which have emerged during the last decade and a half can be accessed. The commonality among these multi-facetted systems are the geo- and time-stamped data, and the wide dissemination of data through web-forums, blogs and social media like Facebook, Youtube and Flickr or services focussed on sports and exercise such as GPSies or STRAVA. Whether free of cost, “freemium” or paid, these systems attract worldwide communities of engaged users. VGI have provided new information regarding use and users of R&PA, most recently to extract spatial locations and intensity of recreational activities such as mountain biking (Campelo & Nogueira Mendes, 2016) (Fig. 1 Top left) and running (Santos et al., 2016). Other activities such as geocaching (Fig 1 Top right) showed value to determine preferences and motivations of R&PA visitors (Santos et al., 2012).

Public participation GIS (PPGIS) mapping

Much of the information that R&PA require is location specific, such as which facilities visitors use or what values they associate with specific areas. The most effective way to collect, visualise and manage location-specific information is through GIS. If such data were collected with surveys or interviews, they would need to be manually assigned to map locations which is time-consuming and error-prone. In contrast, online PPGIS, capitalizes on web-GIS where people explore and comment on customised online maps, for example, to

mark specific locations for undertaking a specific activity in R&PA or for suggesting management actions (Fig.1 Bottom left). That way the information is assigned directly to its location (geocoded) and can be exported for analysis and visualisation with GIS software (see Wolf, 2015). Sampling undertaken for PPGIS research is typically more purposive and the data collection more structured compared to VGI systems. The past decade has witnessed significant progress in the application of PPGIS mapping as evidenced in more than 80 publications, presenting new solutions and challenges.

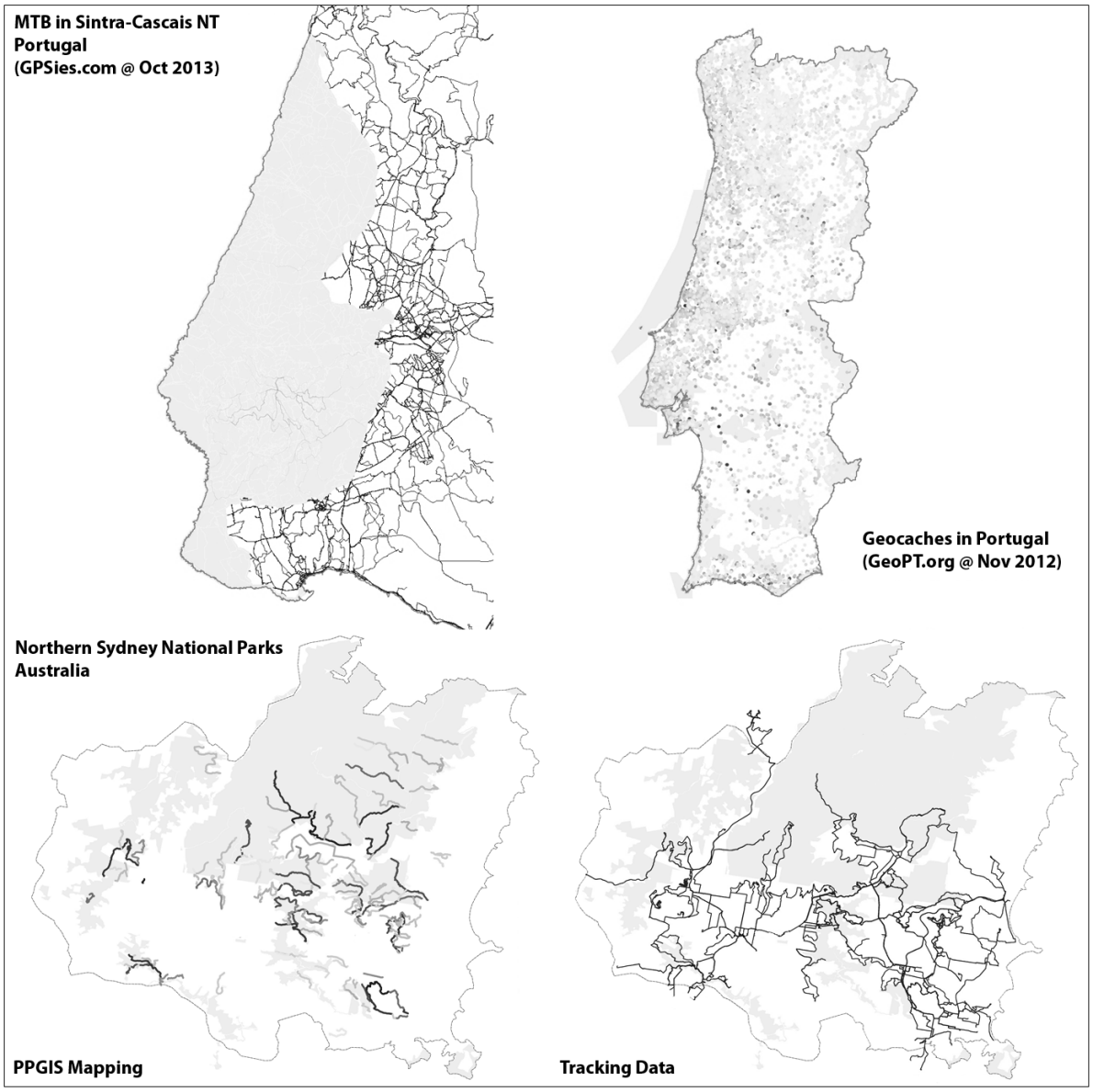

Figure 1. Top: examples of VGI for use intensity of mountain bike in Sintra-Cascais Natural Park (left) and Geocaching in Portugal (right) (adapted from Campelo & Nogueira Mendes, 2016; Santos et al., 2012). Bottom: examples of PPGIS mapping (left) and tracking data (right) inside and outside of Northern Sydney national parks in Australia showing favourite networks of rides (Wolf et al., 2018; Wolf & Wohlfart, 2014; Wolf et al., 2014). More intensely coloured tracks/points indicate more popular mountain bike rides or geocaches.

GPS tracking

GPS tracking is another form of PPGIS which has evolved rapidly over the past decade as evidenced by the rate of papers published annually, including more than 50 GPS tracking papers in the tourism and recreation discipline alone. Typically, participants are equipped with a GPS data logger that tracks their travels (e.g., Fig.1 bottom right) but alternative modes of tracking have emerged including mobile phone and Bluetooth tracking, photo repositories and geocoded social media. GPS tracking studies can be scaled from local to global which evidences the versatility of this technique.

Pros & Cons

Studies to date highlight the clear advantages of these new methods: (1) they can generate massive amount of data (some VGI services have over millions of registered users, tracks, photos, etc.); (2) they can generate detailed information on visitor profiles, distributions and preferences, which perhaps is not required for routine R&PA monitoring but highly useful to address specific management questions; (3) both VGI and GPS tracking produce whole networks of travels (vs. singular location points) enabling sophisticated analysis with great visualisation options; (4) require no manual data entry if administered online; (5) data are independent of the sampling period (some VGI data can cover over a decade worth of data); (6) can achieve high response rates and increase attention span (for PPGIS), possibly higher than traditional surveys, which has been the authors' experience but varied opinions exist.

New challenges for all these data sources may include (1) the considerable expertise required in GIS or Web-GIS design, data management and analysis, which is typically time consuming; (2) spatial accuracy; (3) privacy concerns; (4) issues of representation (especially regarding VGI) i.e. – not all users upload their tracks, photos, comments resulting in data bias; (5) if administered online (for PPGIS), participants need internet access and some computer/mapping skills; (6) differences in results may occur between online and field PPGIS applications (see discussion in Wolf et al., 2015).

Conclusions

The past decade has shown promising developments in various participatory visitor monitoring techniques. We discussed limitations and future potential for the application of these participatory techniques which are integral to our way forward in addressing the major questions in visitor monitoring such as understanding visitor motivations, preferences and behaviours. These innovative techniques open up opportunities for capitalising on local spatial knowledge to enhance decision-making quality and capacity, especially in stakeholder-sensitive contexts. Findings can also be used to better manage R&PA and their visitor experiences to make them accessible and attractive to the public.

Acknowledgments

This research was funded by the Australian NSW National Parks and Wildlife Service, Office of Environment and Heritage. It was further supported by CICS.NOVA - Interdisciplinary Centre of Social Sciences of the Universidade Nova de Lisboa, UID/SOC/04647/2 013, with the financial support of FCT/MCTES through National funds.

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Nature based integration

Nature based integration in Europe – a review

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Introduction

Immigration and the successful integration of migrants into the European societies have become hot topics due to, not the least, the recent influx of asylum seekers and refugees to Europe. The number of asylum seekers to EU member states increased from approximately 300 000 in 2012 to 1.3 million in 2015. These developments have promoted revisiting and developing approaches for the successful integration of migrants all over Europe. Therefore, the European Commission emphasizes that, integration policies should go beyond participation in the labor market and mastering the language of the host country, as integration is most effective when anchored in what it means to live in diverse European societies (European Commission, 2016).

Nature-based potentials and solutions

One possible response to address this challenge is using nature as an arena for socio-cultural integration of the newcomers, as "nature-based solutions" have been proposed to address simultaneously environmental, economic and social problems especially in urban areas across Europe. For example a variety of practical examples in a study by Ambrose-Oji et al (2015) have shown that urban green spaces are used to stimulate social integration and cohesion. Also in the Nordic Countries NGO's and third sector' actors have used nature and outdoor recreation as a point of departure for integrating new citizens. A survey in four Nordic Countries (Denmark, Finland, Norway and Sweden) followed by several workshops with various stakeholders revealed a range of examples where local groups, organizations or authorities had arranged activities in natural areas and urban green spaces to pursue integration purposes (Pitkänen *et al.*, 2017). Systematic evaluations of the outcome on socio-cultural integration barely exist within the examples, and the experiences and lessons learnt from these cases are promising (Pitkänen *et al.*, 2017). However, the potential of nature-based solutions has not until now been capitalized at the public sector policies and immigration work. Moreover, the practitioners do not effectively apply current research and academic knowledge on the relationship between immigrants and nature in their new country of residence. Pitkänen et al. (2017) claims that these shortcomings relate to a lack of common concepts and definitions and suggest that a common understanding of 'nature-based integration' is needed in order enhance cooperation and knowledge exchange across borders; which is also emphasized by Kloek et al. (2013)

Aim of paper – linking immigration, integration and nature?

Following from above it becomes clear that there is a need for investigating the links between immigration and nature; and there are two perspectives, which this review aims to contributing. The first perspective relates to what role nature can play or already plays in terms of integrating immigrants into their new countries of residence. The second perspective is rooted in a social environmental justice perspective, where focusing on the new Europeans should have the same rights and treatment (e.g. benefits of natural areas in terms of ecosystem services; or access to high quality natural environment) regardless of their ethnic background.

The following questions have guided the review process: 1) To which extend can nature function as place for social interaction? 2) Which influence has nature on identification and attachment? 3) How does nature function as an institution such as education, employment, health etc.? 4) Does nature play a role in terms of cultural understanding?

Based on the review we will discuss, the links between nature, immigrants and integration. Further, we will discuss how the relationship between natural areas and integration is understood in the reviewed papers and how this relationship could be conceptualised?

Results

The results are based on a literature study conducted from July 2017 to December 2017, on peer-reviewed articles on the topic. The key words of the review are based on the title and its synonyms: "Nature based integration in Europe". We operated with three key-word groups 1) environments and contexts of nature based integration; 2) concepts and synonyms based on definitions of immigration, 3) definitions of integration.

Based on this systematic review, we identified 13 European papers that have addressed this relationship. Majority of the papers come from Nort-Western Europe, the papers presented case studies from the Netherlands, Germany, Switzerland, UK, Spain, Poland and Finland. Most papers presented a single country case study, only one presented a comparison between several countries.

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Nature-based integration in the Nordic countries – practices and perspectives

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Nature-based solutions are an efficient way to address simultaneously environmental, economic and social problems especially in urban areas (European Commission, 2016). There is increasing evidence on the positive benefits of natural areas to the mental and physical health and well-being. Further natural areas offer important sites for leisure and recreation and play an important role in promoting the mixing of different people with different ethnic backgrounds, both minority and majority populations (see e.g. Peters, Stodolska and Horolets, 2016).

ORIGIN – outdoor recreation, nature interpretation and integration

In order to increase the understanding of the role of nature and cultural ecosystem services in the social integration of immigrants into the Nordic societies, the Nordic Council of Ministers (NCM) has funded project ORIGIN (Outdoor recreation, nature interpretation and integration in Nordic Countries). Initially, a survey revealed that various stakeholders across the Nordic countries' have launched a number of practical projects and initiatives to promote the benefits of nature in integration. However, information and documentation about the various experiences was fragmented. In order to facilitate a better knowledge exchange across borders, the ORIGIN project initiated annual Nordic workshops on nature-based integration, and a network of researchers, NGOs and public and private actors working in the fields of immigrant integration and/or nature was formed.
In two workshops in 2016 and 2017 researchers, practitioners and public sector representatives from Finland, Denmark, Norway and Sweden presented and discussed their practices with emphasis on evaluation and lessons learned by the current practices of nature-based integration. During the workshops, similarities and differences across the practices as well as common ideas of the role and use of nature in the integration process were discussed.

What is nature-based integration?

The essential learning from the presented practices is that nature-based integration is about both nature itself and nature as a base for empowering the migrants to take part in their new society.
Based on the empirical practices presented at the workshop we propose a first attempt to define nature-based integration. The definition is an attempt to gain a better understanding of what is at stake in nature-based integration, and further the definition can be used as an inspiration for future initiatives.

There are several forms of integration and several ways nature can support the integration of immigrants (Esser, 1999; Leikkilä, Faehnle and Galanakis, 2013). As a point of departure for dividing the aim and focus of the Nordic practises we used Essers (1999) four dimensions of social integration (structural, cultural, interactive and identificational integration). Allthough the collected practices vary in terms of e.g. target group, aim, and purpose, all of the collected practices have one way or another aimed at nature-based integration.
In this paper we will discuss the results of the workshop, provide a preliminary attempt to define "nature-based integration" and relate the findings to to Essers (1999) four dimensions of social integration related to nature-based integration practices:

- **Structural integration** refers to the access people have to common resources and main institutions of society such as labour, education, health services or natural areas and recreation opportunities. Besides promoting access to nature, nature-based integration practices can reinforce immigrant's employment or language skills by providing training or enhance the immigrants' health and well-being.
- **Cultural integration** refers to acquisition of both knowledge and competences regarding cultural aspects, common practices, general rules of behaviour, things that enable individuals to navigate in the society. Nature-based integration practices are a key means to transfer knowledge related to codes of behavior, legislation, customs and use of nature. The practices and learning by doing, however, can also be a way to transfer more general tacit knowledge about the Nordic societies, which can be hard to verbalize or teach by other means.
- Friendships, partnerships, and other social aspects characterize the **interactive integration**, which refers to the inclusion of immigrants into the primary networks and relationships of society. Nature-based practices should therefore promote local involvement and interactions between immigrants and other local native citizens.
- Lastly, **identificational integration** refers to a sense of belonging to the new society in terms of emotional bonds to other groups or places. By facilitating access to and introducing the newcomers to nature and local green spaces, nature-based integration can foster the creation of positive experiences of the new country and develop the immigrants' sense of belonging and place attachment to their new country and everyday environment.

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Perception of Forests and Forest Management by Germans and Migrants using Photovoice

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Introduction

Following the definition of landscape perception according to Nohl (2001), the perception of a forest is not only based on physical existing elements, but also aspects such as experiences, previous knowledge about forests, attitudes, expectations, memories, desires and needs. With a changing society (ageing population, changing values and lifestyles, migration), forest perception might change.
Literature suggests preferences for natural forests, which correlate with high biodiversity (e.g. Gobster et al., 2007). Other studies suggest that people prefer more open forest types, supported by the "Information Process Theory" by Kaplan & Kaplan (1989). However, most of this work is related to North-American or Scandinavian forest ecosystems and not Central European ones with different management practices.

Methods and selection of interviewees

Recently, Photovoice as a qualitative approach has received increasing attention. People take photos of features considered relevant for the respective research questions. Afterwards, individual photographers explain in semi-structured interviews why they have taken these pictures (Wang & Burris 1997, Heyman 2012).
In our study, volunteer participants, both Germans and migrants (persons not having been born in Germany) walked a 4 km loop trail in the Weltwald Freising near Munich and took pictures of the forest. At the end of the walk, persons explained why they had chosen to take the respective pictures. 26 Germans participated (15 female, 11 male, 50% below the age of 40, 31% over 60). 14 persons were born and grew up abroad (Luxemburg, Poland, Ukraine, Norway, France/Spain, Croatia, Turkey, Tunisia/Saudi-Arabia, Syria, USA, Canada, Peru, China).

Results

Almost all participants enjoyed the hike in the forest. Especially the Germans took fewer negative than positive photos. In both groups, a large number of particularly colorful pictures were taken. Interviewees stated that they wanted to express the joy associated with discovering a large number of different attractive tree species. Moreover, they mentioned liking the different colors of the deciduous trees. Also the benches and signage in the Weltwald were recorded as explicitly positive features of the forest. Almost all photographed elements such as ant hills and small insects were considered positive features of the forest. Also a group of huge Douglas Firs (*Pseudotsuga menziesii*) trees was photographed as a particularly attractive forest impression. It was associated with "nature", "wilderness", "impressive size" and "power", although they are a non-native tree species and were planted in this forest around 70 years ago. The Germans considered deadwood as a positive feature of forests, while the non-German group often perceived it as negative. According to the explanations given by the interviewees, liking or disliking this element related to their knowledge of deadwood in forest ecosystems. This difference was also observed on a plot

with goats grazing intended for maintaining an open space in the forest for biodiversity purposes. While the Germans photographed it as a positive aspect, the migrant group felt that it was a particularly bad thing that would destroy the forest ecosystem, especially thus perceived by persons from Mediterranean countries. Ponds in the forest were portrayed as a positive element in the forest by the German group. However, only one migrant photographed them. Both groups disliked noise, trash and vehicles in the forest as well as traces of timber harvesting. While traces of skidding timber were photographed as a negative feature by all persons in spring, persons participating two weeks later did not record them, since vegetation growth had already covered them in such a way, so that they were not recognized in a negative way.

Migrants often stated that they rarely visit forests and enjoyed being invited to participate in the study. They claimed they had a lack of knowledge on recreation opportunities in local forests. Furthermore, this group mentioned friends not going out together to enjoy nature. These interviewees suggested providing offers to encourage an initial contact with the local forests and their recreation opportunities. Also a lack of mobility (e.g. own car or bike) was frequently mentioned to be a hurdle to be able to recreate in the forest. The older Germans participating in this study also complained about a lack of mobility for access to local forests.

Discussion and conclusions for management

Natural looking forests were perceived very positively in this study and support postulations such as those by Gobster et al. (2007). However, at a second glance, many forest types and features are considered attractive, such as huge and bizarre trees, regardless of whether they are a native species or not. Also experiencing domestic animals in the forest is attractive for forest visitors, however, for non-Germans, some explanation is necessary, since they might have negative connotations based on knowledge and values gained in other forest ecosystems in their homelands.

The statements by migrants show a need to provide some assistance initiating a first contact to the forests and their recreation opportunities. Also for the older group of Germans, better access to the forest is a vital issue enabling them to use the forest for recreation. Offers such as guided tours, information on recreation opportunities in forests and better access by public transportation and signage would allow more user groups to visit forests more frequently.

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Naturalness and perceived safety in urban green areas. Case study from Tallinn, Estonia

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Introduction

The importance of human-environment interactions taking place in urban green areas is increasing continuously. Naturalness and perception of safety in urban green areas can be two indicators that influence visitor recreational patterns, but their impact may vary (Kabish 2015, Kronenberg 2015). Unmanicured areas with wilderness elements within cities may evoke negative experiences such as fear, disgust, or an uncomfortable feeling because of high-dense vegetation and unmanicured look (Heyman 2012; Bixler and Floyd, 1997). Differently from the mainstream some studies have found that despite dense vegetation considered being less safe it is not less preferred and more naturalistic vegetation can be introduced into parks and green spaces without necessarily making the parks appear unsafe (Wang et al 2017; Jorgensen 2007).

Sites and Methods

The current study provides an overview of the visitor survey of three different urban green areas in Estonian capital Tallinn: 1) historical and most prominent urban park Kadriorg; 2) former strictly closed Soviet military area Paljassaare which is still very wild looking and basically unmanaged; 3) mixed area which has one part of wetland and shrubland in former inaccessible coastal area and another part of classically managed park Rocca Al Mare. Similar areas can be found all over Eastern Europe where Soviet Army established strictly closed areas close to the strategically important cities and after the fall of the Iron Curtain those areas turned into the no man's land with criminal elements. Those areas can still be called as new public recreational areas, because it took time to create minimal safety and develop the basic access and infrastructure during the transitional time of the countries. The study explores two main questions – what are the expectations of urban park visitors to urban greenery and related to that: how people perceive safety and natural hazards in different areas. These questions are studied from perspectives of nationality, gender, age, visiting history and habits. The study is based on on-site interviews carried out in September 2016 (n=470). All people visiting the area alone or in pairs were interviewed. In case of groups one male and one female from a group were selected.

Results and Discussion

The results about the expectations of urban park visitors to urban greenery show that in case of naturalness 81% of respondents in Kadriorg and 79% in Rocca al Mare considered that the area is developed enough (question was referring to the recreational infrastructure development and manicuring of the green area) (Table 1). The most divergent opinions can be observed in Paljassaare: 52% answered that the site has been developed enough, while in the opinion of 48% respondents – too little. Respondents who were satisfied with the current development, pointed out: 1) if there was more development, also more people would come to the site which is not desirable; 2) a big bonus that the site is not developed; 3) there is no need at all to develop the site more; 4) good that the site is not very developed – it is possible

to discover it by yourself and enjoy the wilderness; 5) development is not necessary, don't want more people here. Those who wished more development indicated that: 1) the site has not been developed at all and wanted to open a good café at the parking lot on weekends; 2) to provide places to sit; to keep toilet and changing cabins on the beach available after summer too.

Results about how people perceive safety and natural hazards in different areas show that respondents are most concerned of safety in most unmanaged area Paljassaare (score 3,5 in 5 steps likert scale). Most managed area Kadriorg got 4,1 and the highest score 4,2 belonged to Rocca al Mare. According to the nationality Russians generally have the highest average assessments of the different aspects of nature management and access, and the nationality group "other" has the lowest assessments. Only perceived safety stands out with a different pattern: other nationalities have assessed the safety in Kadriorg as being the highest (4,75), and Estonians the lowest (4,03).

Table 1. Appearance and development level of study areas.

	APPEARANCE			**DEVELOPMENT**		
	Natural enough	Too wild	Too urban	Developed enough	Developed too little	Developed too much
PALJASSAARE	**72%**	24%	4%	**52%**	48%	0%
ROCCA AL MARE	**77%**	6%	17%	**79%**	17%	4%
KADRIORG PARK	**84%**	4%	12%	**81%**	16%	3%

Conclusions

Results show that respondents are most satisfied with attractiveness and nature conservation, but most concerned of safety in most unmanaged area Paljassaare, but they do not feel themselves the safest in the most managed area Kadriorg. There were some visitors in each area who were concerned of the safety. Majority of the visitors in the least managed area Paljassaare did not still want the area to be developed more and were very passionate to defend their opinion. It is also obvious that different recreational areas attract different visitor groups with different preferences and profiles; as distances in Tallinn are not too big people with different desires can find appropriate recreational area. The current study shows that a big part of the population in Tallinn has become fond of the neglected and wild green areas, although those areas have been considered shameful by several professionals. This study shows that in the future development different kind of nature management for recreation is accepted in Tallinn, including wild and unmanaged nature and it can be considered in the future policies on recreation.

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Urban, proximate nature - how is it important in a Norwegian and multi-cultural context?

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Introduction

Norway is a country known for its abundant green space, low population density, and long traditions for outdoor recreation. Hiking, cross-country skiing, fishing, and hunting - often far away from civilization - are still typical outdoor activities for many Norwegians, which have given rise to a purist notion of *outdoor life*, or *friluftsliv*. However, there has been some debate of whether this definition is too narrow and restrictive. Under this relatively narrow definition, participation in outdoor recreation is uneven among socioeconomic and demographic groups. For example, people with low levels of income and education have a much lower participation rate (SSB, 2017). While women's participation rates have increased considerably, except for fishing and hunting, young citizens as well as inhabitants with a non-western immigrant background engage relatively rarely with hiking or skiing in forested areas and mountains (Vaage 2015). One question arising from this development is whether policies should aim to integrate immigrants into practices defined by the hegemonic notion of friluftsliv/outdoor life, or whether policies should include a much wider array of outdoor recreation in the definition of *friluftsliv*. In other words, should policies stick to the restricted definition of friluftsliv, or should policies encompass the breadth of human interaction with the outdoors in a manner that is inclusive of diverse cultural and social backgrounds? In the latter case, everyday outdoor activities in urban green spaces could be included, because the greatest diversity of cultural backgrounds are found in urban areas. In an ongoing study, *Integrating value diversity in the assessment of urban ecosystem services from nature-based solutions in citie*s (SIS URBAN), one of the main objectives is to expand our knowledge about inhabitants' engagement with diverse types of urban nature.

Methods and Research Sites

This study is based on 280 interviews on three different areas in Oslo, addressing passers-by requested to participate in shorter interviews on the spot. The three areas span a range of green space. The different nature types include continuous forested areas in the urban fringe (Østmarka), a small neighbourhood forest without facilitation or management (Goliaskogen), and green structures in a suburban area with apartment buildings (Furuset, see picture). In all the study areas, including the suburban area, residents have easy access to natural areas, both in the immediate vicinity to their homes and to continuous forested areas slightly further away from their homes. The fieldwork included summer and winter interviews.
Nearly one third of all inhabitants in Oslo have an immigrant background. In some boroughs, the proportion is near 80 %, many of which of Asian and African descent. This characterises the suburb of Furuset. On the other hand, the residential area surrounding Goliaskogen is dominated by ethnic Norwegians. During our short on-site interviews, we ensured to include segments of the population with low response rates in quantitative surveys (immigrants, youths and the elderly) among the respondents. The semi-structured interview guide focused

mainly on residents' actual use of their neighbourhoods, the kinds of qualities they ascribed to the green areas, any negative factors, and what kinds of improvements they wished for their area. With some exceptions, the interviews have been recorded and transcribed, and we are currently in the process of analysing the interview material.

Preliminary results

Although immigrants have a lower participation than Norwegians in outdoor recreation under the narrow definition (e.g. cross-country skiing and hiking), this study shows that immigrants value nature in a high degree, but emphasize different aspects of nature. Many immigrants expressed that green structures in their neighbourhoods represent an important motivation for living here, and that the greenness, the fresh air and the natural elements make a significant contribution to their quality of life and to their general level of well-being. Somewhat surprisingly, the study showed that the vast majority (including women) feels safe outdoors. This is in contrast with how these neighborhoods are often portrayed in the media, as being ridden with crime and social unrest.

Both immigrants and non-immigrants emphasised that proximate nature as Goliaskogen and the green spaces between the apartments on Furuset embedded certain qualities they could not find in the forest Østmarka beyond the residential areas (see also, Buijs et al 2009; Gentin 2011; Kloek et al. 2013). An impression from our study is, that while many Norwegians look at the proximate nature such as Golia and Furuset as an important *supplement* to outdoor recreation in the traditional sense, many immigrants describe the proximate nature as the most important and valuable source for experiencing nature. The nature, the people, and the houses were described collectively as important elements of the experience, while nature *without* human life and developments seemed to have a smaller value, expressed by statements such as "we do not need to go to the forest." While contiguous forested areas beyond the urban fringe seems like a more attractive and valued experience for those who use it, the proximate nature was described as an *integral* and valuable part of the everyday life, and an important element for developing place identity of the residents (see also Kloek et al. 2013; Peters et al. 2016).

The different nature types and different degrees of management represented in the various study areas gave valuable knowledge of qualities ascribed more 'wild' green areas nestled among residential neighbourhoods (Goliaskogen) vs. more manicured parks at Furuset, showing the importance of offering residents different types of green space. The importance of green spaces in an urban everyday life has so far been little explored through an inductive and qualitative methodological approach as used here. An important characterization of Norwegian outdoor recreation is the darkness and the cold, but we find a lack of knowledge about the impact of winter for people's daily well-being and public health. This study should contribute to the development of knowledge on this topic, including users' perceptions on what may be important facilitation measures to increase their outdoor activity level, also in wintertime.

Figure 1. Study area Furuset

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Managing Visitors in Iceland's Recreational Areas

Seal Watching in Iceland: Ethical Management Development

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Introduction

In Iceland, nature is the main attraction for foreign visitors, however, management plans for wildlife watching activities are lacking and the need to develop evidence-based management is pressing. Wildlife tourism managers are tasked with the demands of developing tourism management that meet the needs of the local community and visitors, while also minimizing negative impacts on wildlife. Visitors to Iceland believe that nature conservation should be improved and the majority of Icelanders (79%) feel that the negative effects of visitation on nature are too high (Óladóttir, 2017).

Involving local communities in wildlife tourism development plans is important in order to understand local needs and to gain public support. Community participation in developing sustainability indicators helps managers construct the concept of sustainability *for* the community. However, little is known about what sustainability means for local communities and further studies on hearing local voices, to understand how sustainability and responsibility in managing natural areas are perceived, are needed. Hearing local voices empowers community development, underlines the importance of local knowledge and culture, and enhances capacity.

The purpose of this conceptual paper is to address the need to manage human-wildlife interactions in tourism settings to ensure positive outcomes for all stakeholders: wildlife, local communities, and visitors. Seal watching in Iceland is used as a case study to develop a model for investigating theoretical and practical understandings of wildlife watching management, environmental ethics, and community development. It will describe the need for future management actions in Iceland for seal watching in particular, and wildlife watching more broadly, and make suggestions towards ethically responsible strategies.

Background

The demand for wildlife watching has increased in Iceland including visitor interest in seal watching. Seal watching activities revolve around the two breeding seal species in Iceland; harbour seals (*Phoca vitulin)* and grey seals (*Halichoerus grypus*). Seals are easily accessible to visitors in several areas, through land and boat based seal watching activities. Negative impacts due to anthropogenic disturbance, for example, due to visitor use, resulting in alteration of natural behaviour and changes in seal distribution have frequently been reported (Granquist and Sigurjonsdottir, 2014). Previous studies show that human impacts can be a serious threat to vulnerable seal populations. The current conservation status of both the Icelandic harbour and grey seal populations is critical (Granquist and Hauksson, 2016), further underlining the urgent need to developed effective management approaches to facilitate responsible seal watching in Iceland.

One of the greatest challenges of managing interactions between humans and wildlife is the complexity of the phenomenon. Researchers and managers are trained to focus on separate parts in order to explain something that should be examined holistically. Separating these parts can make understanding certain aspects more manageable, however, failing to see them in the context of a larger system does not fully represent wildlife watching as a phenomenon nor is it efficient in predicting problems. Seeing wildlife watching, and the consequences of management actions from a systems perspective gives managers the tools to better cope with a variety of challenges while making them more effective professionals in their field. It is impossible, not to mention unethical and irresponsible, to ignore the potential effects of environmental management actions on local communities and/or exclude the planning process from other stakeholder groups. As an example, exclusion and non-participation of stakeholders in marine management, either deliberate or not, are issues of power and inequality and leads to local distrust and resentment of management actions (Flannery, Healy and Luna, 2018).

Philosophical principles guide wildlife tourism management, whether purposefully or not, and anthropocentrism has largely dominated how management actions are devised. Burns et al. (2011) argue that management actions of wildlife tourism based in nature should focus on policies and strategies with an ecocentric value system rather than on visitor types which only serves to continue the human centred focus. We propose that an ecocentric paradigm entails interdisciplinary and inter-sectoral research and knowledge that builds management actions with the understanding that humans are not devoid of their environment and that human action has direct consequences to both community and natural livelihoods.

Methods

This paper investigates theoretical and practical understandings of wildlife watching management, environmental ethics, and community development to build a methodological foundation for addressing ethically responsible strategies. We use seal watching tourism in Iceland as a case study to identify the need for future management actions, which can ultimately devise a plan applicable for responsible seal watching in particular, as well as for wildlife watching activities for other areas in Iceland. This paper reports on our examination of management actions from a systems perspective—including interdisciplinary and inter-sectorial knowledge—and argue that managers can better facilitate understanding of the critical role wildlife has among other community capitals, making specific management actions more effective and ethical, and increasing the likelihood of community support. Community Capitals Framework (CCF), an example of a systems thinking approach that emphasises assets (Emery and Flora, 2006), will be used to explain the importance of wildlife tourism management actions by contextualizing wildlife as an asset of local communities.

Discussion

By contextualising wildlife watching management, environmental ethics, and community development in a complex system; and by drawing from interdisciplinary and transdisciplinary theoretical and practical understandings, this case study highlights several potential problems and conflicts that managers should be cognizant of. These include: 1) The potential for misconceptions due to the differing levels and understandings of what sustainable and responsibility means among researchers and stakeholders, 2) The potential challenges in addressing and moving from anthropocentric management practices towards ecocentrism agenda, and 3) The potential management issues that may arise between different types of visitors at wildlife areas such as biocentric vs egocentric.

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Hydropower and Tourism: Visitor and Operator perspectives on preferred use of natural areas

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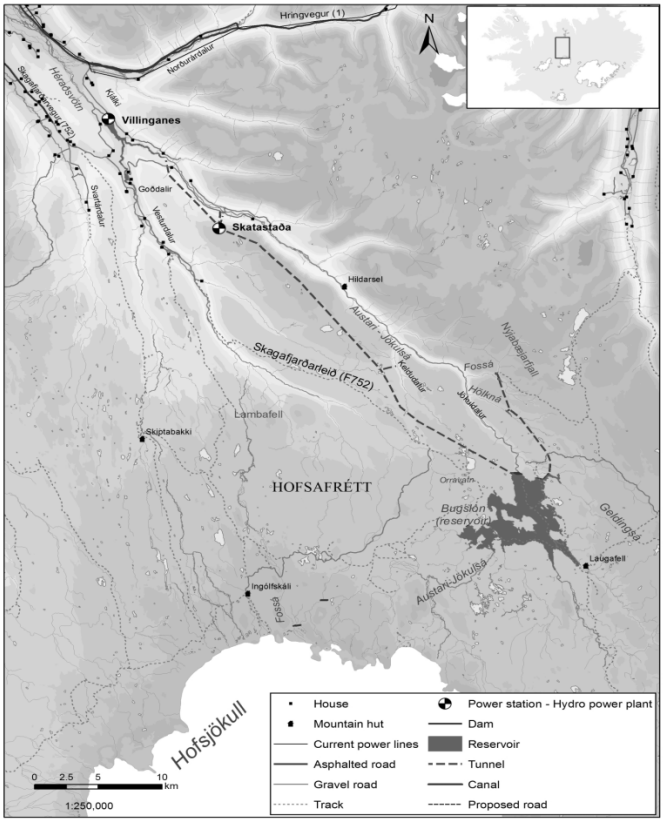
Introduction

Tourism and power generation have grown rapidly in Iceland over the last few decades (Sæþórsdóttir & Saarinen, 2015). Both are critical to the Icelandic economy (Sæþórsdóttir, Ólafsdóttir, & Smith, 2017), and the natural features exploited for power generation are often the same features foreign visitors come to see. Natural places are also highly valued as sites for recreation for Icelanders.

This research aimed to understand visitor and tourism operator perspectives of a recreation destination in the face of competing land use. During the research, three proposals for hydroelectricity development, at two locations in Austurdalur valley, were under consideration by the Icelandic Ministry for the Environment and Natural Resources (Map One). We investigated what visitor activities existed in the area, who uses the area for recreation and why, and the attitudes of both visitors and tourism operators toward the area and the power plant proposals. Results were used to compile a government report (Burns & Haraldsdóttir 2016) that assisted the decision on how best to manage the future of this natural area.



Map One: Location of the proposed power plants and associated infrastructure in Austurdalur (reproduction permission from Anna Dóra Sæþórsdóttir).

Methodology

Data were collected during the second half of 2015 through questionnaires with visitors and interviews with tour operators.

Visitor questionnaires

Purposive sampling targeted visitors who had been into the areas likely to be affected by the power plants. The questionnaire contained 26 questions and was available in four languages. Questions covered visitor demographics (gender, age, nationality, occupation), visit characteristics (type of activity, length of time in the area, number of times visited), satisfaction with and importance of environmental features, and attitudes toward development in the area. 223 valid responses were collected. Results were compiled using version 22 of the IBM Statistical Package for the Social Sciences (SPSS).

Operator interviews

Interviews were conducted with 20 purposefully chosen tourism operators: including those with businesses closest to the proposed power plant sites, those expected to be most affected, as well as other prominent businesses in the region. Content analysis of the qualitative interview data was conducted through semantic mapping to identify central themes embedded within each narrative. Concepts emerged through an analysis of frequency, and the comparison of phrases and words with similar usage.

Results

Visitor perspectives

The average visitor to the area was most likely a professional, 42 year old female from Europe, travelling in a rental car with friends or family, staying for 2-4 days, and taking part in rafting, horse riding or walking activities. Eighty five percent of respondents said they visited the area specifically to experience wilderness and 89% said that they chose destinations like this for reasons of escapism, to rest and recover, and to put their everyday worries aside. Visitors ranked highly the importance of enjoying unspoiled nature (97%) and peace (91%) as part of their experience. Far less importance was placed on the provision of introduced facilities, such as picnic benches and tables (19%) and designed footpaths (25%). These results demonstrate a link between visitor perceptions of relaxation and naturalness.

Potential benefits of a power station in the region include increased road infrastructure and improvement of existing roads. However, improving roads was not strongly supported by visitors. The majority of respondents (77%) agreed that any of the three power plant proposals would negatively affect their decision to visit the area. Findings from the questionnaire demonstrate that perception of wilderness or unspoiled nature is critical to the value of this area as a destination for visitors and that the presence of structures, even ones that are unseen but known about, distracts from this value.

Operator perspectives

Tourism operators considered the Austurdalur valley, and the highland above it, special because of "the rivers", "quietness and peacefullness", "nature and vegetation" and "access to the highlands", and were concerned that potential changes from hydropower could negatively affect this. This opinion was common to most businesses, regardless of their type and distance from the proposed power plant sites.

Only two operators strongly supported increased accessibility to Austurdalur by improving the condition and network of roads. While other operators said accessibility to Austurdalur

could be improved, most also acknowledged that the types of tourists visiting the region were satisfied with the existing level of accessibility.
Four of the 20 operators interviewed were in favour of power stations and 16 were against, with most interviewees believing that the presence of the power stations would have a negative effect on future tourism development. Concerns were mostly based around the perception that the associated infrastructure would destroy the natural environment, thus remove a key attraction for tourists and cause suffering for operators reliant on the area and the rivers as a resource.

Discussion and Conclusions

Tourism is a large income earner for Iceland, who cannot afford to neglect the wishes of both foreign visitors and locals in destinations like Austurdalur. A recommendation to the Ministry to not proceed with hydropower in this region, instead declaring it a protected area, ratifies the claim by Sæþórsdóttir and Saarinen (2015, p.1) that the tourism industry "has become an important stakeholder in terms of defining the use and management of wilderness areas". Effective planning for sustainable management of visitation is now necessary. The tourist voice is often missing from national and local planning, even when that planning directly effects recreational user's facilities and experiences in an area. In Iceland, where the number of foreign tourists annually visiting the country surpasses the total resident population by seven to one, addressing this is necessary.
Satisfaction with environmental conditions is an essential contributor to positive visitor experiences in natural areas (Ryan & Cessford, 2003; Tonge & Moore, 2007); therefore, monitoring satisfaction at a destination over time is a crucial component of policy and planning (Bernini & Cagnone, 2014). This study revealed that both visitors and operators were satisfied with their experience in Austurdalur and did not want it to change. The results provide baseline data that can be used for future monitoring and management of recreation in the area. For Iceland more broadly, they demonstrate the importance of understanding the range of stakeholder opinions and experiences to ensure sustainable management.

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Tourism as a Tool for Nature Conservation?

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Nature consistently has the highest score when international tourists are asked which factor was most influential when deciding to travel to Iceland. When asked further, references are most often made to wanting to experience wilderness, and what is perceived as unspoiled and pristine nature (Maskína, 2016). The image of Iceland as a destination filled with natural wonders, breathtaking landscapes and untouched nature is also commonly used by those marketing the country as a tourist destination (Karlsdóttir, 2013). Domestically, the importance of pristine nature for international tourism has been used by nature conservationists when opposing specific energy projects, especially in the highlands. Results from a number of surveys, however, indicate that international tourists tend to be more tolerant towards human structures in the highlands than Icelanders themselves (Stefánsson, Sæþórsdóttir & Hall, 2017). The questions planners and policy makers are faced with is if nature based tourism and the development of the energy sector can co-exist in the Icelandic highlands, or if the presence of one sector negatively affects the other.
Since beautiful nature, healthy wildlife and authentic culture are all considered important features to attract tourists to a destination, tourism is often used as a justification for why nature conservation may be a more attractive option than extractive industries from a sustainable development perspective (Leung et al, 2018). Thus, nature conservationists often argue that tourism gives the opportunity for economic gains without the negative environmental impacts often associate with large scale industrial projects. Underlying this argument is the assumption that tourism can generate income for local communities without much social strain or negative environmental impact. Furthermore, those using tourism as an argument for why an area will be economically more valuable in the future if nature conservation is prioritized over large scale industrial projects are assuming that tourism and industrial development cannot co-exist and that one needs to choose between either extractive industries or nature based tourism.

Either/or – or both?

The aim of this research is to explore the tension and conflicting interests between nature conservation, tourism and energy projects in Icelandic wilderness areas. Public discourses about new energy projects will be examined, using critical discourse analysis to tease out dominant ideas and underlying assumptions about the relationship between tourism, nature conservation and energy projects. This analysis will then be compared with results from a several recent surveys focusing on how tourists experience nature both in places where no energy structures are in sight and in places close to hydropower or geothermal plants and associated infrastructure.
Preliminary results indicate that although the dominant discourse assumes that new energy projects in Icelandic wilderness areas will decrease the economic value of nature for tourism this is not always the reality. Results from surveys among tourists in places where no industrial development has taken place to indeed indicate that human structures related to energy projects would negatively impact their experiences. Results from similar surveys done in two sites in North Iceland where energy structures already exist, however, paint a different

picture. Although the tourists at those sites are equally interested in experiencing wilderness and untouched nature as the tourists surveyed a the sites where no industrial development has taken place, their satisfaction with the nature of the region was no less than of those traveling in areas without power plants in sight. Furthermore, tourism has been rapidly increasing at one of the site (Krafla) and the power plant seems to be part of the attraction of the area, rather than diminishing its value for tourism. Another research in the southern part of Iceland, however, where different methodology was used for data collection, showed that when tourists where shown photos of the areas they were visiting with and without the energy structures, the photos without the manmade structures were more appealing to them.

Figure 2: Krafla, a geothermal power plant in North Iceland and also a popular tourist site. Photo: Auður H Ingólfsdóttir

These conflicting results demonstrate that the relationship between nature conservation, energy projects and tourism is more complex than what is assumed in the dominant discourse where the emphasis is on the choice between "either" using natural resources directly by harnessing energy "or" protecting nature so it will be valuable for tourism. Thus, emphasizing the economic value of untouched nature for tourism may be a risky strategy if nature conservation is the primary goal.

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How the „essence of the attraction" provides an important foundation for decisions on sustainable development of nature-based tourism destinations

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The breakneck growth of unconstrained tourism has created a number of challenges that currently threatens sustainable destination development in Iceland. The unique natural environment and wilderness has come under pressure (Granquist & Sigurjónsdóttir, 2014) and the number of tourists in popular sites is also starting to have negative impact on the visitors' experiences (Sæþórsdóttir, Gudmundsdóttir & Stefánsson, 2016). Fast actions are needed to protect nature and the attraction of nature while maximizing the benefit of tourism for all stakeholders. The paper introduces a contribution to destination development and management where the „essence of the attraction" and "tourism recovery experiences" provide an important foundation for decisions on sustainable development of outdoor recreation sites. The contribution introduced in the context of Hornafjordur municipality as a destination for nature-based tourism at various levels of difficulty and service.

Figure: Svinafellsjokull glacier, Iceland. Photo: Gunnthora Olafsdottir 2017.

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Image analysis to assess hiking impact in Icelandic vegetation communities

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Outdoor recreation in scenic landscapes seems to be rapidly increasing worldwide and in Iceland hiking has long been one of the most popular outdoor recreations. The increasing number of people hiking every year is of concern regarding the environmental impact hikers pose on the country's fragile ecosystems, as well as how to best manage the bulk of visitors, especially during the short high peak period. Research show (i.e. Gísladóttir, 2006; Ólafsdóttir and Runnström, 2009; 2013; 2015) that high trampling pressure in some of Iceland's most popular recreational hiking areas is triggering soil erosion and land degradation. In Iceland, the vegetation and soil cover are extremely fragile and susceptible to external pressure partly due to the soils high content of Andosols (e.g. Arnalds, 2008; Ólafsdóttir and Guðmundsson, 2002). Furthermore, with abundant wind and rainfall surface run-off water follow the trails and scars causing severe and rapid soil erosion that affects both hikers' safety as well as their natural scenery experience.

The objective of this research is to study the correlation between hiking impact (number of hikers) and resilience of different vegetation types in some common Icelandic vegetation communities; moss, moss-heath and grassland. Experimental plots were established in two popular areas of nature-based tourism in Iceland, i.e. Þingvellir National Park located in the lowlands, and Fjallabak Nature Reserve in the highlands (Figure 1). Each experimental plot was designed to encompass five separate walking lanes, each 20 meters long, and with a randomly designated hiking pressure; 0 (control), 25, 75, 200, or 500 hikers, number based on Cole and Bayfield (1993). In subplots (0.6 * 0.6 m in size) along each lane, parameters on soil and vegetation were assessed to analyse to what degree the different vegetation types was affected by different trampling intensity.

In order to assess vegetation cover, high resolution digital RGB-photographs were acquired from 1.7 meters height above each subplot and classified using algorithms common by the Earth Observation Science (EOS) community. Each photograph was split-up into three separate images (Red, Green, Blue), each containing information of ground reflection in separate parts of the electromagnetic spectrum. This facilitates better possibilities to perform an automated classification to separate vegetation from non-vegetation in the images (Richardson et.al. 2007). Thus the vegetation coverage in each subplot was assessed using two methods; i) Supervised maximum likelihood, and ii) Green chromatic coordinate (Sonnentag et al. 2012).

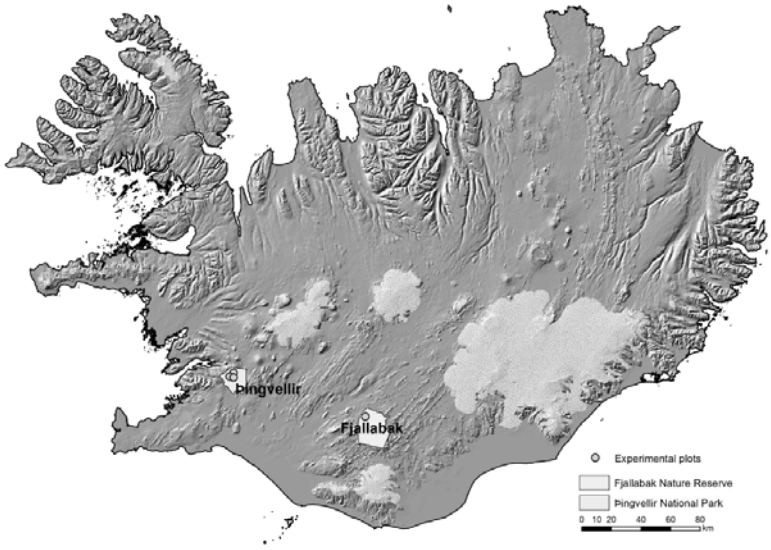

Figure 1. Location of the study sites in Iceland

The difference in resilience (resistance to hiking impact) between the lanes (trampling intensity) and between the different vegetation types, and additionally between highland/lowland moss-heath vegetation is evaluated through analysis of variance (ANOVA) providing statistical correlations. The current experiment was performed in July/August 2014 and the plots re-visited and photographed in 2015, 2016, and 2017. The images thus convey a time-series of recovery for the different vegetation types as the trampling has ceased, a parameter that can be highly relevant in the planning and management of protected or sensitive natural areas.

Initial statistics show good correlation between hiking intensity and loss of vegetation. The physical impact of the trampling breaks down the vegetation, and subsequently decreases the amount of live biomass and vegetation coverage. The moss cover shows to be the most sensitive vegetation community to trampling pressure and already 25 hikers cause a severe trail/scar in the moss layer. The recovery rate of the moss is moreover slow and still after three years, the impact from 25 hikers is still clearly visible. The moss-heath vegetation have more resistance compared to moss. Statistics show that moss-heath in the highlands are more disturbed compared to the lowlands. The grasslands have clearly the highest resilience of the evaluated vegetation types. A dense and thick inter-twined root system of the grass is a probable cause. One year after the trampling experiment, it is *just* possible to distinguish where the 500 hikers-intensity lane was located; the other lanes have blended with the surrounding grassland.

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Expanding carrying capacity assessment from the site-level to the national-level: An Icelandic Case Study

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Tourism and visitation to Iceland has increased dramatically over the last decade, rising from just a few hundred thousand visitors per year to several million visitors annually. Nearly 90% of these visitors cite experiencing Icelandic nature as the primary motivation for their visits. This motivation manifests in heavily visited nature-based tourism destinations that include waterfalls and beaches; mountain and highland trails; glacier-, volcano-, and wildlife viewing-based excursion areas; and "internet famous" selfie spots. Consequently, Iceland can be understood as functioning like a park-nation in which the entire country and its diverse regions are the destination for nature-based tourists.

The current pattern of visitation to Iceland provides the island many benefits with potential to counterbalance the more tenuous phases of existence in the remote north Atlantic. This Icelandic economy has been rocked by spectacular booms and busts throughout its millennium-long history (e.g., maritime trade cycles, fisheries, catastrophic volcanism, energy intensive industries, etc.). Additionally, as a nation of less than 400,000 nationals with close ties to North America, Europe, and Asia, the Icelandic language and culture are vulnerable to dilution and evaporation amid the flow of globalization. Sustainable tourism, driven by both Icelandic nature and cultural, has great potential to provide a stable economic foundation for the country and a mechanism to preserve and celebrate Icelandic nature and cultural.

However, the combination of the island's rapid rise in popularity, historically low-intensity development, and traditional resident-centric approaches to outdoor recreation have created a critical situation with respect to visitor infrastructure, carrying capacity, and nature-based tourism management. The infrastructure at Icelandic tourism destinations, most of which are nature-based sites that in many other countries would be enshrined within protected areas, is being overwhelmed by tourism demands. Trails are turning into muddy troughs. Overlooks and scenic viewpoints are trampled, eroded, and littered. In the absence of public toilets human waste is scattered about the countryside. Prime opportunities for environmental and cultural interpretation are missed and conflicts occur because of an absence or inadequacy of information signage and visitor education. In is important to note that these conditions exist not because of a lack of will or interest among Icelander but because of the overwhelming and unrelenting explosion of visitation to the island.

Clearly, many dimensions of Iceland's carrying capacity for nature-based tourism are being exceeded. Yet, surely excess capacity exists in some places and at some times. There must be ways to expand and enhance the carrying capacity of already busy sites and seasons and better use underutilized existing capacity. This is, generally speaking, the perspective of Stjórnstöð Ferðamála - the Icelandic Tourism Task Force.

Stjórnstöð Ferðamála has commissioned EFLA Consulting Engineers (Iceland), and their collaborators from Recreation and Tourism Science (USA) and TRC Tourism (New Zealand), to develop a nation-wide approach to tourism carrying capacity assessment. This assessment analyzes the economic, infrastructural, and social dimensions of tourism carrying capacity for Iceland. Based on a quantitative modeling approach that predicts destination conditions (Y-axis variables) from tourism drivers (X-axis variables), the study leverages existing data from diverse sectors (e.g., transportation, environment, hospitality, safety, community wellbeing, etc.) to:

- Identify the key factors that define Iceland's carrying capacity for tourism
- Establish thresholds associated with the desired level of quality for Icelandic environments, infrastructures, and tourism experiences
- Identify the factors that currently limit the island's tourism carrying capacity
- Provide guidance on strategic approaches to efficiently enhance the carrying capacity of Iceland for tourism while sustaining Icelandic nature and culture.

This presentation will review the project's theoretical and methodological approaches, discuss how existing administrative and social science data is being leveraged to drive the project's quantitative models, and illustrate how results will inform tourism, infrastructure, and environmental planning and management in Iceland. Attendees will gain a better understanding of the national-level challenges facing Iceland, preview innovative quantitative approaches to monitoring and evaluating carrying capacity-related visitor use and tourism issues, and participate in a discussion with application to nature- and culture-based recreation and tourism sites elsewhere.

Nature-based tourism trends, markets and innovative products

Prominent trends in nature-based tourism – An international comparison

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Nature-based tourism (NBT) is an increasingly important sector of the economy for many countries rich in outdoor recreation opportunities, especially so in rural regions where expectations for economic growth are high (Hall & Boyd, 2005; Fredman & Tyrväinen, 2010). NBT is also subject to significant changes due to social, technological, economic, environmental and political factors, referred to as mega-trends (Dwyer et al., 2008), where a trend implies a general direction in which something is developing, changing or people are behaving. This paper aims to identify the most prominent trends in NBT within and across five countries / regions with respect to their commercial potential.

The Delphi Method

To study trends in NBT and associated commercial opportunities, five panels of experts were engaged using Delphi methodology. The Delphi method is a structured communication technique organized in several iterations where respondents receive controlled feedback for each repetition, and the researcher is looking for convergence in the distribution of opinions (Landeta, 2006). There were 73 experts from Norway (21), Sweden (21), Finland (10), the European Alps (10) and the Western United States (10) invited to participate, whereof 69 remained for the second round. In order to capture the diversity of the NBT sector, experts came from a range of private and public domains associated with nature-based tourism and outdoor recreation: National or regional ministries; regional tourism associations; tourism marketing organizations; nature-based tourism companies and associations; outdoor industry (equipment, clothing); outdoor recreation organizations; academia and consultants; special interest media; and youth organizations.

The questionnaire was developed based on previous Delphi-studies in the tourism literature (von Bergner & Lohmann, 2014; Donohoe, 2011) and a literature review on megatrends affecting nature-based tourism (Elmahdy, Haukeland & Fredman, 2017). The first round of the survey was exploratory and included open-ended questions where experts identified and described up to five major trends in nature-based tourism in their country / region with a 10-year time horizon. The trend identified as the most important by each expert in his / her country / region was then followed up with questions regarding drivers, challenges and opportunities for the NBT sector. In the second round of the survey, the expert panel of each country / region received a list of the most prominent and frequently reported trends in their own country / region (domestic trends) as well as for the other countries / regions (international trends). For each trend, experts indicated the degree to which they think it will impact commercial opportunities in the NBT sector in their country / region the next 10 years (negatively or positively) on a seven point scale. There was also an option to mark the trend as not relevant. In the third and final round, experts are presented with the results from the

second round (their own answers and the average answer by all experts in their country / region to each question) with the opportunity to adjust their answers.

Trends in nature-based tourism

The first open round of the Delphi study identified approximately 150 different trends. Analyses of these trends by the research team resulted in some of them being re-classified as changes in activity participation (a second part of the study not reported here), while other could be merged into one single trend with a common direction. Hence, for the second round of the study, 36 major trends in NBT were subject to evaluation by the expert panels (except for the US survey, which included 20 trends). Table 1 reports the five most prominent trends in each country / region after the second round of the Delphi survey.

Table 1. Five most significant (positive) trends in Norway, Sweden, Finland, the European Alp region and Western United States. Mean values of seven-point scale (-3: large negative impact, +3: large positive impact).

NORWAY	
Experience local culture and locally produced products, food etc.	2.3
Sustainability and responsible travel	2.1
Commercial guided services or courses in nature	1.9
Authentic nature and culture experiences	1.9
Personalized and exclusive experiences in nature	1.9
SWEDEN	
Increased international demand	2.3
Nature experiences combined with high quality facilities and services	2.3
Experience local culture and locally produced products, food etc.	2.3
Demand for remote and unique places	2.3
Simple and easily accessible activities (soft adventure)	2.2
FINLAND	
Physical activities in nature for health and fitness	2.4
Experience wild food (berries, mushrooms, game, herbs etc.)	2.3
Increased international demand	2.2
Health and wellbeing from nature experiences	2.2
Sustainability and responsible travel	2.1
EUROPEAN ALP REGION	
Digital marketing, trip planning, and booking	2.5
Health and wellbeing from nature experiences	2.1
Experience local culture and locally produced products, food etc.	2.0
Nature experiences combined with high quality facilities and services	1.9
Authentic nature and culture experiences	1.8
WESTERN USA	
Product customization for different markets	2.3
Sports/ activity-oriented nature-based experiences	2.0
Increased demand in the winter season	2.0
Health and wellbeing from nature experiences	2.0
Commercial guided services or courses in nature	1.9

Results show several similarities across the countries / regions, but also some noticeable differences. Experiencing local culture and locally produced products and food is a recurrent trend in this context, reported among the top three trends in Norway, Sweden and the

European Alps region. It also scores high in Finland, although not on the top-tree level. An increased international demand for nature-based tourism experiences is a major trend in the Nordic countries, but not to the same extent in the other regions studied. The Norwegian expert panel rates sustainability and responsible travel high, while Swedish experts put more emphasis on nature experiences combined with high quality facilities and services. Finnish experts judge physical activities in nature for health and fitness to be the most significant trend in terms of commercial opportunities in the NBT sector within the next 10 years. In the European Alps region, digital marketing, trip planning, and booking is reported as the most significant trend. The western US diverge from the other countries/ regions in several respects. Trends reported from this region focus to a larger extent on availability and funding of public land and user conflicts, compared with the other countries / regions, but the highest score is given to product customization for different markets. Commercial guided services or courses in nature, which scores third in Norway, is also among the more significant trends in all countries/ regions studied.

Findings from this study will provide a better understanding of the future of NBT, thereby benefiting businesses, public agencies and policy makers. This is crucial, given the diversity and complexity of the NBT sector. This research is part of BIOTOUR, a multi-disciplinary research project with the overall hypothesis that an integrated perspective of the nature-based tourism sector will provide a basis for innovative products and a more sustainable development.

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E-Mountain Biking – Potential for Swiss Tourism Destinations

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Introduction

Since the 1990s, mountain biking has been one of the fastest growing outdoor recreational activities in Switzerland and now represents an important branch in Swiss tourism. The average cost of a one-day mountain bike tour in Switzerland is 83 Swiss francs (= 86 USD) per person per day and 227 Swiss francs (= 236 USD) per person per day for overnight mountain bike tours. In all, mountain bike tours in Switzerland generate annual revenues of 800 million Swiss francs (= 832 million USD) (Rikus, Fischer & Lamprecht, 2015).
A few years ago, electric motor-assisted bikes were introduced. Swiss sales statistics illustrate the importance of this development with 28,704 E-MTBs (8.5% of total bike sales) sold in 2017 in Switzerland (Velosuisse, 2018). Environmental impacts and conflicts between users of E-MTB are often discussed. However, very few scientific studies on the subject of E-MTB are currently available. According to Eller and Lommele (2015), the environmental impacts of E-mountain biking are similar to those of mountain bikes and less severe than those associated with motorcycle use. However, E-MTBs may cause more severe soil displacement at turns, on ascents and descents, and in the case of sudden changes in trail conditions (Eller & Lommele, 2015). Articles that focus on the conflicts between E-MTB users and other recreationists show that politicians, environmental organisations, and local officials have been voicing concerns about higher frequencies on trails and the difference in speed between E-MTB users and other recreationists. Although hikers and mountain bikers show similar patterns in terms of motivation, requirements and behaviour, there is an on-going debate on the subject of compatibility of hiking and mountain biking. Conflicts arise when user groups differ in speed on the same trail, and when new sectors of outdoor recreational use intrude into territory that had been traditionally used exclusively by one group of recreationists (Morey et al., 2002; Rupf 2016).

Methodology

In this study, focus groups were formed to examine the needs of Swiss tourism destinations for adaptation to E-mountain biking, most of them without E-MTB experience. A total of six focus group workshops took place in 2016 in Swiss tourism destinations. Each workshop lasted approximately two hours. Seventy professionals from different sectors such as tourism, mountain biking experts, destination managers and local authorities discussed the E-MTB market situation, the potential of E-mountain biking for tourism destinations, and the needs of tourism destinations when adapting to E-MTB tourism.

Results

In the focus groups, three drivers of growth that might explain the rising numbers of E-MTB sales were detected. Firstly, E-MTBs enable people with poor physical condition to ride together with fitter cyclists. Secondly, E-MTBs enable users to cycle to places that are inaccessible to them without engine support due to distance, altitudinal difference or steepness of the trail. The third driver of growth is people's need for optimization of time management; in other words, with E-mountain biking, more can be experienced in less time.
The focus group participants agreed on several requirements that are important for tourism destinations when adapting to E-MTBs.

- Cycling directions for E-MTB users must be given on specific trail sections.
- Trails and routes should be defined and classified in terms of skills required, and not by physical condition.
- E-MTB tourism destinations need to provide charging stations and inform users exactly where these charging stations are.
- The co-existence of different user groups (hikers, bikers etc.) should be regulated.
- Considering the wide potential of E-mountain biking, interregional destination offers could provide additional attractions.
- Specific education in E-mountain biking for guides as well as coordinated communication should be considered.

Challenges that should be monitored in the future are co-existence between trail users, trail conditions und the maintenance of trails. It is conceivable that E-MTBs will cause more trail damage, so the maintenance of trails will need to be adapted. Key players and decision makers should therefore be more sensitized to the needs of E-MTB.

Conclusions

This study is a first attempt to analyse E-mountain biking and its relevance for tourism destinations in Switzerland. Even though the scientific literature about E-mountain biking is still limited, it can nevertheless be inferred that this sport has important economic value and that it is a topical issue in terms of environmental impacts and user conflicts. This has been confirmed by the outcomes of this focus group study. Thus, E-mountain biking can be regarded as a trend in outdoor recreation with high potential for tourism destinations.
If E-mountain biking develops in a similar way to E-bikes and mountain bikes, its popularity can be expected to increase. It might expand the mountain bike target group and boost mountain bike tourism. When adapting to the trend of E-MTB tourism, destinations should consider the environmental impacts of E-MTBs, especially if higher frequencies on the trails are generated. A number of important issues need to be taken into account by tourism destinations when joining the E-MTB trend. Especially in times of climate change, when tourism destinations are facing new challenges, E-mountain biking can bring new benefits. Promoting summer tourism and specializing in E-mountain biking might be a good opportunity to maintain the attraction of winter tourism destinations whose profitability is at risk because of the ascending snowline (OcCC, 2007).
However, given the many aspects that are important to look at, the potential of E-MTB for Swiss tourism destinations is not very easy to assess. It is still not yet clear what economic benefits E-mountain biking will provide, what the socio-economic profile of E-MTB users will look like, what impacts E-MTBs will have on the environment, or how conflicts between E-MTB users and other recreationists can be solved. It is therefore important to bear these open questions in mind and to scientifically follow the E-MTB trend. Further research on E-

mountain biking will help to reduce conflicts between recreationists and environmental impacts. It will also support tourism destinations in optimizing their offers for E-MTB users, and thus prepare them for the E-mountain biking trend.

Acknowledgements

We would like to express our gratitude to the participants in the focus groups for sharing their knowledge and adding extra relevance to this study. Furthermore, we would like to thank the administration of the Canton of Graubünden for supporting the focus group study financially as well as Darco Cazin from Allegra Tourismus, for moderating the focus group workshops.

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Nature-based tourism firms and community resilience

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Introduction

Adaptation to ecological, economic, and social change is one of the greatest challenges facing society today, and there has been substantial societal, political, and theoretical interest in resilience (Butler 2017; Hall, Prayag, and Amore 2018; Cheer and Lew 2018; Wilson 2012; Houston 2015; Walker and Salt 2012). In rural communities, nature-based tourism (NBT) potentially contributes to resilience. The purpose of this paper is to discuss three aspects of resilience (ecological, economic, and social) with reference to NBT and illustrate this through findings from a study of NBT firms in Norway. The study is part of a cross-disciplinary research project on NBT (BIOTOUR) taking place 2016 to 2020.

Adger (2000:347) defined social resilience as "the ability of groups or communities to cope with external stresses and disturbances as a result of social, political and environmental change." Hall and Lamont (2013:2) define social resilience as "the capacity of groups of people bound together in an organization, class, racial group, community, or nation to sustain and advance their well-being in the face of challenges to it." Their focus on sustaining well-being is consistent with Norris et al.'s (2008) inclusion of well-being as one of the outcomes of resilience. Put simply, resilience reflects a community's ability to thrive in the face of change (Steiner, Woolvin, and Skerratt 2016).

Within tourism, the focus often is on the resilience of tourism firms and/or destinations (e.g., Becken 2013; Butler 2017; Calgaro, Lloyd, and Dominey-Howes 2014; Cheer and Lew 2018; Hall, Prayag, and Amore 2018). BIOTOUR concentrates on the contribution of NBT firms to community resilience, especially in rural communities. The focus is on general resilience, especially in the context of slow-onset changes such as economic and demographic stressors (e.g., sector-specific decline and out-migration). Although much of the community resilience literature concentrates on natural disasters, the challenges posed by economic and demographic stressors are also recognized (e.g., Steiner, Woolvin, and Skerratt 2016; Maclean, Cuthill, and Ross 2013).

Data and methods

There are several strands to the resilience literature, but social science evaluation with primary data is relatively uncommon. As Brown (2016:60) notes, adapting from Levine (2014), "[f]ew of the suggested measures of resilience are derived from theoretical frameworks on resilience [and] at present the frameworks do not really help in finding appropriate measures."

In this study we apply a mixed method approach to assess NBT contributions. We combine quantitative data from a 2017 nation-wide survey of NBT firms (N=280 to 558, depending on the content) with qualitative interviews with representatives of 24 NBT actors in three areas in Norway: the arctic region of Varanger, the forest area of Trysil and the fjord and mountain area of Hardanger. In Varanger local communities have since the 1990s witnessed downturn in fisheries. NBT, such as birdwatching, started to develop in the 2000s. Trysil experienced a

similar decline related to forestry. However, since the 1960s Trysil has developed into a major ski resort. Here, a growing NBT sector can contribute to more summer tourism. Hardanger differs from the other two areas by having a much longer history of tourism (since the 1800s) and strong integration with farming. In 2009 the tourism strategy was changed from focusing on "blossom and national costumes" to nature based experiences.

Results

Economic resilience

An important economic aspect of small, specialized NBT firms is, beyond establishing jobs, to enhance the package of tourism products. This benefits both guests and more established tourism actors, such as hotels. Also, NBT firms, through differentiated offerings, contribute to better seasonal balance. This is the case in the winter destination Trysil where there is a coordinated action to develop activities such as biking tracks / trails and fly-fishing. In the summer destination Hardanger there is a similar commitment to develop winter activities.

Social resilience

Hardanger Eventyr, established in 2016 is just one of many NBT firms in Hardanger contributing to enhanced "spirit" and awareness in the local community. Another example is the development of bird tourism in Varanger, which has opened the eyes of local people to their unique bird fauna and increased pride in their region because of that. A third example is the conscious work in Trysil to preserve the town center alongside a large-scale ski resort in another part of the municipality.

The nationwide survey included several sets of questions relating to community resilience, including a scale of nine items reflecting the relationship between NBT firms and local communities (see Figure 1 below). Exploratory factor analysis indicates the scale reflects two aspects: business relationship between firm and community and broader relationships, including aspects of social resilience. For example, firms report that they help strengthen community identity, though their perceived contribution to community cohesiveness is less strong.

Ecological resilience

Many of the NBT actors interviewed emphasized ecology. For example, Biotope, a pro-nature architectural practice based in Varanger, has developed small bird watching shelters and dedicated information (books, maps) accessible both for tourists and local inhabitants. To prevent huge traffic on the glacier Folgefonna in Hardanger, the glacier guides there never take groups larger than eight persons. They also are dedicated to teaching the visitors about ecological aspects pertaining to the glacier.

Discussion

The preliminary results from the study support the view that NBT firms and local communities can mutually gain from NBT. The firms view the local community as an important part of the tourist attraction. At the same time the firms may strengthen community identity and person-to-person networks. The interview data confirm and elaborate these findings. Several of the informants express that local inhabitants and local authorities look positively upon the contributions of their NBT, including as catalysts for local jobs, settlement, infrastructure and activity. However, underlying conflicts of interest, such as rights of use, may have to be resolved, preferably through dialogue. Some of the informants are also worried that large scale tourism (such as the arrival of large cruise ships) would have

negative impacts on small communities (affect social resilience) and would deter tourists seeking niche based, "quality" experiences (economic resilience).

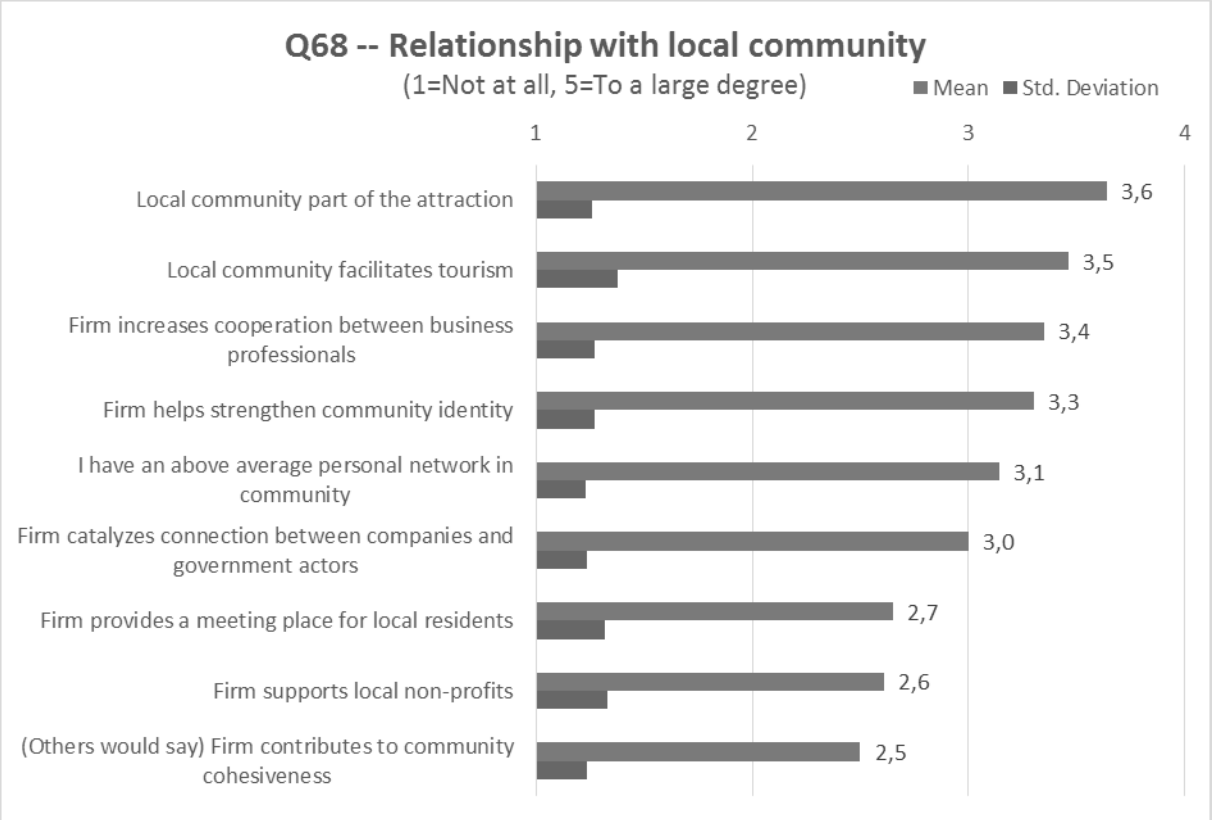

Figure 1. Responses from nature-based tourism firms in Norway to statements about relationship with local community. 2017. N=280

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Customer Journey Mapping for Nature organizations; implications and applicability

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In many regions National Parks and other protected areas have become an important attraction and play an critical role in destination development (Reinius and Fredman, 2007). Such attractions are a very important motivator for tourist travel. In order to ensure consistent development of National Park tourism, management practices must focus on effective marketing and satisfying customer experiences which enhance revenue streams from tourism (King et al, 2012). This is important for attracting visitors. In national parks in The Netherlands, however, there is little emphasis on value creation for customers through service experiences. Customer Journey mapping is a tool to analyze the way in which customers engage with an organization, encompassing their entire interaction, and how this influences the visitor experience (Stein & Ramaseshan, 2016). The concept is mostly used in the retail industry and offers valuable insights which are helpful to improve visitor experiences in National Parks.

Application of customer Journey concept for National Parks

The Customer Journey of National Park visitors can be understood as the collection of experiences that are formed by different moments of interaction between the visitor and the park organization before, during, and after the visit to the National Park. It highlights the different phases of the customer experience, formed by different moments of interaction (Anderl, Schumann & Kunz, 2015; Cardoso et al., 2015; Jolly, 2015; Stein & Ramaseshan, 2016;). These moments of interaction are called touch points (Marcus, 2014; Stein & Ramaseshan, 2016; Tax, McCutcheon & Wilkinson, 2013). Stein and Ramaseshan (2016) highlight that not all touch points are necessarily intentional ones from the providing company itself, for example external reviews or advertisement of other companies. Customer Journeys have become more and more complex in nature, in which consumers interact with an enormous number of different touchpoints. Also, customer to customer interactions (through social media) have given new challenges and opportunities for organizations and firms.

A Customer Journey can be designed for any kind of product, optimized in any type of organization, for any target group. Insight in how a Customer Journey works and how it plays a crucial role in attracting visitors, meeting their expectations and offering a satisfactory visitor experience is the first step towards improvement.

Methodology

The European Futures Institute (ETFI) has developed a method to analyze the Customer Journey of National Park visitors in a workshop for forest rangers and marketing and communication managers in The Netherlands. The Dutch Forestry Department (Staatsbosbeheer) has applied the Customer Journey Mapping workshop as a tool to get insight into how the organization communicates with its visitors and influences the customer experiences in NP De Biesbosch. The research questions which need to be addressed during a

workshop differ per organization. In De Biesbosch the participants analyzed how prominently the brand of Staatsbosbeheer was represented in the different phases of the Customer Journey. Also looking for missing or failing touchpoints (and the related customer experience) was an important part of the exercise.
A Customer Journey mapping workshop is usually done with 8 to 12 participants which are split up in small groups. The first step in the workshop is to brainstorm about the most important touchpoints which are intentionally set up by the organization (the planned journey). Then the participants assume the role of a specific visitor type (persona) and start searching on the internet for those specific activities in which the persona is interested. This allows the park managers to experience the actual journey, from the visitor's perspective. Visitor satisfaction surveys, complaints and feedback are also important to get an understanding of the visitor perspective. The last part of the workshop is about setting up an action plan and implementation of improvement points.

Results and Analysis

The results from the workshop show that:

- Nature conservation organizations operate in a diverse, multi stakeholder environment.
- The management of the network of touchpoints is complex and requires careful management of communication and marketing. This coordination is often lacking but is very important in order to present a coherent image to the public.
- A nature conservation organization has two basic interests; providing a satisfying visitor experience and protecting the natural values. The customer journey should be carefully designed so that both goals are met. This is distinctly different than most commercial companies and organizations that focus solely on selling their service or product to their client.
- The desires and intentions of the consumer might be in conflict with the interest of the nature conservation organization. This makes it hard for natural area managers to think from a customer perspective and adds a level of complexity to the design of a customer journey.
- Besides communicating about the heritage values of the area and the importance of nature protection, the organization can win satisfaction when they focus more on the technical and service related aspects of the experience they provide.

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The digital future and its possible influence on winter tourism in the European Alps

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Introduction and methodological approach

In the developed countries digitalization plays already a significant role in everybody's life and influences both the private and the professional life significantly. Based on an extensive literature review and expert discussion the presentation will analyze the expected benefits by digitalization and discuss possible consequences from an outdoor recreation and tourism perspective, including economic and ecological aspects. In order to get insights managers of 9 ski resorts in Austria and Switzerland were interviewed at a fair in Grenoble and at a conference for cable car enterprises in Zell am See Austria. In addition firms offering data collection systems were interviewed about their typical products and the data they provide.

Main findings

The expectations concerning the possible effects by digitalization mentioned by experts and tourism stakeholders embrace a wide range of possible effects, including

- a better communication with the client,
- an improved marketing/marketing strategy,
- a tool for influencing the booking behavior,
- an individualization of the offer with tailor-made product development,
- an opportunity for new experiences such as the "ski movie" (video) or the "speed check" with finish photo), as well as
- an economic benefit due to an increasing automatization of the internal processes,
- a tool to optimize the cable car maintenance and slope management
- a significant support for controlling and monitoring especially concerning energy efficiency and the check for wear.

In addition the overall discussion about pricing systems must be seen in the context of a significant shift towards a digital future (see figure 1, showing an online platform with daily changing prices). It is expected that in the digital future the cable car enterprise will be able to answer the question "Who is my client" in detail, based on his or her booking behavior. However, whether this additional knowledge will change the whole business model remains unclear (Schegg and Engeler 2018).

Ski areas with an environmental management system, based on EMAS or ISO 14001, had to invest in the data collection concerning all environmental issues and resources. The available digital data had a significant effect on the management in winter (e.g. artificial snow production and its spatial distribution) as well as in summer (e.g. mowing concept considering biodiversity hot pots) and open the door for energy saving and environmental protection. Some experts also perceive opportunities for the development of new tourism products and experiences using these digital data.

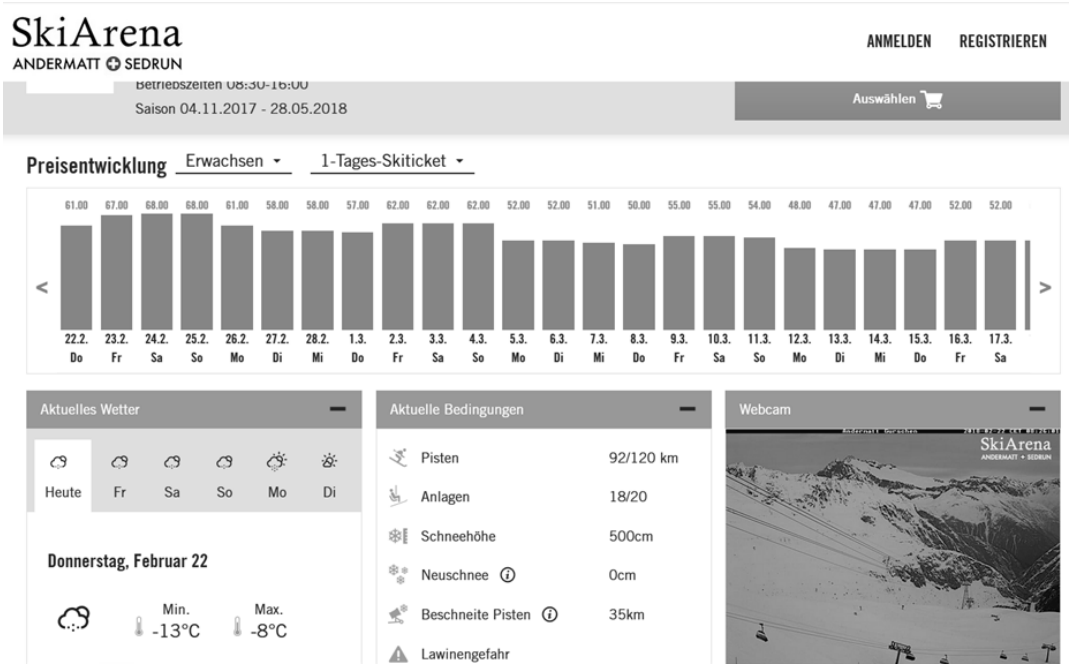

Figure 1 Online booking website and the given information with daily changing prices (SkiArena Andermatt – Sedrun and Ticketcorner 2018, screen shot 22.2.2018).

Conclusion

Within the alpine destinations in Europe the differences in the implementation and visioning about digitalization differ already significantly. While in Switzerland all these opportunities mentioned above are taken into consideration, Austrian entrepreneurs focus more on marketing and communication opportunities.

Many experts underline that the tasks of a cable car enterprise in winter tourism have changed from transportation to an experience providing integrated local tourism enterprise and may change again to a digital integrated provider offering individualized products (Schegg and Engeler 2018).

Overall the tourism branch is not fully aware of the great opportunities for future development. Beside the improved marketing and communication tools with the outdoor recreationists or the tourist, the digital future can be used for developing personalized products, including active experiences but also environmental education. In addition it may lead to improved environmental management, saving money, energy and protecting natural resources. The digital future may also affect the client's behavior and may be used for co-creating new products and providing new experiences. However in this respect further research is needed.

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Park visitor segmentation to inform park management, marketing and product development.

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Introduction

National parks and protected areas in Victoria, Australia, are managed by a state government agency, Parks Victoria (PV). PV are responsible for managing an expanding and diverse estate covering more than 4 million hectares, about 17 per cent of the state. Victorian protected areas have high levels of visitation, with 42 million annual visits to national parks, state parks and conservation reserves. In order to manage these high visitor loads, PV developed a benefits based visitor segmentation in 2007 (Zanon *et al*. 2014). This segmentation is based on face to face surveys cond
ucted in park. Broad benefit domains were determined based on the activity undertaken during the visit. This approach identified seven visitor segments and provided a concise visitor typology applicable across a range of different parks. The visitor segments focused on the relationship between the level and type of services and facilities and visitor satisfaction for different park types and have been used to drive the development of visitor service strategies, park planning and management over the last ten years.

Current agency priorities include increasing visitation through development of improved visitor experiences and nature base tourism product development. When reviewing data available to inform this priority, it was identified that the current segmentation provides information of visitor segment activities and required services and facilities in park, but did not provide sufficient information on attitudes, behaviors and motivations of visitors, required to inform marketing, communications and product development. It was determined that the visitor segments needed to be validated and refined, in order to ensure that they were up to date and able to inform various components of protected area management.

Approach

The data set that informs PV visit segments has been collected every second year over the last ten years, using face to face interviews in 30 different parks across the state. This data set was reviewed to determine temporal trends in current segments proportions and demographics.

A visitor profiling survey was developed and delivered online with a sample size of 1,500 Victorians. The survey included PV's segmentation variables, and New South Wales Parks and Wildlife Service (a neighbouring Australian state protected area management agency) 'needs based' segmentation variables. This allowed for each respondent to be classified into both state's segments, providing an opportunity for exploration of parallels between parks visitors to the two Australian states and leverage NSWs relevant category profiling information.

The survey also included additional questions that aimed to explore:

- Key needs, motivations, attitudes and behaviours in relation to parks, nature, culture, heritage, activity, health and wellbeing, family and friends.
- The likelihood of undertaking different types of visit experiences;
- Trusted sources of influence / information;

- Familiarity with and use of technology (devices and platforms);
- Key destination decision drivers and barriers.

Thirty three questions from the survey were converted to seven factors using principal component analysis, using a varimax rotation. A k means cluster analysis was then run to on the factors to determine a new segmentation solution. These visitor profile segments were then cross validated with PV's segments and NSW Parks and Wildlife segments.

Results

Review of PV's data showed that the visitor profile has shifted over the last ten years. Nature Admirers, who visit for a novel, visual nature experience, make up 10% more of total visits than in 2007. This segment also has an increased number of younger people than previously, a trend mirrored in overall visitation demographics. Trail users, who visit for a variety of trail activities, have also increased by 8%. This segment now has a more varying demographic with young singles and families with older children both represented. Urban Socials, who visit typically for a large social gathering within the park make up a smaller proportion of total visitation, as do Activity Centrics, visit to undertake high energy and/or water based activity.

PV's benefits based segments and NSW's needs based segments only showed minimal overlap. The PV segment "Urban Socials" overlapped with the NSW segment "Socialisers", with a 50% match. There were no other significant relationships between the two segments. Four new segments were identified using the visitor profiling data; Active in nature, Social in nature, Me time in nature and Experience seekers. For the Active in nature segment staying in good physical condition is important (69% vs. 31%) and parks are a place where they can engage in physical activities (25% vs. 9%). Social in nature enjoy spending time with people they know (57% totally agree vs. 40%) and it's important for them to socialise with family and friends in natural settings (31% very important vs. 24%). Me time in nature make an effort to get some 'me time' and to spend time by themselves (43% totally agree vs. 25%). Parks are a way of disconnecting from daily life (36% totally agree vs. 23%) where they can unwind and relax (46% very important vs. 38%). Experience seekers seek out new experiences (25% totally agree vs. 17%), they're well informed about Victorian parks (23% totally agree vs. 8%), they feel the parks are well maintained (33% totally agree vs. 17%).

Management Implications

The functional needs identified for each visitor profile segment support the development of tailored visitor experiences in suitable locations. For example, Me time in nature are seeking experiences that emphasise opposite to busy, hectic, life pressures. Primarily wellness activities in a natural setting that are convenient and not challenging.

Marketing and communication approaches can be informed by the social values and emotive drivers of each segment. These can be targeted through identified information sources and influences trusted by each segment, as well as familiarity with and use of different technology.

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Marine protected areas – new requirements for visitor monitoring and management?

Limited awareness by recreation users' of French marine protected area: is there a flip side to the soft management approach?

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Introduction

Marine protected areas (MPAs) are generally considered an important tool for conservation of marine biodiversity, habitats and various ecosystem services, including those related to recreation use. Rees et al. (2015) noted that understanding and engaging with MPA recreation users can help garner support and facilitates more effective management.
MPAs are a relatively new addition to the protected area network in France (Deboudt, Meur-Férec and Morel, 2015). French MPAs adopt a soft management approach, meaning generally open public access and minimal regulations, for social equity reasons. Furthermore, French protected area management (including MPAs) has an emphasis on social engagement for collective decision making (Folco and Germain, 2015). Through an interdisciplinary approach (geography, sociology and environmental psychology), the aim of our study was to understand the awareness of recreation stakeholders, and their relationship with MPAs as a relatively recent, soft management, phenomenon in France.

Method

Data was gathered using an onsite survey of recreation users in French MPAs. The study included a total of seven recreation activities and ten French MPA and coastal protected sites (Figure). Beside demographic questions, the survey involved variables relating to how the MPA were used by the respondent included four aspects: their knowledge of MPA presence and local management, their willingness to engage with local MPA management, their personal support for more environmental regulation in the MPA and the importance of the MPA for participating in their particular recreational activity. Responses to questions were indicated using 5 point Likert scales.

Results and discussion

In total, 1000 questionnaires were collected using face-to-face interviews in the field, between April and November 2016.

Recreation types and demographics

Most of respondents were male (74%) and lived locally in the area where they were surveyed (55.2%) or owned a holiday home in the area (10.6%). About one third were visiting the area as tourists (34.2%). Results showed significant statistical relationships between the type of recreation activity and demographic variables (gender, age, status of residence, social status, region of practice).

Knowledge of MPA presence and management

Half of the respondents (51.8 %) had a low level of knowledge, or no knowledge about the MPA presence and management in locations they accessed for recreation. This lack of knowledge about the MPAs also indicates a lack of knowledge about the MPA management objectives (particularly conservation). This lack of knowledge could lead to difficulties with fostering community support for, and engagement in, MPA management (Hastings & Ryan, 2017).

Declared importance to use a MPA

The generally low perceived importance of French MPAs as a place for recreation (45.7 %) may also relate to minimal regulations. It seems that minimal regulation means the presence or absence of MPAs in France make little difference to recreation users. Most users did not clearly perceive benefits from the presence of the MPA either in terms of conservation and preservation of landscapes, or in terms of maintaining and safeguarding sites for their own use.

Personal acceptance of more regulation for environmental reasons

Most respondents (63%) supported the introduction of additional MPA regulations to some degree. This result seems to be a positive indicator of concern for the preservation of the marine and coastal environment. This finding appears to counter the concerns of French MPA managers that recreation users are a general threat to conservation objectives. Soft management is often generally accepted by recreation users because it is less likely to infringe on public use.

Willingness to engage in local MPA management:

Just over half of all respondents (53%) indicated a lack of willingness (37%) or show only mild interest (16.4%) in terms of engagement with the MPA management process. This lack of interest by recreation users who are a key stakeholder group presents a significant challenge for French MPA managers for whom recreation is a priority issue (Folco and Germain, 2015). The minimal approach to French MPA regulation intended to ensure minimal social impacts appears to also minimize public awareness of, and interest in, MPAs and subsequently, stymies participative governance.

Conclusion

This study demonstrates the complexity of engaging with recreation users as a stakeholder group for marine protected area in a country where these protected areas are a relatively recent concept superimposed on well-established and historically settled human uses. It

seems that soft management of MPAs to avoid impinging on recreation access and public liberties is also associated with an overall low visibility of MPAs in France.
Should we conclude that there is a need for more regulation, despite concerns about impinging on liberties in French MPAs? It is important to note that, past examples involving stronger regulatory management based, in part, on the exclusion of humans from protected areas were not supported by local people and also failed to meet the management objectives. Perhaps the solution lies in a hybrid approach to management between top-down management (administrative and regulatory) and participatory governance as proposed by Mathevet and Godet (2015). Stronger regulation could increase the visibility of protected areas, increase understanding, support and engagement with MPAs for users. This would also require active engagement through more effective communication including the presence of managers on site to interact with the public to allow more visible management.

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Visitation 'Barometer' as a tool for environmental management and awareness: the Berlengas Nature Reserve case-study

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Introduction

Protected areas are fundamental to nature conservation, providing also opportunities for tourism and recreational activities (Spenceley *et al.*, 2015). The visitation of these areas offers many benefits but, without control, high numbers of users may have serious environmental impacts and may also reduce the quality of the recreational experience (Lockwood *et al.*, 2006). Therefore, it is essential to establish and regulate the human carrying capacity of protected areas, defined as the amount of visitors they can support without threatening or modifying its original characteristics (Manning, 2007). This concept however, has been highly discussed within the scientific community, being criticized for its subjectivity when applied to the recreational activities, with the attempt to use a universal formula able to comprehend the complexity of factors involved in the carrying capacity calculation (Silva, 2002). However, with caution, it can be a very useful tool for the management of protected areas, as long as it is combined with other methods.

Effective management of protected areas requires the use of social data for decision-making. Moreover, new solutions encompassing educational and awareness strategies are essential to insure a better communication, decision-making and policy development (Zorilla-Pujana and Rossi, 2016).

Environmental education and stakeholders' involvement are critical to the long-term success of protected areas. Indeed, communication is an important instrument of management, and awareness strategies a key contribute to its efficiency (Sureda *et al.*, 2004).

The use of signage is a cost effective tool to communicate complex environmental and management information, contributing to increase stakeholders' knowledge and awareness. Specifically, in-situ informative/interpretative signage may help promote positive attitudes, and increase beneficial environmental behaviors, and voluntary compliance (Martin *et al.*, 2015).

The Berlengas Nature Reserve in Portugal (39º24'N, 9º30'W) encompass Berlengas archipelago and is part of Natura Network 2000. It has a Special Protection Area (SPA) for Wild Birds (Directive 79/409/EEC), covering the same boundaries as the reserve, and is part of UNESCO Biosphere Reserve.

However, the reserve has been facing multiple human pressures and degradation, namely in association with the visitation of the Berlenga island. The Berlengas' carrying capacity was roughly set as 350 people per day in 1990 - a number that is frequently exceeded, especially in august.

In fact, as estimated by the management body, the island was visited by nearly 25.000 people in 1998, 30.000 in 2000 and 40.000 in 2003 and in 2004. Recently there was a clear assumption that the number of visitors has increased dramatically. Therefore, the characterization and monitoring of Berlenga's visitors was included in a LIFE Project that seeks to establish and recover some of the natural values of Berlengas Nature Reserve (LIFE 13 NAT/PT/000458 – *www.berlengas.eu/*).
This study aimed to: i) determine the number of visitors in Berlenga island - a baseline for carrying capacity adjustment, and ii) develop a Visitation 'Barometer' – a tool presented as a quality scale associated to the recreational pressure of the protected area, with the aim to provide information for management decisions and visual support to environmental awareness.

Methods

Visitor surveys and counts were conducted in the Berlenga Island in 2015 and 2016, during four weeks per year. Surveys were conducted between 12pm and 6pm, included 35 questions, open-ended, close-ended and using Likert scale, and had a filling duration of 15 to 20min. Counts were made by observers in a fixed place, namely in the port where the vast majority of people disembark, beginning at 9am with the arrival of the first boat and finishing at 8pm with the departure of the last one. Records included boats' names, hour of arrival and number of people arrived, and were used to estimate the total number of visitors per year.
The Visitation 'Barometer' was built from key questions of the survey regarding the visitor's perception about the number of people in the island and the quality of experience compared to expectations. These were closed-ended questions with three options (positive, negative and neutral). Additionally, it was used a rating question with the classification by the visitors about some aspects of the island: accessibility, signage, trails, vigilance, natural beauty, tourism, cleanliness, environmental quality, bathrooms, beaches, prices and people's behavior. The average results were converted into a 180 degree scale for the close-ended questions, and to a radar chart for the rating question. The Visitation 'Barometer' presents, for each question, the results of 2015 and 2016 for comparison, derived from 707 and 358 surveys, respectively.
Correlations between key questions and other questions of the survey were quantified using the Spearman's coefficient. For each variable, differences between groups were assessed using the non-parametic Mann-Whitney and Kruskal-Wallis tests. Finally, reduced Linear Regression models were built to describe the associations between variables.

Results

The number of visitors ranged between 65.620 in 2015 and 79.875 in 2016. Berlengas' carrying capacity was often surpassed, with records of more than 1000 people landing per day.
The Visitation 'Barometer' (Figure 1) showed that visitors perceived an excess of people in the island in 2016, whereas in 2015 they indicated the number of people in the island was 'fine like this'. However, the experience still exceeded the expectations, and there was a slight increase of satisfaction from 2015 to 2016. The worst rated aspects of the island were vigilance, restrooms facilities and prices in both years.
In overall, preliminary results showed that the 'first time visitors' have a higher tolerance to the number of people in the island than the remainder visitors (2015: $U=53043.0$; $W=146139.0$; $p=0.005$; 2016: $U= 12693.5$; $W= 30459.5$; $p< 0.0005$). This was associated with the visitors opinion that the excess of people was the main problem of the island and that

implementing a reduction of the number of people will improve recreational experience (R^2=0.33).

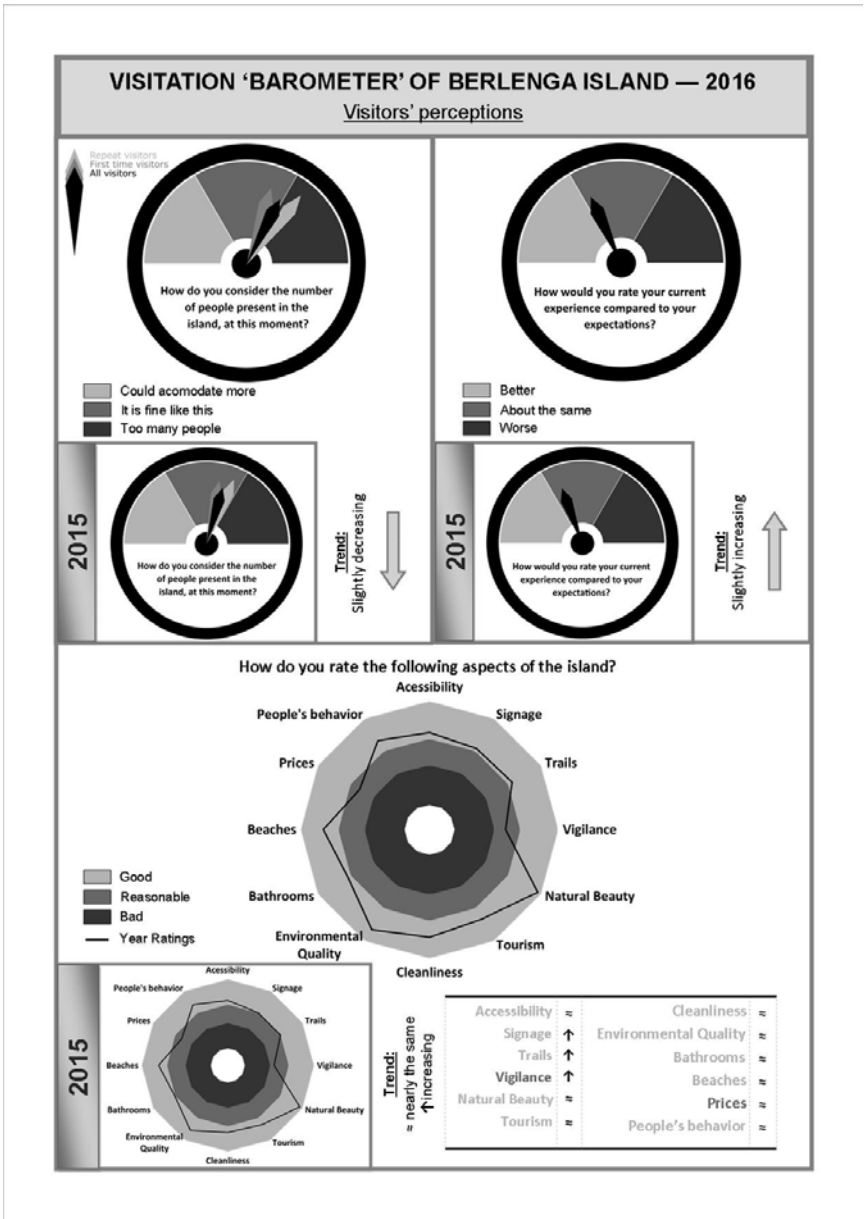

Figure1: Visitation 'Barometer' of Berlenga Island for 2015 and 2016.

Conclusions

The increasing number of visitors in protected areas raises the need for suitable management measures.

The Visitor 'Barometer' appeared to be an appealing tool to inform visitors of the main conditions of the Berlenga island and aspects to improve, as well as to alert the management entity to the main issues to be addressed and its evolution over time. Also by uncovering relationships between key and other questions included in surveys, it may be possible to further reduce the time spend in surveys.

Therefore, the Visitation 'Barometer' may contribute with prompt information to management decisions, being also useful to manage visitor expectations and the quality of experience. This tool, if used as part of the in-situ signage, can be effective in nature conservation to inform visitors and other stakeholders, and to increase environmental awareness.

Acknowledgments

This paper was made with the support of CICS.NOVA - Interdisciplinary Centre of Social Sciences of the Universidade Nova de Lisboa, UID/SOC/04647/2 013, with the financial support of FCT/MCTES through National funds.

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Profiles of water-oriented outdoor recreation groups in Denmark

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Background

Water-oriented outdoor recreation plays an important role in a small country with intensive land use and limited terrestrial nature areas. The extensive coastal areas represent the main 'wilderness' areas and are very diverse ranging from the Wadden Sea tidal areas, and sandy beaches of the North Sea to more protected waters, islands and fjords towards the Baltic Sea. This provides opportunities for many different recreation activities. The Danish coastlines are over 8000 km long and generally publicly accessible. Most of the population lives in coastal municipalities in Denmark and hereby have opportunities for water-oriented recreation within close proximity. But what types of water-oriented recreation appeal to different people? Who are the underwater recreationists? Who are the beachcombers?

Aim

The paper aims at drawing profiles of the different groups participating in different types of water-oriented outdoor recreation in Denmark in relation to a number of socio-demographic variables.
A deeper understanding of the different user groups, their profiles, and their spatial distribution are important aspects of management in e.g. marine and coastal areas.

Methodology

The analyses are based on data from a national mapping and documentation of water-oriented recreation within the adult population in Denmark. A dual approach of crowd-sourced PPGIS and a nationally representative survey combined with the mapping tool was used for data collection. In total, 92 different water-oriented recreation activities classified into 16 main types were included in the study. The large representative sample of 10,291 valid responses provides novel and in-depth insight into participation in even smaller activities rarely studied in a national context.
Water-oriented outdoor recreation was defined broadly as all outdoor recreation activities in which water was part of the recreation experience (e.g. passive activities like taking a walk along the seashore) as well as the classical water activities (swimming, boating etc.). All activities had to be undertaken within the past year in Denmark.

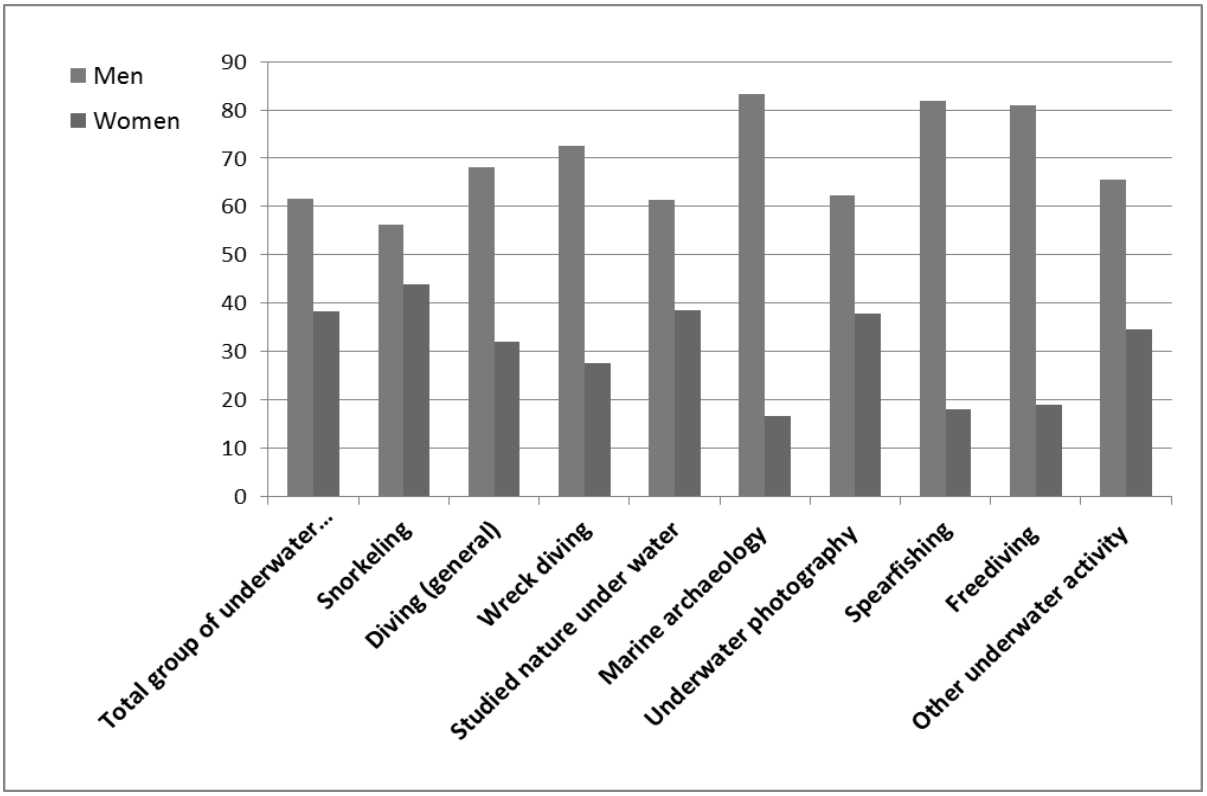
Results

Results show that 77.6 % of the adult population annually participates in water-oriented recreation in Denmark with women having an overall higher participation than men. All 92 different activities had users hereby showing a very diverse activity pattern. The results indicate significant differences in the water-oriented activities in relation to a number of socio-demographic variables. Some activities were found to have very significant gender differences with fishing, hunting, boating and diving being highly male dominated. For most activities, the participation declined with age while a few activities increased indicating a shift from more physically demanding to 'softer' activities.

Based on the extensive and nationally representative data, profiles will be drawn of the different main user groups (and in some cases sub-groups) to illustrate who the users are. Also, the innovative mapping approach provides novel insight into the spatial distribution of the recreation activities of the different user groups. This may also contribute to the profiling of the groups.

Conclusions

The overall profiles of water-oriented recreationists in Denmark will be presented and similarities and differences be discussed. The implications of the methodology, mapping and profiling of the water-oriented user groups for planning and management in marine and coastal areas will be discussed.



The figure shows the **gender differences in underwater recreation** (one of the 16 different main categories of water-oriented recreation in the national study in Denmark comprising 92 different water-oriented outdoor recreation activities) for the overall category and within the 8 sub-activities of this activity. (n = 401 for underwater recreation). This illustrates how underwater recreation is generally a male-dominated activity but has large gender variation among sub-activities.

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UK National Marine Parks: Managing Tourism and Recreation Through A Paradigm Shift of Corporate Social Responsibility (CSR).

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In 2012 the author George Monbiot (noted for his environmental and political activism) stated in *The Guardian*, 'a marine-protected area in the United Kingdom is an area inside a line drawn on a map - and that's about it.' In more recent times, perhaps extending from such commentary, there have been calls for greater, robust designations of protected marine areas in the UK: to extend opportunities from the UK's renowned and respected National Park systems - to create new National Marine Parks. In 2017, Luke Pollard, the Labour MP for Plymouth Sutton and Devonport, a marine city located in the SW of England, suggested one such opportunity. According to the Labour Party's website it was proposed that Plymouth could be the first National Marine Park of its kind in the UK, that the city should aim high and expand its world credentials; most notably it would be '…about managing space robustly…' Such robust management would require a strong consensus to sustainable development, so that the new National Marine Parks offer more than what Monbiot described the majority of the UK's current marine protected areas as; '…nothing but paper parks.' The new designations would need to offer internationally recognised areas of protection for our seas and coastlines that conserve biodiversity, whilst also allowing tourism, recreational and commercial use. However, the balance between protection and use - the ability to ensure sustainable development is absolute - has created many issues for UK National Park management, since they were 'enabled' through the 1949 National Park Act. Fundamental to managing conservation alongside tourism and recreation is a binding mechanism created through the Sandford Principle. Campaign for National Parks (2017), a UK Charity dedicated to promoting and protecting the 13 parks of England and Wales states, the Sandford Principle '…is a long-established mechanism for ensuring that priority is given to the conservation of National Parks where there are irreconcilable conflicts with other purposes and duties. This simple principle has been central to the protection of our beautiful National Parks for decades. Without the Sandford Principle, there is a real risk that economic interests will be given priority over the conservation and enhancement of National Parks.' This mechanism may provide a framework for conservation but it also requires tourism managers and recreational users to follow an acceptance of corporate social responsibility (known through its renowned acronym of CSR). This process underlies the management of access for all, in other words the public rights of accessibility alongside a need for conservation. It focuses the acceptance of 'fair share', yet responsibility is a strange process to use in order to manage sustainable outcomes. Not only is it, in the main a voluntary and subjective code but, 'Responsibility does not equal sustainability! Responsibility is relative: [tourism] companies can take it a lot, somewhat, a little, or none' (Ketola, 2010: 324). As Stones (2018) states, 'with so many demands on humanity to overcome social injustice and environmental degradation it does seem absurd to rely on a 'relative' model to progress sustainable outcomes from tourism and recreation management strategies. So, with an entirely new model of national park being proposed in the UK, how will a National Marine Park look to progress sustainable outcomes from tourism and recreational use? Will it be through a similar

principle of responsibility or will it endorse a paradigm shift and look to progress a new model of responsibility?

The character and style of this presentation will use the presenter's extensive expertise in national park and tourism management to provide a conceptual framework addressing this new model of management. The presentation will argue a contemporary paradigm of CSR, asserting that accessibility and protection may be better managed through a new lens of 'R', which no longer represents responsibility!

It should also be noted, to understand the character and style of the presentation, that the presenter is a practitioner in global National Park strategy, Board Trustee of one of the founding organisations of UK National Parks (Campaign for National Parks) and an Honorary Research Fellow of the University of Exeter. As such, this robust argument builds, not only from practitioner expertise but also develops from extensive research undertaken as part of a PhD, looking into a new paradigm of CSR and sustainable development within a land based national park in the USA, namely Yosemite National Park.

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Nautical tourism ecological footprinting (NatEF) – experiences from east Adriatic in developing assessments

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***Dario Omanović**, researcher at Ruđer Bošković Institute, Croatia*
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Intensity of nautical tourism in Croatia is rapidly increasing. Most attractive and sensitive locations are under rapidly growing pressures threatening their ecological status. First analysis of nautical tourism environmental aspects were initiated 10 years ago focusing on emerging cruise tourism. Since then understanding of cause-effect matrix of environmental pressures and impacts is evolving and providing more detailed knowledge on nautical tourism ecological footprint. Furthermore, with marine NATURA 2000 network emerging in recent years, to complement existing nature parks, management challenges appeared from all aspects and the need for stakeholder cooperation and informed management is the priority. Although MPAs are conducting mitigation measures, the extent and complexity of related issues is such that wide partnerships are inevitable necessity.

Project presented here is taking place in scenic marine environment that is a NATURA site linking to the Krka National Park that annually attracts more then 1.000.000 visitors with continuous increase. Therefore the locations in question are under considerable visitation pressures from both nautical and land based tourism. Prime concern, therefore, from all interested stakeholders is to gain data, information, parameters and indicators that can enable informed decision-making.

Since basic information of number of vessel (per day/month/year/season) in the Krka River estuary is not available a preliminary "spot" counting was conducted concluding that: number of vessels passing in/out of the Estuary during nautical season may reach up to 1.500 per day - nearly 100.000 vessels during summer period.

A significant number of boats anchor in front of Skradin town that is frontier of the National Park Krka and sensitive estuary ecosystem. No reliable data is available on exact spatial and timing of boats' activities, making the risk of uncontrolled anthropogenic inputs even more worrisome. Additionally, the crowding and intensity of boat movement in the season increase the probability of various incidents and accidents with different scales of potential impacts.

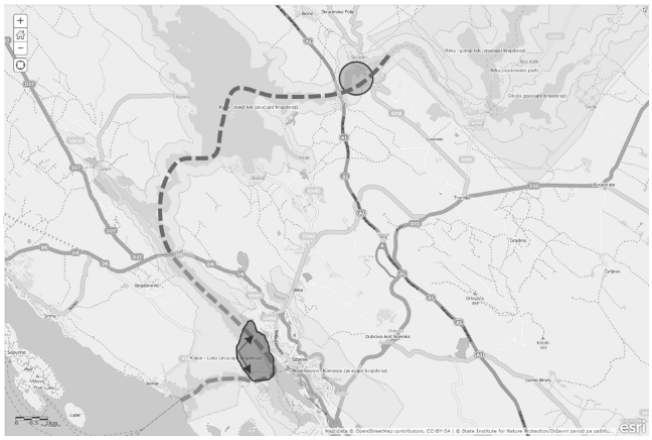

Figure1: Map of the "Krka Mouth" area (Code: # HR3000171). Dashed lines represent ranges of the two distinct protected areas: "Krka – lower part" (blue line) and "Channel – Harbor" (orange line). Marked red area represent investigated sites; arrows show two directions of video counting system. The pilot site is located in the Mediterranean part of Croatia, between towns of Skradin and Šibenik.

Located between the Skradinski Buk waterfalls through the Prokljan Lake to the St. Ante Channel, the estuary has a total length of 22 km.

Since 2014. research is conducted on the sources, distribution and behavior of ecotoxic metals in the Krka River estuary in cooperation with the colleagues from the Toulon University (France). Subsequently the irregularities were disclosed: during summer season concentrations of copper are up to 20 times higher compared to winter season! Sampling methodology and analyses of trace metals used here were:

- Two field scheme were surveyed: the first along the whole estuary transect, involving two contrasting periods of a year (winter and summer), covering 15 sites and the second, "high-resolution" mapping, within the Šibenik Bay (summer) covering 40 sites. Vertical profiles of main physico-chemical parameters (salinity, temperature, pH, and dissolved oxygen) were measured in-situ at each site by CTD multiprobe. Samples were collected using a trace metal clean horizontal water sampler (Wildco).
- Samples were filtered through 0.45 or 0.22 μm cellulose-nitrate membrane filters (Sartorius) and acidified with ultrapure concentrated HNO3 (TraceSelect Fluka) to pH < 2.
- Trace metal concentrations were determined by electrochemical techniques using Autolab (EcoChemie) potentiostats and three-electrode cell (663 VA Stand, Metrohm).

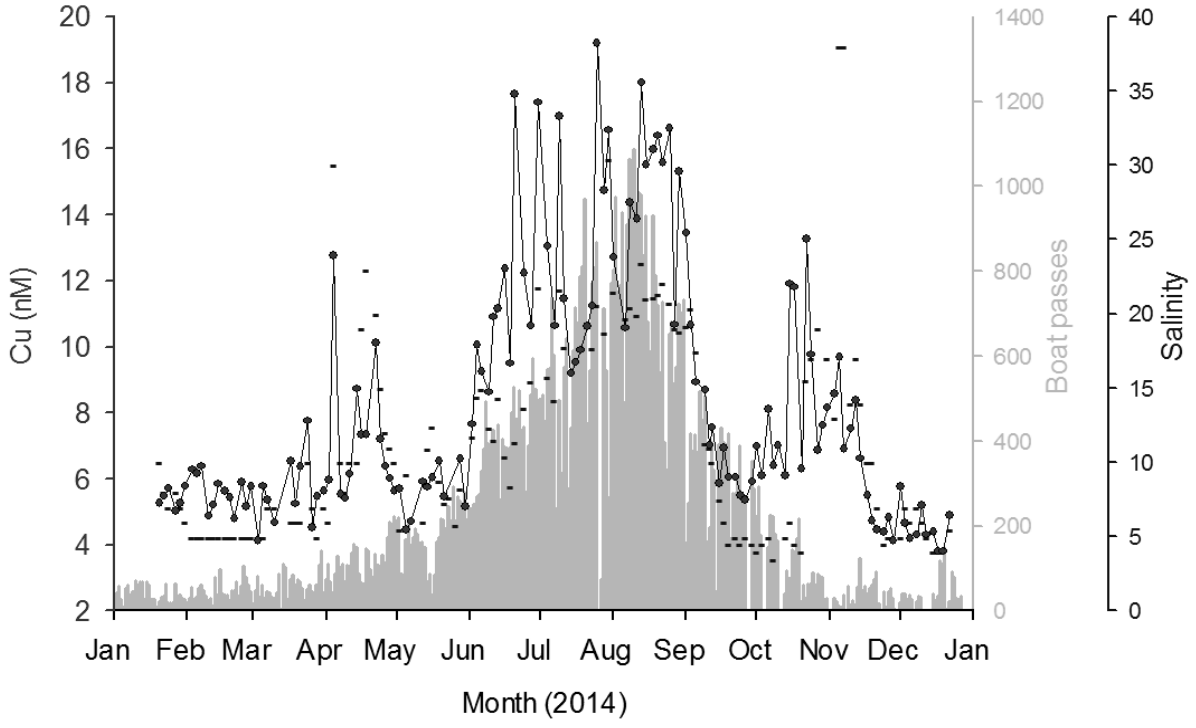

Figure 2. Daily values of salinity, passages of boats and Cu concentrations surveyed in 2014. in the Krka River estuary sites

The main source of increased copper concentration is anti-fouling paints used as biocide agent for nautical vessels. For particular environmental / chemical conditions, at this level elevated concentrations (~1.3 μg/L), copper is considered as potentially toxic and a matter of

concern regarding possible negative effects to different organisms (especially phytoplankton species) and entire ecosystem. In combination with temperature, high nutrient content, this could lead to the increased primary production, finally finishing with the eutrophication, which was already registred in parts of the MPA in question.
Since risk assessment model for antifouling was developed previously, the project is continuing in direction of further data gathering and analysis in order to disclose risk level and subsequently mitigation. Key issues here are heavy metal bio-magnification through food-chains in sea environments and biodiversity fragility. Because the Krka River Mouth area is fish and mussel farming area (5.000 tons per year) it is necessary to make effort to reduce possibly consequences to minimum.
Based on the up to date experiences, a group of researches decided to continue on evolving methodologies that would lead toward fuller understanding of Nautical tourism ecological footprinting: developing parameters and indicators based on both existing standards and evolving research. Along those lines the methodological approach for NatEF is as following:

1. Monitoring intensity, timeing and spatial distribution of maritime traffic by:
- video system for nautical vessels counting with automatic counting software;
- heat mapping of traffic through radar imaging and vessel finder system (through the ministry of maritime traffic).
2. Monitoring of copper content in surface water of the Krka Mouth: Off-shore sampling of surface water (every 2 to 15 days, depending on the season/site). Primary sample preparation (filtering, acidification) is conducted in laboratory or on-site. Further samples pre-treatments and handlings required for measurement is performed immediately before analysis. Analyses used high-quality instrumentations and methods: electrochemical and/or HR ICP-MS (High Resolution Inductively Coupled Plasma Mass Spectrometry).
3. Determination of correlation between copper distribution and number of boats in the estuary: data collected is analyzed through mathematical/statistical packages (Data Mining and Principal Component Analysis) and interrelations correlated within the measures: number of boats, copper concentrations, weather conditions, hydrological conditions, seasonal activities.
4. Expand footprinting analysis with other aspects: underwater noise, gray waters, black waters, bilge etc. Assessing best available methodologies for monitoring of named aspects.
5. Mitigation recommendations for MPAs - alternative methods, techniques and treatments that remove fouling with no heavy metal inputs into the environment.
Currently part of the named activities is being conducted as part of a MedPAN project ("NaTEF – Nautical Tourism Ecological Footprint in MPAs").

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The participation of tourism and outdoor recreation interests in coastal national park management in Norway – a lack of integration?

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Problem statement

The Norwegian national parks system was established in the beginning of the 1960s with a chief aim of nature conservation, and to a lesser degree, outdoor recreation. In recent years, the protected areas' tourism and outdoor recreation functions have come more to the forefront of management strategies. A central research question is whether the outdoor recreation and tourism actors are well incorporated into the participatory planning and management processes. The paper addresses the participation of outdoor recreation and tourism stakeholders in the management of two Norwegian coastal national parks. By means of individual interviews, we aim to reveal stakeholders' roles and functions in the management systems of *Ytre Hvaler* and *Færder* national parks.

National parks and management system in Norway

Norway's Nature Diversity Act (2009) states that national parks can be designated in large areas of natural habitats that contain distinctive or representative ecosystems or landscapes, and where there is no major infrastructure development. Accordingly, the country's national parks have typically been located in rural and remote alpine regions, whereas coastal landscapes, particularly in the southern and western parts of Norway, have been underrepresented. National jurisdiction, park regulations and management plans have guaranteed free and unlimited visitor access to the parks by way of accepting the tradition of *friluftsliv* (outdoor recreation) with low levels of technical assistance. In recent years, however, the Norwegian national nature management agencies have increasingly acknowledged the various user interests in the protected areas; a branding and visitor strategy for the national parks was launched in 2015 and is now about to be implemented. These new trends are highly relevant to the coastal national parks, with larger population concentrations nearby and quite intensive user pressure from tourism and outdoor recreation activities.

Coastal national parks

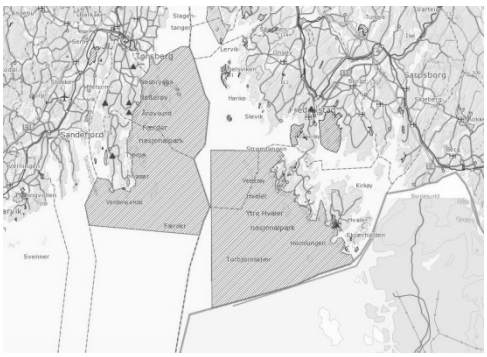

Figure 1. Map of *Ytre Hvaler National Park* and *Færder National Park* in Outer Oslofjord, Norway

In 2009, the first coastal and marine national park in Norway, Ytre Hvaler National Park, was established on the eastern side of outer Oslofjord. Færder National Park, located on the opposite side of the fjord, was inaugurated in 2013 (Figure 1). Ytre Hvaler and Færder national parks are the case study areas of our research. The protected areas are similar in that they consist mostly of marine territory and relatively small terrestrial sections of the shoreline.

There is reason to believe that the coastal national park management system, with its given jurisdiction, management regulations, management plans, professional competences, financial and staff resources, etc., are not properly designed to handle the high volume of visitors or the variations in visiting patterns (Stokke & Haukeland 2017). As a response to this management deficiency, the coastal national park managers try to form professional networks amongst themselves and learn from each other's experiences and management practices (Stokke, Haukeland & Hansen 2017).

Interview data

The data for this paper is semi-structured interviews with representatives from four tourism providers in the two parks, the outdoor recreation organization for the Oslofjord (*Oslofjordens friluftsråd*), the national park centers and the business department in the municipality in Færder National Park, and the tourist destination company *Visit Fredrikstad and Hvaler*. The interviews were conducted in the period from August 2017 to February 2018.

Results and discussion

According to the interviews, the stakeholders representing outdoor recreation and tourism interests have modest roles in the management of the two national parks. Their involvement is mainly limited to participation in reference groups, which serve as a forum for local interests, and in which tourism-related issues are not always at the top of the agenda. This is in line with previous research of other Norwegian national parks, which indicates that these reference groups have, in general, very little actual influence (Hovik & Hongslo, 2016). Another limitation is that the outdoor recreation organizations and tourism industry interests in both areas are relatively weak and fragmented.

An important organization for both parks is *Oslofjordens friluftsråd*. This regional organization for outdoor recreation initiated the work, as early as in the 1930s, to safeguard public outdoor interests along the Oslofjord, and in the Færder and Ytre Hvaler areas. Thus, the organization has worked to prevent the development of second homes and other installations along the coast, which has been common in other parts of the region. This long-lasting endeavor was an important foundation for the establishment of the two national parks. However, the organization's participation in national park management is quite limited, even though it possesses key competence in coastal recreation and tourism management and was interested in participating in the boards when the two national parks were established.

An interesting distinction between the two national parks, however, is that tourism stakeholders in Færder National Park have, to a greater extent, expressed interest in the tourism potential that the protected status of the natural resources represents. The difference is probably due to historical reasons; the establishment of Færder National Park was a result of a local initiatives, whereas Ytre Hvaler National Park was already part of the initial national National Park Plan. The affected municipalities in and around Færder National Park have promoted the national park as a destination for outdoor recreation and tourism, and, in many ways, bridge the gaps between tourism and outdoor recreation and national park management.

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Environmental effort in recreational and protected areas at risk from inequality

Impact based management of recreational uses: a fair share of environmental effort? A sociological approach applied to two French national parks

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Theoretical framework and methodology

This presentation focuses on the impact of nature-based activities on protected areas from an environmental sociology perspective. Without denying their ecological effects (Ng, Leung and al., 2018), this approach underlines that those impacts also raise social issues, as with all environmental considerations (Candau and Deldrève, 2015).

We argue that managing these activities on the basis of their impact on the natural environment is an "environmental effort" for users, that is to say a socially differentiated and potentially unfair contribution of social actors to environmental protection policies (Deldrève and Candau, 2014).

Considering nature-based activities only as a potential hazard for environmental protection may have the same social effects as categorizing overuse as a danger (Claeys and al., 2011). In addition, it could lead to the exclusion of human populations from the territory, and may create or accentuate environmental inequalities (Deldrève and Candau, 2014). Since the 1980s, this issue has become a topic of increasing interest for policy makers and researchers, under the influence of the "Environmental Justice" movement in the United States. More recently, both have been recognized as a crucial issue, even in outdoor recreation (Taylor, 2000).

Ecological paradigms as well as the political and legislative international contexts in which these protected areas are developed have also evolved to better recognize human activities. But what are the concrete effects of these evolutions in terms of environmental effort? Who defines environmental effort for users in natural areas and how is it argued? What principles of justice govern the arguments put forward by different stakeholders? What are the different forms of effort and how different stakeholders judge them?

Our research contributes to a French ANR program (Candau et Deldrève, 2014-2019) with an approach based on the analytical framework of environmental effort (Deldrève and Candau, 2014; Deldrève and Claeys, 2016) tested in two case studies: the *Calanques* national park, near Marseille, and the La Réunion Island national park. Our corpus is built on data from a qualitative survey) of stakeholders and managers, as well as a diverse range of users of these two natural parks (hikers and trail runners, swimmers, mountain bikers, etc.) whose activities may be criticised on account of their impact on protected nature. All 63 of these semi-structured interviews were recorded and fully transcribed, and were subject to manual thematic analysis. These data were completed by direct observation of outdoor events and by the analysis of various documents.

Main results

Limiting nature-based activities based on their impact: a collective principle for managers contested by users

In the two national parks studied, managers aim to limit activities because of "environmental protection". However, some users, recognized as "historical" and "ecofriendly" (not precisely

defined), benefit from advantageous rules for their activities and events. In the Calanques, managers put forward the idea of limiting groups of hikers and races on trails to 100 participants because of their supposed (but unproven) impact on the natural environment. In this context, the definition of ecofriendly uses cannot be treated objectively, and a lack of reliable data about the impact of those uses may exacerbate emotionally and ideologically loaded discourse from all the protagonists involved.

In the national park of Reunion Island, impact-related rhetoric can lead to unequal environmental effort being required from users who practising the same activities. Walking on trails has continued to be permitted since the creation of the park, so many tourist hikers interviewed feel a weak environmental effort. The situation is different for numerous local walking clubs, for whom walking forms part of a wider set of cultural practices, such as picnicing and other get-togethers, - which are either restricted or forbidden. In their mind, there is no sense in separating walking from these practices, and they endure a higher level of environmental effort than users (often tourists) only interested in hiking.

Managers and local authorities also share and apply the principle of limiting or banning some activities because of their impact. However, this common principle is called into question for two main reasons: Firstly, studies on the impacts of local uses (cross-country running, hiking, mountain bikeing, etc. are rare and not particularly convincing, because impacts are very difficult to evaluate, and their causes are numerous, as recognized by a few managers. Secondly, users strongly criticize the principle of limiting their pratices based on purported impacts when they believe that there is a “double standard” and “queue jumping” among recreative users.

Beyond controversies on impact: feelings of environmental (in)justices in living territories

In many cases, recreative users do not separate their activities from issues affecting the territories in which they live (Ginelli, to be published). In the two parks, their recurrent discourse about “double standards“ reveals feelings of injustice shared by many recreational users towards others activities. For example, in the Calanques, newcomers and ‘traditional’ users see increasing restrictions on their activities, while at the same time the public authorities and the scientific council of the park have allowed –under conditions- a multinational industrial company to continue to pump toxic sludge into the Mediterranean in the same area (figure 1). This situation creates widespread feelings of injustice, and discredits the park’s arguments for managing nature-based activities on account of their impact.

Discussion

“Carrying capacity”, “overuse” and “impact” are linked by an ecological perspective with the same ambiguity: they are both scientific concepts and management norms (Claeys and al., 2011). As a consequence, difficulties in assessing them weaken at once these concepts and their legitimacy when used for management of protected areas. Research into “carrying capacity” underlines that it is not an absolute value or a “miracle number” but depends on values and needs to be defined from a management perspective (Bergère and Le Berre, 2011). Such a perspective, that “could leave way for an ‘accepted’ socio-natural system” (Claeys and al, 2011: 89), may be based on a combination of relationships and roles for researchers, managers, and stakeholders that we will discuss.

Figure 1:"Future of the Calanques: toxic sludge allowed, mountain bikes forbidden", poster of Mountain Bikers Foundation-France, 2017

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Managing Visitors and Environments: Resident Perspectives on Amenity Values in Mexico

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Successive conferences on the management and monitoring of visitors in protected and recreational areas have provided us with clear frameworks and valuable methodologies for assessing visitor experiences and impacts as well as strategies for addressing their relationships with the resources in question. Indeed a central concern of these conferences has been the centrality of the visitor as the focal point of research, policy, and practice. Drawing heavily on European cases where ecological and economic considerations promote attention to visitor engagement with natural surroundings or local residents it is understandable visitors/users take a key place in any discussion.
In other settings, however, reduced levels of visitation and more limited recreational use create new management challenges. A principal goal may be to attract visitors in ways that contribute to local economic development, thereby promoting patterns of use that attach tangible value to amenities such as landscapes, forests, wáter, or wildlife. The central issue for professionals, communities, and managers is to find ways to increase and direct visitation in ways that lead local residents to view recreational or amenity use of resources as important contributors to their wellbeing and therefore to assign resources a value making them worthy of protection instead of neglect or degradation.

Research Site

Our research addresses a very different site and circumstances than those found in developed countries with established patterns of recreational use, environmental management, and visitor traffic. As elsewhere in Mexico the Rio Copalita watershed in the southern state of Oaxaca is one where ecotourism and other forms of recreational or amenity use is in its infancy. The mountainous, forested region is home to about 35,000 people, mostly Zapotec Indians, scattered across 1600 square kilometers. Dependent largely on subsistence agriculture and minor commerce the watershed appears to offer visitors from Mexico`s urban centers or abroad grand opportunities for ecotourism and enjoyment of local cultural traditions. Yet the current population cannot live in expectation of future potential and may be tempted to neglect good forest practices, hunt wildlife to extinction, or fail to protect the quality of streams and rivers because of the short-term benefits of such behavior. In the interest of clarity we will focus on the municipality of San Pedro El Alto although our findings are broadly representative of the 19 in the watershed.

Methodology

This paper draws from ongoing research in the Copalita watershed. Our central question is "How do local residents understand and make operational their sense of resource value?" Behind this question is a recognition that if residents attach value to resources consistent with the values of conservation and sustainability they will act to protect those resources in ways consistent with prospective visitors, thereby enhancing the attractiveness of San Pedro El Alto for recreational and ecological tourism. If residents view existing resources as commodities to be exploited and exported from the region then they may act in ways that

damage or degrade resources in the eyes of prospective visitors. If pleasant streams become sewers or waste dumps it is unlikely recreational users will appear.
While the overall perspective of resource management may include landscape, forest, water, and wildlife we will concentrate on water, and particularly on water quality. Water quality is readily compromised by careless behavior at the individual level so we want to understand whether attitudes and behaviors will support or discourage visitation to the Copalita watershed. Attitudes and behaviors are being monitored through individual interviews using semi-structured questionnaires, through focus groups drawn from neighbors and organizations, and from informal discussions with possible stakeholders likely to be affected by an increase in visitation. Experience suggests respondents may voice supportive attitudes yet display behaviors that damage water quality, e.g., follow practices for disposing of household or human waste that degrade surface water. So we want to know to what extent do San Pedro El Alto residents share the values of prospective visitors.
Second, we want to understand how institutions and other stakeholders approach protection of amenity values for visitors. The national government has formal policies and plans governing water management but do these reach into remote places like the Copalita watershed? Do outside policies include incentives or support? The government of the state of Oaxaca is an enthusiastic promoter of ecotourism and diffusion of tourism to rural areas to encourage development; does it address practical amenity matters such as water quality? Analyzing stakeholders requires interviews with local government officials and community authorities, review of formal plans and the documentary record, and discussions with environmental activists and tourism promoters.

Findings

Work to date suggests the widespread consensus found in Western Europe or Japan regarding protection of environmental values or the contributions of amenity management to the wellbeing of protected and recreational áreas is only beginning to penetrate stakeholder consciousness in places like rural Mexico. In Europe this permits a focus on the visitor while in Mexico attention is divided between the hope for increased visits and the need to attend very directly to the relevant natural resources. What is largely settled in Sweden or Austria is still problematic and contested in Mexico. Furthermore the long tradition of treating the Mexican countryside as a giant reserve of commodities to be exploited for the benefit of outsiders means economic models contemplating the sale of resources to those with the economic capacity and political influence speak loudly. In rural Oaxaca this may mean large mining operations dumping thousands of tons of toxic waste into rivers. Do communities bound together by tradition and culture have the capacity to protect their resources and in the process maintain environments attractive for recreational use? Visitor management requires integral attention to those amenities visitors seek to enjoy.

Reconciling Small Scale Protected Area Designation with Local and Traditional Land Uses: two Nova Scotia cases

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The Nova Scotia Nature Trust (NSNT)

Established in 1994, the Nova Scotia Nature Trust (NSNT) is an incorporated charitable conservation organization dedicated to protecting ecologically important natural areas in Nova Scotia, with a focus on rare, outstanding and imperiled coastal and freshwater habitats and the critical habitat of at-risk species. Its vision is for "a future in which Nova Scotia's native species, and unique habitats and natural landscapes are protected in perpetuity, and in which this natural legacy is appreciated and actively stewarded". It has been highly successful is securing conservation lands through donation, purchase and conservation easements; however, limited resources are available for ongoing stewardship management. It must, by necessity, rely on local volunteer stewards and strategic partnerships.

The Land Tenure Context

European settlers established permanent settlements in Nova Scotia in 1604 substantially altering and dividing the landscape. Seventy percent was privatized into small private forests and farms with remnant Crownland generally found more remotely. More recent land expropriation by the provincial government to consolidate for national park designation in the nineteen thirties, sixties, and seventies (a failed attempt), engendered government distrust tainting later attempts to designate protected areas.

Given the context of complex land use, traditional recreational uses and natural resource exploitation, protected area designation often clashes with established local practices. This paper examines two such cases, Black Point Beach /Hemeon's Head on the South Shore and the Wolfville Watershed Nature Preserve, both in Nova Scotia, Canada.

The Two Locations (see Figure 1)

Hemeon's Head/Black Beach is owned by Acadia University and is located on Nova Scotia's south shore and is comprised of 46 hectares. A conservation easement between the university and the Nature Trust was signed in 2011. Black Beach contains seven kilometres of undisturbed coastline, supports an endangered breeding bird (the piping plover) population and adjoins the adjacent Matthews Lake property belonging to the NSNT. Together, the properties equal 125 hectares of diverse and significant coastal barrens, bog wetlands, salt marsh and sand dunes, with habitats used by waterfowl, shorebirds, and migratory birds, including three provincially and federally listed species at risk. Its ecological value is under threat from all terrain vehicle (ATV) activity, particularly within the cobbled dune system where piping plover breed, and other traditional uses not strictly compatible with conservation objectives.

The Wolfville Watershed Nature Preserve is a 243 hectare property owned by the Town of Wolfville (TOW), previously used as a water supply and is located 10 kilometres from town. A conservation easement between the Town and the Nature Trust was signed in 2007 and was the first of its kind in Canada between a municipality and a land conservation trust. Its most significant conservation value is an old growth hemlock forest. The surrounding

landscape has been highly altered through agriculture and logging resulting in no nearby government protected areas. This site includes several popular trails primarily used by walkers, but there are other recreational uses, some condoned, and others notionally prohibited. Hunting is prohibited, however, there is evidence of a hunting blind just off property pointing toward the Preserve.

Study Methodology

A goal of NSNT is to establish feasible management plans that garner local support and ensure long term ecological integrity. For Black Beach a management plan was to be developed and for the Wolfville Watershed an established plan was to be reviewed. In both cases, applied research courses within the Environmental and Sustainability Studies Program at Acadia University were commissioned to conduct preliminary human dimension analyses and make recommendations. In both cases, historical and contextual analyses were conducted, supplemented by on-site orientations. For the Black Beach case, an issue orientation was also provided by a local conservation champion which was followed by a townhall type meeting, and a small number of semi-structured interviews. For the Wolfville Watershed, a narrated PowerPoint and a podcast was reviewed prior to the field visit, and several semi-structured interviews were conducted.

Findings

Both sites showed obvious physical evidence of non-conforming use and site degradation was evident from ATVs primarily in the form of an extensive trail network. The South Shore beach was strewn with ocean debris, none of which could be attributed to site users. Matthews Lake was accessed by subsistence clam diggers on ATVs and there were numerous other ATV tracks. A gravel road through the Watershed property, once a public road, provided convenient off highway vehicle access to distant trails.

Conservation Management Issues

Broadly speaking, the conservation challenge in both locations boil down to how far can the NSNT and landowners manage the sites for conservation objectives, condone prescribed recreation uses, manage non-conforming use, and tolerate traditional consumptive uses without compromising the ecological integrity of the sites? This must exist without active, on-site management.

Given a dearth of management resources, a second related issue is the extent to which local volunteers can be recruited to monitor use and to promote conservation, particularly considering the potential for conflicting and adversarial behaviours. It is important to note that local conservation champions must co-exist with neighbours some of whom have quite different land-use aspirations.

Conclusions and Recommendations

Both studies provided preliminary insights into the human dimensions of small scale conservation challenges in rural areas. It became clear in both situations that to promote biophysical conservation goals, full adherence to prescribed uses must at best be aspirational rather than rigidly applied. Even in relatively small-scale conservation areas, the human dimensions are complex and sometimes adversarial.

At Black Beach, subsistence clam diggers' livelihood could be adversely impacted by a no harvesting regime. Duck hunters, whose families have hunted this area for generations, would likely oppose a hunting ban while Piping Plover conservationists' work can be undone in a moment by ATVs or a marauding dog. A nature lover's hope for a tranquil hike along the beach can be shattered by noisy ATVs, and some recreational ATVers are indiscriminate in choosing places to play. In the Wolfville Watershed mountain bikers who invested many hours developing trails, building jumps and laying bridges, found their work dismantled and displaced. And ATVers who have used the trail through the Preserve for decades, push back by cutting new trails around newly erected trail gates. Informational signs disappear or are damaged.

While the analyses are preliminary and require more in-depth field analyses, particularly focusing on local residents' aspirations, and conforming and non-conforming users; it is clear that the stewardship plans must be sensitive to local realities, if neighbours are to become conservation stewards.

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Figure 1: The Two Nova Scotia Nature Trust Sites: Top left, Wolfville Watershed Nature Preserve Site Map; Bottom left, the Old Growth at the Wolfville Watershed; Top right, Hemeon's Head Site Map; Bottom right, Hemeon's Head showing ATV Tracks; Bottom inset, Map of Nova Scotia with site locations and Canada inset highlighting Nova Scotia

Collaboration with Communities Living next to Protected Areas, for the Conservation of Biodiversity, Landscape and Heritage in Israel

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Protected Areas in Israel

The Israel Nature and Parks Authority (INPA) is Israel's government agency in charge of all legally protected areas (Nature Reserves and National Parks). The INPA has been working for many years in collaboration with local communities. This connection between the INPA's Nature Reserves and National Parks, and the local communities that live next to them, is a longstanding association with mutual implications. Over the years we have experienced a rise in the public's impact upon the environment. This is due to the tremendous growth in the size of the population in Israel and the concomitant reduction in open spaces, and also due to the public's increase in awareness and the desire of the public to be more involved in environmental issues. In order to protect biodiversity, landscapes and heritage over the long term, the INPA realizes that we must have the public as a cooperative partner.

The INPA is empowered by Israeli law to protect and manage the biodiversity, landscape and heritage of Israel, and we use a variety of tools to implement this responsibility, including planning, enforcement, monitoring, research and development, education and public awareness, and running an assortment of activities in our Nature Reserves and National Parks to develop long-term connections with local communities.

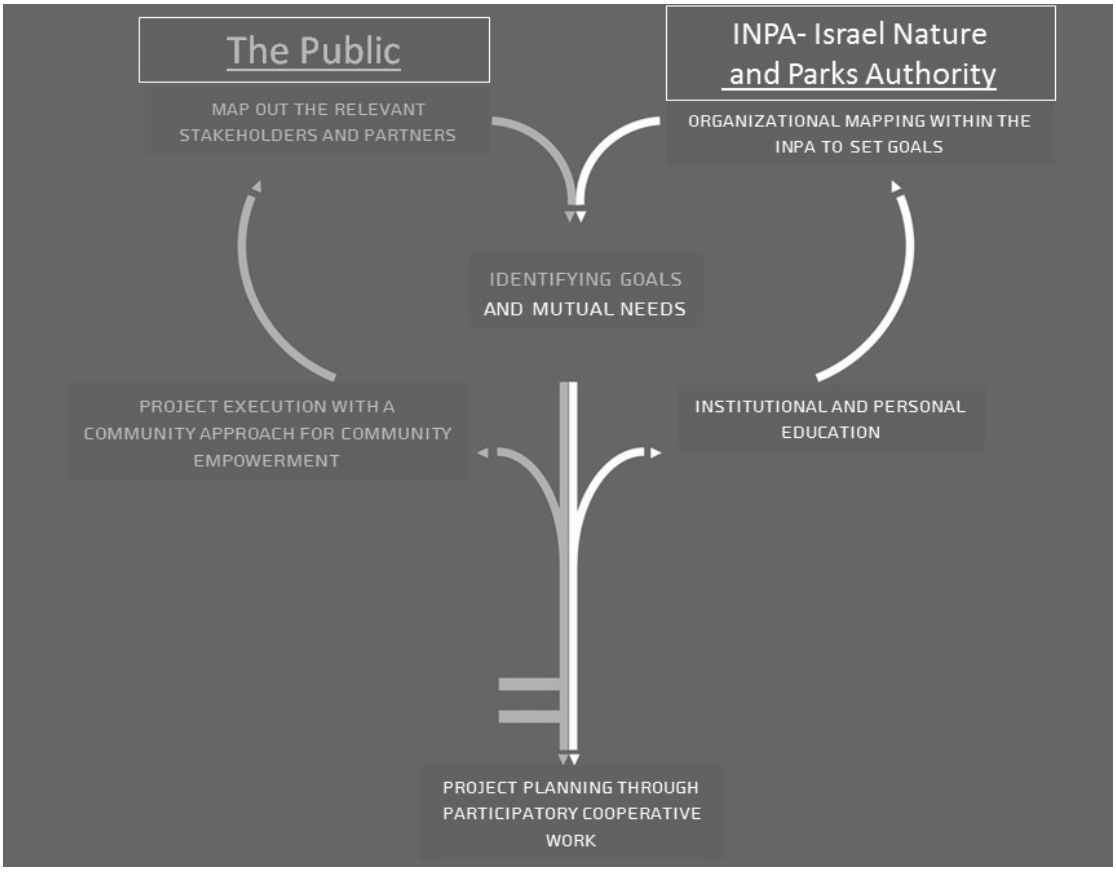
Over the last few years, the INPA has done extensive work to define anew its collaboration with the public and the tools that are necessary for this. A new professional standard within our organization has been established for collaboration with communities, and we have hired a new Coordinator for Community Relations in each of the INPA's four national regions.

Israel's Nature Reserves and National Parks contain a tremendous variety of biodiversity, as well as many protected landscapes and important heritage. While neighboring communities can sometimes come into conflict with protected areas due to different interests and perspectives regarding these natural and historic areas and their resources, the communities can also be a valuable source for support and collaboration. This support can be nurtured to the point where the community actually identifies itself by the protected area and it actually becomes a patron and a source of activism for its protection.

In Israel there have been social trends lately for greater public involvement in government issues, and a trend by government to facilitate greater transparency and public input. These trends have resulted in greater participation of local communities in sustainable development and management of the INPA's Nature Reserves and National Parks.

The "Key to Success" Model

The INPA has adjusted the agency's vision statement to reflect this new spirit of collaboration and transparency in order to make the public more involved and active in the INPA's efforts, and we have developed a new model built upon participatory planning for cooperation with the public in general, and with neighboring communities in particular, We call our model: "The Key to Success".



The "Key to Success" is a model that involves participatory planning and collaborative work between the Public and the INPA, with feedbacks to ensure improvement of the action plans by both parties. The model is depicted in the figure in the shape of a key.

The Key to Success (see figure) has six activities that all feedback to each other, from mapping the various participants and stakeholders and their needs, to learning from the effectiveness of projects and actions, and on to project planning through participatory cooperative work.

Details of the model and each of its components are described in a booklet and all managers of Nature Reserves and National Parks are taught to use it. Each component of the model is broken down into 8-10 action points and the managers are given practical guidelines for accomplishment. There are also detailed checklists and worksheets that the protected area managers receive in order to keep track of their progress in using the model.

The Key to Success model has worked extremely well with quite a number of local communities in Israel.

Collaboration with neighbors through volunteers

A natural connection always exists between protected areas and the communities that live next to them. This connection can be positive, negative, or mutual apathy (ignoring each other), and such will be its outcomes. The INPA seeks positive connection between the

protected areas and their neighbors for two major reasons: practical (in order to increase activities to a larger audience), and also for the principle of serving the public and protection of nature, landscapes, and heritage.
Many of the collective projects between the INPA and neighboring communities were actually initiated by INPA workers who came from within these communities. The goal was to manage these connections by creating a model for mapping the potential partners for each protected area, in order to create larger circles of active participants.
We encourage activism in our projects by setting up possibilities for volunteer work in many of the INPA's endeavors which are appropriate for the neighboring community. This volunteer work empowers the community and brings them closer to understanding the INPA. Working together to achieve goals reaps better results than had been possible only by the INPA without these community-based volunteers.
The INPA workers who are also members of the nearby communities choose their volunteerism for a number of reasons, including the feeling of belonging to a large and successful organization combined with the positive public image, and activities that incorporate fun and enjoyment.
In this way the local communities learn to experience nature and this brings a stronger link to their love of the land, since everyone is connected to nature together.
This is in keeping with the famous saying by John Muir: "*When we try to pick out anything by itself, we find it hitched to everything else in the universe."*

Toward recognition justice through empowerment in Natura 2000 ecotourism.

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Introduction

Justice concerns are embedded in environmental policy-making and a sense of injustice related to Natura 2000 policy-making has become powerful local narrative in a number of the EU member states. It has also become evident that more attention should be paid to recognizing local values, cultures and traditions in the process of environmental governance (e.g. Grodzińska-Jurczak & Cent , 2011).

Aim: This study is driven by questions of how Natura 2000 ecotourism can succeed in empowering local residents and to establish the parties misrecognized in the past decision-making processes as a full member of a local community.

We discuss the case of Natura 2000 implementation in Poland to offer a better understanding of Natura 2000 conflicts as the issues of environmental justice. Specifically, we focus on the recognition dimension of environmental justice in the Natura 2000 governance because we find it highly relevant the case of Poland. Our ambition is to illustrate advantages of looking at Natura 2000 conflicts through the lens of recognition justice and foster a better understanding of how Natura 2000 ecotourism can empower residents engaged in those conflicts.

Organization: After taking a closer look at the major theoretical contribution to the questions of recognition, we review issues of recognition in Natura 2000 governance process in Poland. Lastly, we discuss how Natura 2000 ecotourism can contribute to recognition justice by empowering local residents psychologically, and politically as well as empowering them as a member of the local communities and thus serve as a tool to mitigate local recognition conflicts.

Review of concepts

Environmental justice as recognition

Environmental justice frames social issues as environmental issues (Figueroa, 2006). Despite the broad evidence of multidimensionality of injustices, vast majority of environmental justice scholarship has been primarily concerned with its distributive dimension. In contrast, recognition scholars have been interested in 'why' inequality occurs, 'how' justice is conceptualized and who gets to define and design 'just' political processes (e.g. Fraser, 2015). Major concerns identified within the recognition discourse included the political, cultural, social, ecological misrecognition, the lack of representation of certain social actors in the processes of governance, and discriminatory participatory processes.

Building on the critical political theory of social justice it can be proposed that environmental justice as political recognition boils down to the question of how resources are used and who gets to make environmental policy decisions and who does not. Political recognition rests on

the idea that the community members are able to represent their views consistently with their values and local and historical situations in the places where they live. Thus, recognition justice requires appreciation of individual and group identity- e.g. experiences, knowledge, traditional beliefs, and environmental heritage (e.g. Schlossberg, 2007). One step closer to recognition justice would be a direct and robust participation in the decisions that affect a people. Meaningful participation can be ensured through fair procedures of who, and to what extent, is included in decision-making processes.

Empowerment through Natura 2000 ecotourism

In a tourism context, empowerment can be linked to individual changes, interpersonal changes and social structural changes. The resident empowerment literature, describes how the tourism development process can either psychologically, socially, politically empower residents depending on how tourism affects residents' self-esteem, community cohesion, and political agency. From the 'power' perspective residents who become politically empowered through tourism exhibit political efficacy and are motivated to employ social and political resources. Knowledge and information in particular raise residents' awareness of available opportunities and thus help empower individuals to be tourism decision-makers. Social empowerment occurs when tourism-related activities strengthen local relationships resulting in increased community cohesion. Social empowerment, on the other hand, involves changes in a community social structure and community agency. Tourism can promote those changes by bringing residents together for tourism development projects. Finally, psychological empowerment occurs when tourism promotes residents' self-esteem and pride. It can arise from situations when pride and self-esteem are enhanced from visitors who recognize the natural resources of a local community (e.g. Strzelecka et al, 2017).

In sum, empowerment from tourism is not mere inclusion in the participation process, but a complex process that occurs when people gain the agency to steer and control tourism processes, feel proud of their communities as well as when tourism positively shapes local community structure and its capacity to act. The notion of empowerment, therefore, enriches the notion of recognition justice as it explicitly considers interaction between individual and community processes.

Contribution

This paper makes a theoretical contribution to the fields of sustainable tourism and environmental sociology by that it: 1) relates justice to empowerment from tourism in the context of post-transition economy 2) trains the focus on justice-related issues in environmental policy making in Central and Eastern Europe. By applying recognition justice perspective this work offers a problematization of the Natura 2000 decision-making and empowerment through Natura 2000 ecotourism as political issue in post-transition state.

Acknowledgements: We would like to thank Emily Höckert from Linnaeus University for her valuable insights on the question of recognition and early drafts of the paper.

This project is supported by grant No. UMO-2016/23/P/HS6/04017 from National Science Center, Poland.

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Conservation, tourism and fishermen communities in the Toliara region (SW Madagascar).

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In Madagascar, one of the poorest countries on the planet, nature-based tourism is increasing and is considered by the Government as an important driver of economic development. However, it requires extensive investments in public infrastructure that is still limited (i.e. roads, water supply and electricity, waste management) and protection of the environments that visitors come to see. The Toliara area, SW Madagascar, is a region of ecologically important coral reefs (cays; barrier, lagoonal and fringing reefs; seagrass beds and mangroves) bordered by a unique dry forest zone in that is a Biosphere Reserve under the "Man and Biosphere" UNESCO program. Tourism developed rapidly in this area since about 1970. This tourism development allied to nature conservation efforts has occurred in a context of extreme poverty resulting in: (a), the relegation of coastal communities in the margins of profit and (b), the accelerated disappearance of the bundle of rights on which relied the customary reef management. Exploitation of the reefal aesthetic values attracts a new category of actors whose speculative behaviour leads to spatial competition. The power asymmetries between local fishermen communities and tourism operators, often of foreign origins, call into question the validity of an ecological tourism model supposed to be beneficial for environmental conservation and local populations.

Until 1972, the Toliara Great Reef area was considered to house the greatest marine biodiversity in the W Indian Ocean. But in few years, it experienced extensive degradation. Many coral reef habitats documented during the first studies were destroyed. Biomass and reef fish diversity declined significantly; invasions by macroalgae and zoantharians plus changes in sedimentation were observed. However, the Toliara coral reefs are considered highly resilient due to hydro-climatic conditions, presence of a deep canyon and periodic micro-upwellings. This puzzling geomorphology and the existing diversity of biota are favourable to refugia zones, allowing species to adapt to climate change. The causes of this degradation were studied by assessing the effects of (a) over-exploitation and increasing population pressure (urbanization, migration, coastal degradation) linked to regional famines, (b) general climatic changes (dryness's, El Nino high seawater temperature inducing coral bleaching events, increase of tropical storms and cyclones), (c) land deforestation and huge terrigenous coastal inputs. It was shown that overexploitation is occurring mainly involving massive and destructive bottom fishing and destructive gleaning (for octopus, lobsters, comestible shells, collect of corals for chalk making) that is threating recovery and future restoration. While climatic disturbances are destroying coral reefs in the W Indian Ocean, in SW Madagascar it is: - demographic pressure, - land pressure and deforestation related to the rural migrations, - rice and sugarcane agriculture, - expanding urban development, - tourist facilities development, - mining activities, that are involved. Food shortages were always recurrent there due to irregular rainfalls; the repeated outbreaks of the early 1980s led to a large and continuous influx of rural populations and their settlement on the coast. These "neo-fishermen" villages, specialized in fishing and gleaning on reefs and coastal flats, participate in destruction of habitats, increase in fishing effort and overexploitation of the

coral reefs and lagoons. The customary marine tenure of the native Vezo fishermen communities and their fishing governance (shared migrant fishing, prohibition of certain gears, species and fishing zones) were gradually dismantled with the arrival of an inland population alien to these traditions.
To remedy this degradation, Marine Protected Areas were established, mainly by Non-Government Organisations and recently by the Government, in consultation with local populations. These are mostly temporary reserves that correspond to previous seasonal fishing practices and demonstrate certain efficiencies in terms of increased catches. Sanctuary marine reserves are rare and too small; they correspond to taboo areas traditionally prohibited to fishing. MPA have been systematically accompanied by tourism projects with the aim of offering an additional source of income to local populations while these reserves are tourist attractions. Apart from the marginal cases of ecotourism or humanitarian tourism, profitability in the tourism sector depends on access conditions and on basic services that are often lacking. SW of Madagascar which used to be poorly serviced by transport is now better connected. Export fishing societies, as tourism operators, are associated in the MPA establishment decisions. New roads created to serve tourist zones in remoted areas are being used by fish collectors, leading to increased fishing pressure on species valued for export (fishes, octopus) when the revolving MPAs are opened.

Over the past decade, there was an intense land speculation on the Malagasy coastline to the detriment of fishermen without land titles, who are relegated to small areas or highly degraded and even polluted areas. There was also a rush for purchase of inaccessible but exceptional natural sites, designed to secure property and exploitation rights in the future, freezing the space in expectation of opportunity. In the Toliara area, tourism generates significant urban growth (new coastal resorts, shops, bars, curios markets, with changes in behaviour) with rising demand for food and increasing waste pollution directly along the shores to the lagoons, or indirectly into the coastal phreatic water table. The new settlements sometimes destroy the mangroves or/and sandy shorelines including beaches, beach-rocks, littoral dunes) essential to the ecological functioning of the reefs. A recent analysis of the health or degradation factors, done by comparing 2,500 coral reefs of different conditions, has shown that reef degradation is always associated with the development of roads and markets while the reef health is associated with local management systems or customary governance.

The win-win alliance between MPAs and recreational tourism, between environmental preservation and economy, is in question in Madagascar where roads are developing, and customary management has disappeared. MPAs are mainly used for the tourism development and to increase catches for export species when fishermen, dispossessed of their space and customary rights, are left in patron-client relationships with foreign operators. The exploitation of the aesthetic value of the coral reefs is not without damage and must be regulated as the exploitation of the biomass, in a system considered as a whole.

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Interpretation as a tool for connecting visitors to and managing visitors in protected areas

Interpretation program perceptions: A comparison of Alberta Parks staff views of visitor trends, program opportunities, challenges, and outcomes

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Introduction

The mandate of most park systems is to "inspire people to discover value, protect, and enjoy the natural world" (e.g., Government of Alberta 2009, p. 3). Interpretation and environmental education efforts (called interpretive activities) are key management tools to help visitors discover, value, conserve, and enjoy parks. Interpretive activities can achieve many goals in parks and protected areas, including increased public action to protect the environment, reduced negative visitor impacts, fewer enforcement and public safety problems, and re-distribution of visitors (Sharpe 1982; Marion and Reid 2007). Park interpretation should "offer an opportunity to learn about, appreciate, and care for natural and cultural heritage" (e.g., Government of Alberta 2009, p. 17). However, there are often inconsistencies among interpretive goals, planning, delivery, and outcomes. For example, the perceptions of practitioners may differ from those of planners; similarly, the outcomes for visitors may differ from the agency goals (Machnik et al. 2006). These differences in perceptions and outcomes are critical today as many provincial park systems implement results-based planning approaches.

Research can help inform park practitioner efforts to assess performance of and improve interpretation programs. This paper reports on the first stage of a multi-year study designed to assess the outcomes of a provincial park agency's in-person interpretive programs, and the factors that shape their performance. More specifically, we report data from interviews with park staff, to reveal similarities and differences in their perceptions regarding the agency's interpretive programs.

Methods

To understand perceptions of interpretation program outcomes, challenges and opportunities, we conducted short, semi-structured qualitative interviews with a sample of the 50 policy-makers, planners, managers, and practitioners associated with interpretive programs conducted by a Canadian provincial park agency, Alberta Parks. Alberta Parks manages 2.9 million hectares of protected areas landscapes, ranging from wilderness parks and strict ecological reserves to heritage rangelands and provincial recreation areas. It conducts extensive in-person interpretive programs in approximately 10 of its most heavily visited parks.

Through the survey questionnaire, administered via telephone and in person interviews, we asked about interpretation's mandate, roles, strategies, outcomes, and future possibilities. We also asked staff about their past experiences with personal interpretation and their personal demographic characteristics. We will present thematic analyses of open-ended questions (Braun & Clark, 2006). SPSS (v. 23) will be employed for statistical analyses (i.e., ANOVAs, t-tests, and MANOVAs) of closed-ended questions to compare perceptions about interpretation among these staff groups (front-line interpreters, supervisors, coordinators, managers, planners, and executives).

Anticipated Results

Based on similar studies which have compared conservation agency staff program and policy perceptions (Machnik et al., 2006; Seva & Jagers, 2013; Sheikheldin et al., 2010), we anticipate differences in perceptions will be observed based on category and level of employment within the agency, education (degree completed and discipline), past experience with interpretive programming, and degree of interaction with visitors. Interviews are nearly complete, and final analysis will commence in June. Preliminary analysis suggest interpretation at Alberta Parks interpretation programs emphasizes entertainment and experiences for visitors with the goal of making memories and increasing enjoyment rather than simply delivering education and management messages. This advocated approach to interpretation (Stern et al., 2013) has been embraced by some but not all Alberta Parks staff. Differences within types of interpretation may also be expected as some programs are heavily focused on cultural or heritage interpretation while others are centred around physical or natural science elements. Inter-regional systems of communication and provincial interpretive planning appear to be under developed, allowing for different regions, areas, and parks to operate under the same mandate (as stated above) but not with consistent management or strategic direction.

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Social media in parks and conservation areas: A case study of "virtual visitors" from the Facebook page of Yellowstone National Park

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Social media has fundamentally the way the people engage with organizations, including agencies like the National Park Service (NPS). Many organizations are trying to benefit from the huge number of people that can be reached through social media. However, we know almost nothing about the "virtual visitors" that engage with park and conservation area organizations on social media. In this presentation, we discuss some of the first empirical research conducted on virtual visitors, including their characteristics, motivations, and preferences (Miller & Freimund, 2017). Additionally, there is a perception that social media is a great tool for engaging with younger populations who may not find parks as relevant. This research explores virtual visitors' demographics, motivations, activities and engagements on social media. It also explores differences between millennial (born 1981 to 2000) and non-millennial virtual visitors related to these concepts.

Background

Social media in the NPS began in 2011 when the director issued a memorandum providing guidance on the purpose of social media in the organization (Jarvis, 2011). In this memorandum, social media would be used in the NPS for: 1) interpretation and education, 2) civic engagement and public involvement, and 3) communicating the NPS mission to a broader society. The powerful potential of social media tools is demonstrated by the number of people a single post can reach. For instance, a single post by Yellowstone National Park reached over 13 *million* people (Miller & Freimund, 2017). However, with this novel and powerful communication tool comes many questions about its use.

Facebook is the most dominant social media platform, with over 70% of all internet users registered on the site (Duggan et al., 2015). Facebook users tend to engage with the platform daily, and use continues to grow in frequency (Duggan et al., 2015). Although originally intended for college students, the Facebook population has diversified in respect to age. For instance, 31% of people age 65 and older in the US use the platform (Duggan et al., 2015). As opposed to Twitter and Instagram, Facebook allows users to choose their level of engagement with their peers, organizations, and businesses (Miller & Freimund, 2016).

Research on motivations for engaging with organizations on Facebook is lacking (McCorkindale & Distaso, 2013). However, the limited research that exists suggests that socializing, entertainment, self-status seeking, and information seeking are key reasons for engagement (Park, Kee, & Valenzuela, 2009). Additionally, expression of support and information gathering were also noted as key motivations for engagement (McCorkindale & Distaso, 2013). None of this previous research was related to park and conservation areas.

Kanter and Fine (2010) outline several different ways organizations can communicate with people via social media. This includes three types: 1) the fortress, 2) transactional, and 3) transparent. Fortress approaches include age organizations that have strict protocols and

include an “us” and “them” mentality. This results in a unidirectional approach to communication, where information is projected from the organization, but is not received from the outside. Transactional approaches are more fluid in communication, but still view outsides of the organization as serving a purpose, such as furthering a mission or providing donations. A transparent approach views everyone, including those outside the organization, as helping to define and achieve the goals of the organization.

Millenials are a digitally savvy segment of the population born between 1981 and 2000. They have markedly different preferences for interacting with organizations online (McCorkindale & Distaso, 2013). Understanding these differences can help organizations and agencies create more engagement with this important group.

Methods

We sampled people who “like” the official Yellowstone National Park Facebook page by creating a post on the wall of the page with a link to a survey. This method obtained 1,610 completed surveys from a population of about 815,000. Comparisons showed that the sample was reflective of “engaged” virtual visitors. The survey focuses on motivations, engagement behaviors, and communication preferences. We used data reduction techniques (i.e. principal components analysis) to explore the structure of the data. We also used independent *t*-tests to assess differences between millennials and non-millennial virtual visitors.

Results

The analyses showed that virtual visitors had three motivations for engaging with the page, which were called social, affective, and education and entertainment motivations. Millennials had significantly lower social and affective motivations. We also found two forms of engagement, including passive and active engagement. Active engagement was much less common. Overall, millennials were significantly less engaged for both passive and active forms of engagement. Patters of communication preferences (see Kanter & Fine, 2010) were similar. Overall, virtual visitors preferred higher levels of engagement, and disliked forms of communication that were strictly user-generated. Millennials significantly differed on two forms of communication preferences.

Discussion

A huge majority (93%) of virtual visitors had already visited Yellowstone National Park, and thus were very similar to in-park visitors. This suggests that virtual visitors are using social media as a reflection tool as part of the multi-phasic recreation experience. Compared against the NPS goals for social media, it appears there is room for improvement in achieving other goals, such as communicating the NPS mission to a broader audience. We provide several suggestions, including on-site social media engagement, as a way to do this. Additionally, the collective results of this study suggest millennials are less engaged than non-millennials on the social media page, which is a counterintuitive finding. Several suggestions for increasing millennial engagement via social media include promoting “free agents” and providing millennials with opportunities to tell their stories via the social media platform. Future research suggestions include refining and developing basic information on virtual visitors, techniques for improving outreach to underserved or desirable populations, understanding park managers use and perceptions of social media, and merging past research and management techniques with social media.

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Learning during guided wildlife tours in protected areas and its implications for behavioural change and stewardship

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Introduction

This presentation introduces a model of wildlife tours that examines learning outcomes in the context of stimuli that constrain and provoke guide visitor interaction (GVI), the cues that participants respond to, and, how guides can manage such factors. The model is based on qualitative research on professional and volunteer-based tours for non-government organisations (NGOs), Pacific Whale Foundation (PWF) and Supporters of Tiritiri Matangi (SoTM), in marine and terrestrial settings. The model responds to the research's findings that highlighted the complexity of learning during the tours where access to wildlife is regulated for conservation.

Literature review

How to mediate information for visitors in protected areas to educate and inspire visitors to act beneficially towards phenomena they encounter is a central issue for interpretation research (Knapp, 2007; Weiler & Black, 2015). A benefit of face-to-face interpretation is that it provides interactive opportunities through GVI to respond immediately to visitors' on-site needs (Spring, 2016). Evaluating learning in informal learning environments such as guided tours is fraught with difficulties, and this makes researching the learning outcomes of visitors on such tours especially challenging (Knapp, 2007; Weiler & Black, 2015). Determining what key messages and information can influence visitor behaviour is critical in a free-choice learning environment where learning is not systematically assessed (Falk, 2001; Ham, 2013; Weiler & Black, 2015). Research on GVI during wildlife tours has contributed to models of interpretation that contextualise visitor outcomes in relation to curiosity, affect, follow up opportunities to facilitate behavioural change, and, feedback to management. The approaches advocated in these models have further been elaborated on in respect to the formulation of relevant content through thematic interpretation, specific site-based goals, and/or modelling behaviour (Ham, 2013; Knapp, 2007; Orams, Forestell & Spring, 2014; Weiler & Black, 2015).

The rationale for this research was to explore the relationship between instances of GVI during wildlife tours and the personal insights and outcomes visitors gained from their tours. There have been few empirical investigations of learning and behavioural change in the context of guided tours that include studies of GVI that is independent of the experience of the participants and/or use the experience of both visitors and guides. This constrains a fuller understanding of the effectiveness of the guide as a broker between conservation goals and visitors' needs in protected areas (Spring, 2016).

Model of GVI on Wildlife Tours

Field research on the tours of two NGOs was conducted between 2009 and 2012. PWF whale watch tours operate in the Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS), Hawaii, USA, and the volunteer-led habitat restoration tours of SoTM are on Tiritiri Matangi Open Scientific Reserve, Auckland, New Zealand. Using narrative methods this research collected data through participation in, and observation of, the tours and via in-

depth semi-structured interviews with visitors and guides. The research found that learning was an important part of the experience sought by the visitors involved in the guided tours studied. GVI plays an important and influential role in shaping visitors' experiences during wildlife tours. The free choice learning environment of these tours is influenced by a wide range of factors such as psychological and physical constraints regarding access and proximity to wildlife that are often beyond a guide's control. These influences are outlined in the proposed Model of Guide Visitor Interaction in Wildlife Tours, whereby the experiences of the visitor are considered in terms of the temporal nature of the wildlife tour (Figure 1).

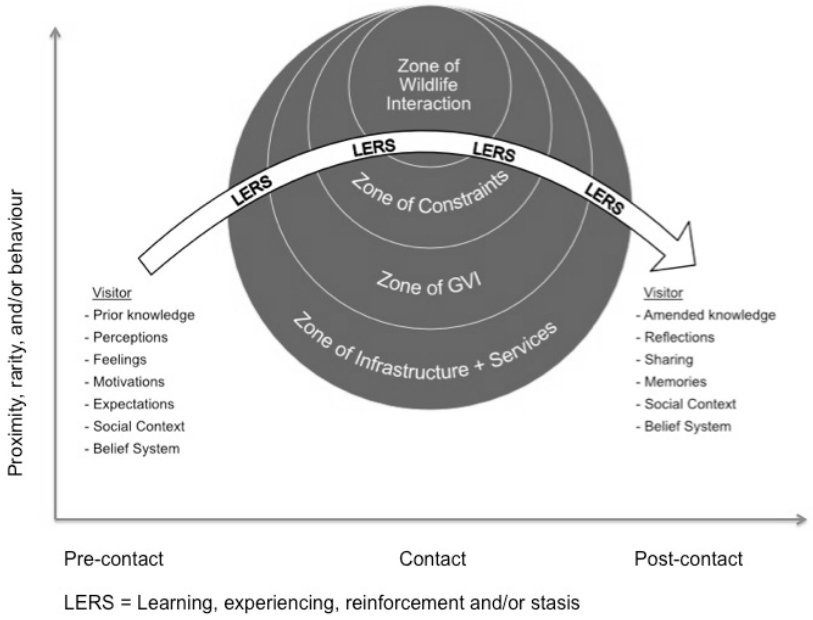

Figure 1: Model of GVI on wildlife tours (Spring, 2016).

Learning in the context of the model refers to the findings on GVI incidents that stimulated questions that visitors did not anticipate they would need to ask or address before the tour. Visitors conceptualised learning on the tours as something that was pleasurable, and involving a range of interaction contexts with place, animals and guides. Learning is connected in the model to experiencing, reinforcement and stasis.

Experiencing connects to the joy and pleasure of the experience in a way that separates out a desired wildlife encounter from learning. Stasis suggests that for some visitors it is possible that the visit does not evoke emotion or provoke thought. Reinforcement as a concept is the boundary between learning, experiencing and stasis. Reinforcement refers to how many visitors appeared to be aware of a demarcation between the extent that learning occurred for them through GVI and the degree to which what they heard was a catalyst for recalling existing knowledge. Reinforcement as an outcome is not necessarily a lesser outcome than learning as it may act as a catalyst for visitors to maintain existing conservation supporting behaviours (Spring, 2016).

The Model of GVI in Wildlife Tours is a tool that can help define the limits and possibilities of how and when to engage visitors undertaking a guided tour to maximise learning opportunities and protect the resources of the site visited. Tour operators are important constituents of the free-choice learning environment that is available for the public in learning about conservation, and together with libraries and museums, they make up the informal infrastructure of learning, outside of schools and universities (Falk, 2001). As a tool, the model aids in planning how to facilitate effective learning outcomes through engaging

visitors at the different temporal stages of the tour through tour operators' own resources and other forms of free-choice education infrastructure.

Conclusion

This research demonstrates the good work of guides that contributes to visitors' learning outcomes despite the challenges inherent in free-choice learning environments that appropriately prioritise conservation of resources over the learning needs of visitors. The Model of GVI on Wildlife Tours seeks to provide greater clarity about what visitors already know, believe and seek to experience on a tour, and how infrastructure and services as well as the regulatory framework of protected areas either facilitate or constrain the overall visitor experience.

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Nature Interpretation in Protected Areas: Connecting with Gen Y

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Introduction

With decreasing government funding and increasing threats to protected areas (PAs), Watson, Dudley, Segan and Hockings (2014) argue for better engagement with the public to secure the long-term protection of these natural areas. In particular, international and intergovernmental declarations have drawn attention to the need to reach out to younger generations such as Generation Y, also commonly referred to as *millennials*, to ensure they value and reap the benefits from visiting protected areas (UNESCO, 1997). On-site communication (interpretation) continues to be a principal vehicle by which protected areas communicate their values and deliver benefits. As such, it is important not only to get Gen Y into protected areas but to ensure that this generation engages with and is impacted by interpretation.

Generational cohorts such as Gen Y tend to share a collective memory and persona as a result of their time of birth, approximately the late 1970s to the late 1990s (Strauss and Howe, 2997). For example, they may share a common response to social changes and events (Donnison, 2077). Although there is disagreement on characteristics that are widely shared by Gen Y, there seems to be consensus on this cohort being technologically aware and connected (Strauss & Howe, 1997; Black, 2012; McQueen, 2010) and even highly dependent on technology, particularly communication technology including social media (Rainer & Rainer, 2011). Importantly for this paper, Gen Y may share particular views and behaviours regarding nature, protected areas and communication that may make their receptiveness to, engagement with, and responses to interpretation different to previous generations of young people.

Some have suggested that Gen Y is detached from or disengaged with the natural world (Taylor, Gray & Birrell, 2015) including being alienated by natural experiences in national parks and protected areas. Notwithstanding anecdotal evidence of low levels of engagement with nature, it is not clear how nature, experiences in nature, and protected areas are viewed and valued by Gen Y (Shultis & More, 2011). In a rare but localised study of a university-based Gen Y cohort by Ruiz (2017), 4 out of 5 respondents had visited a national park, two-thirds stated they were likely to visit a national park within the next 12 months, and 4 out of 5 view parks as valuable and important. The results of studies to date, however, fall short of determining whether Gen Y's interest in and responses to natural environments differ from previous generations when they were of a comparable age. Moreover, very little is known about Gen Y's engagement with interpretation.

This paper draws on a scoping study of literature from 1977 to 2017 together with a case study undertaken by Australia's New South Wales (NSW) National Parks & Wildlife Service (2011) to illuminate how Gen Y experiences, views and is influenced by protected areas. In

particular, this paper focuses on research findings that have implications for communicating with Gen Y about and in protected areas.

Methods

The scoping study reviewed peer-reviewed articles published up to and including 2017 using search terms associated with Gen Y in combination with nature, parks and protected areas. Of the 51 full-text articles accessed and analysed using our inclusion criteria, just eight empirical studies were found in the scholarly literature with empirical data relating to Gen Y and protected areas. Thus a key finding of the review was that the body of empirical and theoretical research examining Generation Y's engagement with national parks and protected areas is very small. The NSW study included a questionnaire-based survey of 401 Gen Y respondents, a 5-day online discussion forum with 28 participants, four 2-hour focus groups of visitors and non-visitors to NSW national parks, and two 2-hour accompanied visits with a friendship pair and a professional couple.

Selected findings

A key finding of one South African study was that a higher proportion of Gen Y respondents were unaware they were visiting a national park compared to other generations, suggesting the need for educational programs (Cini & Saayman, 2014). Ruiz's (2017) study also highlighted the need for educating Gen Y about national parks vs other protected areas.

Both Cini and Saayman (2014) and Roberts (2010) found that hands-on projects were effective communication vehicles, helping to connect Gen Y participants with national parks and promote environmentally responsible behaviour. In our case study, Gen Y responded particularly well to interactive engagement with them such as competitions and prizes to leverage interest. Our case study also revealed that respondents seek communication via experiential offerings and that park management agencies need to convey the versatility of these, as Gen Y participants only had limited experience with national parks. Importantly, once Gen Y have experienced national parks, they feel strongly positive towards them. This highlights the importance of communicating the benefits of parks to Gen Y and encouraging visitation.

Our case study results also point to the importance of social media and particularly the opportunity to share photos during a national park experience. However, in a study undertaken in Colorado, Gen Y respondents acknowledged that 'time was squandered on electronic devices such as television or social media Web sites like Facebook' which directly interfered with potential nature-based experiences (Barton, 2012). Similarly, respondents in an Australian-based study responded favourably to the opportunity to disconnect with "the real world" and reported feelings of wellbeing and a sense of belonging to the natural world as a result of being separated from communication technology (Taylor, Gray & Birrell, 2015). These results present a challenging dilemma regarding the use vs non-use of high-tech communication to engage Gen Y with nature and its conservation.

Implications and conclusions

What comes across from the scoping study is the following:

- Compared to other generations, Gen Y may have a particular need for communication about what is a national park, why protected areas are important and that they are in a protected area
- Gen Y may be particularly receptive to hands-on and interactive activities in protected areas
- Gen Y may be responsive to structured nature-based experiences that enforce a disconnection from technology

- Gen Y may want access to communication technology to share their experiences in nature in real time

The implications of these and other findings for interpretation are presented through the lens of best practice interpretation principles as reported in Skibins, Powell and Stern's (2012) meta-analyses (Skibins et al., 2012).

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Mobile apps as nature-based tourism experience facilitator: A conceptual approach

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Outdoor recreationists increasingly interact with nature via technology. Especially the use of mobile applications enables tourists to consume, create and share content in order to enhance nature-based tourism (NBT) experience (Dickinson, Hibbert, and Filimonau, 2016). This conceptual paper aims at understanding the development of usage habits of mobile technologies in the NBT context. The primary focus of the paper is on the value-creation potential of both content and the various elements of mobile apps functionalities. We argue that mobile applications show the capacity to enhance major aspects of the NBT experience, such as emotional, social and epistemic value, as well as excellence, efficiency and safety (Chekalina, Fuchs, and Lexhagen, 2018).

Electronic marketing postulates significant implications for building customer relationships and opportunities for exploring new service offerings and markets. Especially for information intensive and sense making services, like tourism, electronic customer relationship management (e-CRM) is considered as essential for facilitating and mediating touristic experiences (Wang, Xiang, and Fesenmaier, 2014). E-CRM typically applies ubiquitous (mobile) technologies, which directly respond to travelers' communication and service needs, thereby serving the purpose of building, maintaining and improving customer relationships between destination suppliers, their customers and between customer-peers (Kolas et al., 2015).

Typical elements of mobile apps functionalities, which are already available to various NBT segments, include map-based information, weather/avalanche warnings, augmented reality and 360 images, QR-code tags and geocaching, location-based services, near field communication (NFC) and mobile payments, as well as social media integration (Buhalis and Foerste, 2014; Kolas et al., 2015). At the same time, in the context of NBT, the use of mobile devices, especially smartphones, represents a dilemma, as particularly revealed by Dickinson, Hibbert, and Filimonau (2016) for the case of campsite tourism experience. Specifically, as the desire to 'escape' is one of the main push motivation factors, at least 50% of tourists in the NBT domain view mobile devices as a potential distractor and, therefore, demonstrate a need for mobile 'disconnection' (Dickinson, Hibbert, and Filimonau, 2016).

Indeed, the barriers to use technologies are more prominent in the NBT context compared with the use of mobile devices when travelling to populated (urban) areas. Dickinson, Hibbert, and Filimonau (2016) address various hardware considerations, such as availability of the signal, mobile charges, as well as concerns about possible damage or loss of an expensive device, that all constitute to the factors of 'forced disconnection' (p. 197). Battery time limitations are yet other technological barriers on the way of using mobile devices when being outdoors for an extended period. Moreover, in the tourism context, consumers' concerns of privacy and security are particularly important, especially in relation to responsive e-CRM applications mediated by personal attitudes towards mobile marketing (Buhalis and Foerste, 2014).

Nevertheless, the growing use of mobile technology solutions in everyday life converts into an increased importance of smartphones as part of tourists' travel process (Neuhofer, Buhalis, and Ladkin, 2014; Wang, Xiang, and Fesenmaier, 2014). Indeed, frequency and patterns of smartphone usage in daily life determines the use of mobile apps in the tourism domain (Wang, Xiang, and Fesenmaier 2014). Again, Dickinson et al (2016) reveal that among campsite tourists, the active smartphone users were more inclined to both staying connected and using their mobile devices, thus, anticipating that smartphone usage in a NBT context will further evolve.

Figure 1 conceptually outlines our proposed framework for a better understanding of the process of value enhancement of the NBT experience by using mobile applications at different stages of the travel phases. An experience hierarchy (Neuhofer, Buhalis, and Ladkin 2014) distinguishes between different levels of technology impact on pre-travel, on-site and post-travel stages of the tourism experience. Particularly, non-interactive Web 1.0 technologies assist the experience process as tourists can access websites, use booking systems and send e-mails. Smartphone users can consume various multimedia content via their devices, such as text, music and movies, and download mobile applications, such as digital travel guides, directories of tourism service providers, maps, or relevant reference literature (e.g., glossaries of birds, plants, mushrooms, fish species, etc.).

Second, the advantages of Web 2.0 with a focus on social media, interaction and consumers' active involvement into content creation constitute the technology-enhanced level of travel experience (Neuhofer, Buhalis, and Ladkin, 2014). This stage implies an active role of tourists in shaping their experience through networking as well as experience-based content generation and exchange. Moreover, marketers can combine the benefits of mobile technologies with social media-based, contextual and location-based information about the customer to offer 'SoLoMo' marketing solutions, such as route-guidance, check-ins and NFC (Buhalis and Foerste, 2014).

Finally, technology-empowered experience represents the highest level of impact, as mobile technology becomes an integral part of the tourist experience (Neuhofer, Buhalis, and Ladkin, 2014). Here, for instance, mobile game applications based on QR-code tags and geocaching, as well as augmented reality applications have already found its technological implementation in the context of NBT (Kolas et al., 2015).

Hence, tourists use smartphones before, during and after the trip for multiple purposes, including information search, communication, facilitation (e.g., navigation, weather information, itinerary management, purchases, etc.), and entertainment, which includes both consumption and creation of multimedia content. These functionalities contribute to various aspects of the travel process, from anticipation and planning to sharing and re-experiencing, and, therefore, facilitate the value creation out of the travel experience (Wang, Xiang, and Fesenmaier, 2014).

The paper concludes by outlining follow-up research activities and related methods that empirically assess the use of mobile apps for facilitating the value of tourism product packages in a nature-based tourism context for various tourism segments. More specifically, the consequent stages of project implementation include (1) the evaluation of segment-specific experience needs and sensation potentials in the NBT context; (2) the conceptualization and prototypical implementation of mock-up-based mobile applications (Kolas et al. 2015); and (3) usage and acceptance tests of NBT mobile application prototypes in laboratory settings. Through its potential to validate and further develop the conceptual framework proposed in this paper, the expected outcome will provide valuable theoretical and applied insights into NBT experience facilitation via mobile technology.

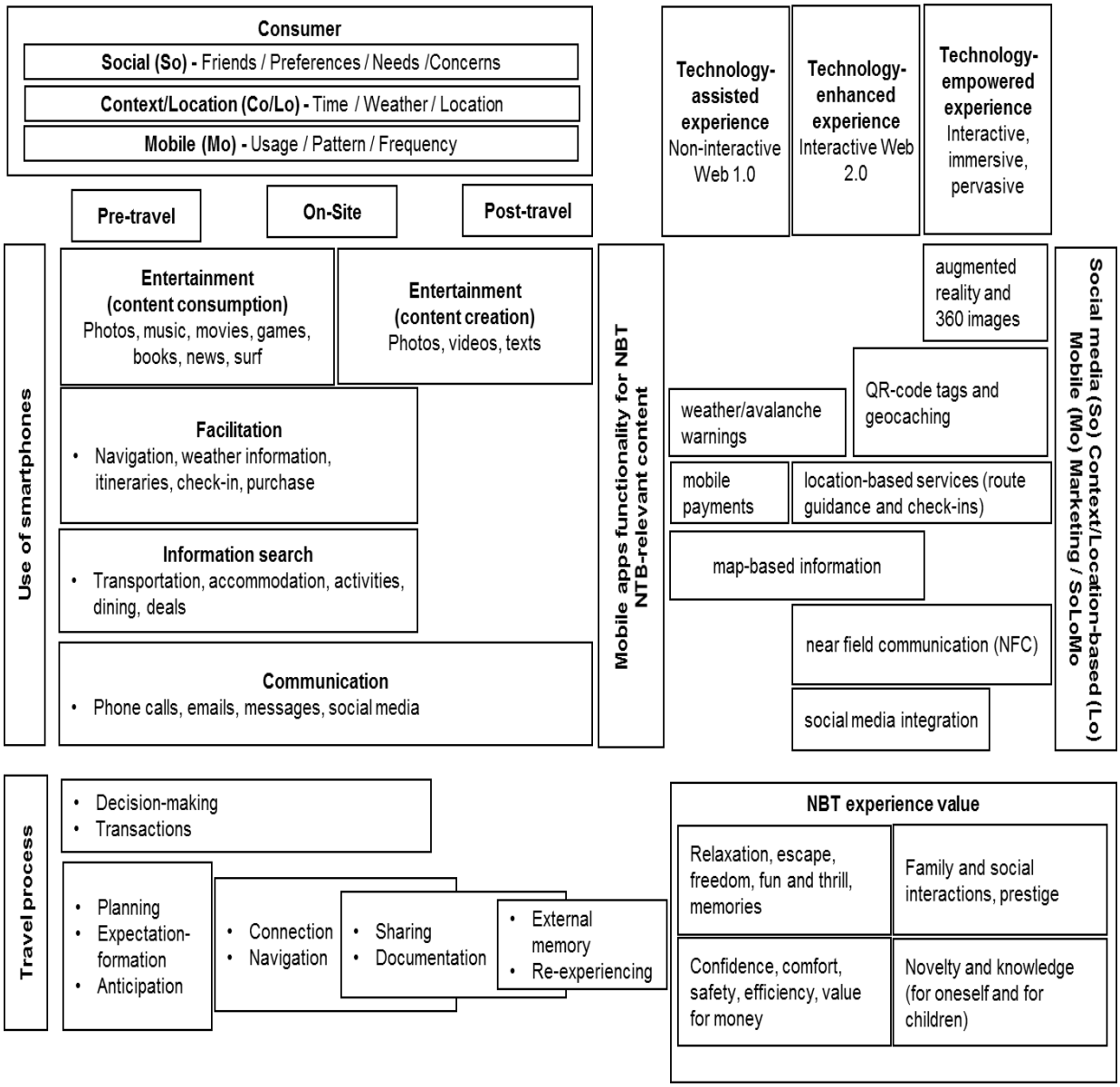

Figure 1. Conceptual map of NTB experience value enhancement by using mobile applications (adapted from Neuhofer, Buhalis, and Ladkin, 2014; Wang, Xiang, and Fesenmaier, 2014; Buhalis and Foerste, 2015)

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Development of interpretative trails in Brazilian protected areas

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Introduction

According to Tilden (1977), environmental interpretation instigates a new look at nature. So, this process should also inspire the critical construction of new concepts marked by environmental education. Interpretative trails are more than simple pathways to nature attractions and so they should be developed by following this precepts and encompass different objectives and subjects (Atalay, 2015). The Brazilian Ministry of Environment establishes guidelines for the interpretative trails in conservation units, a kind of protected area in Brazil, considering the visitors' impacts management. Therefore, environmental education in interpretative trails assumes different managerial dimensions based on the recognition of the social meaning of protected areas (Pimentel et al, 2017).
This paper aims to discuss the cases of interpretative trails' development experienced in different protected areas, pointing out similarities and particularities of the process from defining the environmental interpretation points to interpretative trails evaluation.

Methodology

The interpretative trails were developed by defining interesting environmental interpretation points for the visitor, but also allowing discussion of different concepts and themes related to environmental education in the protected areas.
The Morro das Andorinhas belongs to the Serra da Tiririca State Park (PESET-RJ). In the locality there is an old fishing trail that was used for the development of two interpretative trails (TMA1 and TMA2 - 833m) to the viewpoints. A folder assists the conductor and visitors in the environmental interpretation points (TMA2). The trails were tested with elementary and middle school students, by observation of their behavior, their collection of photographs and their answers to questions during the activities and later from the production of texts and drawings. In the same Park, the Enseada do Bananal Trail (TEB-660m) belongs to the Itacoatiara headquarters (Pimentel et al 2016).
The Coastal and Marine Interpretive Trail of Itaipu (TCMI - 2280m) is adjacent to the PESET. The course also includes the Itaipu Marine Extractive Reserve (other conservation unity category), as well as the Fishermen's Colony (Z-8). It was performed a survey with students of a technical course of touristic guiders to define the points for environmental interpretation.
The Itaipu Coastal Trail (TCI - 1500m) presents a similar layout to the TCMI, adequate to the activities of the Socio-environmental Program (PESA) of the Itaipu Archeological Museum (MAI). A guide folder and a game were produced in which elementary students are asked to relate local images to the observed ecosystems.

The Environmental Protection Area (a conservation unity category) of Engenho Pequeno and Morro do Castro (APAEP) includes a forest fragment in the poor Municipality of São Gonçalo (RJ). The Mirante Trail (TMAPAEP - 2000m) is the most visited and extends from the administrative headquarters to the viewpoint of 927m high. To evaluate its effectiveness, a slide show of the environmental interpretation points was produced for the realization of a classroom dynamics, subsequent to the activity on the trail. The Abraão-Abraãozinho Trail (TAA - Ilha Grande – RJ. 2600m) is located in the Tamoios Environmental Protection Area. The route goes from the Visitors Center of the Coral Sol Project (PCS) to the coast of Abraãozinho cove (there are two coral-sol exotic invasive species, belonging to genera *Tubastraea*). The attractiveness survey to define the environmental interpretation points was performed by the PCS environmental education team. The TAA was tested with university students, tourists, residents and educators. Volunteers were encouraged to critical observations. With the educators, diagnostic questionnaires of environmental perception and evaluation of the activity were applied.

Results and Discussion

The discussions proposed in the interpretative trails encompassed themes such as environmental history, biodiversity and conservation, parks'institutionalization, landscape'stransformation and other socio-environmental issues (Pimentel et al, 2017). Historical curiosities such as the English naturalist Charles Darwin observations about the Serra da Tiririca were used in the TCMI, which is the first terrestrial and underwater trail established in Niteroi Municipality. The TCI presents a pedagogical proposal directed to the concepts of biome and ecosystem. The TAA contributes to the discussion and formation of multiplier agents on bio-invasion.

The TAA and TCMI were developed for tourists. The activities with a pedagogical profile are incorporated into school planning, either through actions proposed for a discipline (TMA1, TEB, and TMAPAEP) or as an interdisciplinary activity in the non-formal teaching space (TMA2, TCI). The shared experience with the students was adequate to the specific demands of the age, school curriculum, and management's objectives of the PESET and MAI Institutions.

When the interpretative trails are analyzed for the number of environmental interpretation points and time, it can be noticed an average of seven stops. All the trails are guided and evaluated with the participation of their target audience and the use of different dynamics as questionnaires; question and answer games; pre and post-tests of learning about specific topics, as well as overall observation of the guided tours. Trails and stopping points should be constantly re-evaluated.

The environmental education based on interpretative trails can be allied to recreation in parks and other protected areas and stimulate the understanding of local socio-environmental characteristics. This can also be the way to mitigate the environmental impacts caused by public use on trails. The protected area fulfills its preservationist objective and supplies the different forms of public use's management needs, besides qualifying the visit.

For the trails structuring in partnership with the school, it was essential the dialogical experience with the visiting students. The teaching objectives emanated from the school curriculum and were enriched by the conceptual basis of the critical and interdisciplinary environmental education.

The printed guides produced should not limit the possibilities of observation on the trail. In this context, it also expands the importance of the trail conductor to foment these discussions. Therefore, interpretative trails structured as an environmental education tool values the work of the teacher, as well as stimulates the recognition of the importance of environmental and cultural heritage conservation.

Final considerations

The interpretative trails primarily aimed at raising awareness of nature, but the discussions should not be limited to biological or ecological features. The interpretative trails based on environmental interpretation were quickly rationalized by protected area managers as an important management tool. The philosophical foundations of environmental interpretation are important for environmental education. However, what is generally observed is the limited focus on issues related to negative impacts'management of the visitation. The establishment of an environmental education process requires planning and several stages of execution with constant re-evaluations, which makes it difficult to effectively implementation in protected areas, which usually have budgetary and personnel limitations. Thus, the establishment of partnerships is of fundamental importance for protected areas to fulfill this fundamental objective.

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The effect of interpretation by local guides in burabay aspiring geopark, Kazakhstan

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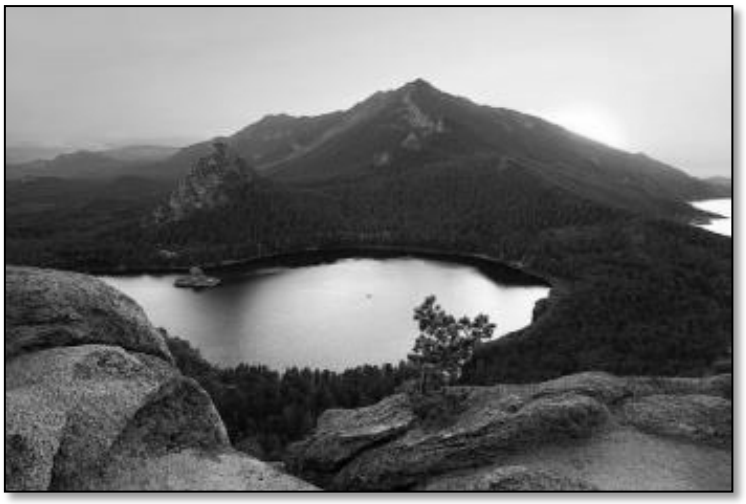
Burabay National Park was founded in 2000 with the area of 83 511 ha and is located in the north of the country near the capital of Kazakhstan. Over 1 000 000 tourists come to Burabay annually including up to 500 000 in the summer time. The numbers grew significantly from 120 000 people in 2011 and 12 000 people in 2005 respectively. Most tourists are attracted by outdoor recreation activities including hiking, fishing, horse back riding etc. In a recent study, Burabay was named the most popular destination among CIS destinations for tourists from neighboring Russia.

Since 2017 Burabay has received the status of an Aspiring Geopark, and currently, there are ongoing efforts to nominate the territory of the national park and adjacent territories to UNESCO Global Geopark. Unique geological formations such as in-depth magmatic rocks and metamorphic mountain rocks are represented in the territory. There are 14 picturesque lakes in Burabay and uniquely formed rocks that are associated with many legends told by local people. 757 species of plants including 95 rare species, 305 vertebra species of animals including rare and endangered 200 species of birds are found in the park. All these creates vast opportunities for geotourism, ecotourism, different sporting activities, heritage tourism etc.

The study **aims** to look at the effect of interpretation provided by local guides to visitors in Burabay National Park. The guides were selected and trained among representatives of local community within geopark project. The **methods** used included questionnaires and in-depth interviews. The questions asked included not only the ones that can reveal the usefulness of interpretation, but also its effect on satisfaction level and destination loyalty. Can the local guides transmit the love and passion for their land to visitors? How perceptive the tourists are for hearing the legends "first-hand" from locals? Finally, can the management of the park employ the "soft" management approaches by proper selection and training of the guides and appropriate interpretation techniques? These and other questions are answered in this study. The **results** of the study show that interpretation and environmental education can be used as powerful management tool in combination with other tools. The role of museum visitation prior to the actual visits as well as the use of information panels can increse the efficiency of the tool. The study confirms that tour guide interpretation influences tourist satisfaction levels and has a positive effect on destination loyalty.



Borovoye Lake and Zhumbaktas Mountain in Burabay National Park

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Monitoring of outdoor recreation on national level – method updates and challenges

Estimating Daily Exiting Traffic from National Forest Recreation Sites Using Short-term Observational Counts

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Introduction

Since its inception, the Forest Service's National Visitor Use Monitoring (NVUM) program has based its visitation estimates on a random sample of daily (i.e., 24-hour) mechanical traffic counts, calibrated by a combination of 6-hour observational counts and interviews (English, et al., 2002; Zarnoch, et al., 2011). Mechanical counters have inherent measurement errors and fail for an array of reasons. In addition, about 20% of the NVUM field data collection costs are tied to the use of mechanical counters.

Our goal was to develop estimates of daily (24-hour) exiting traffic volume using just the 6-hour observational count of exiting traffic and two variables from the interviews. More exactly, our goal was to develop 24-hour estimates from the 6-hour counts that were equivalent to the estimates generated from the current NVUM method. If our work was successful, we could eliminate the data quality issues and costs of the mechanical counters without appreciably changing the resulting estimates of visitation. We present our analytic process and results, and an evaluation of how well the process worked.

Data and Analysis

Interviewers record the starting and ending times for their 6-hour onsite interview period and keep a running tally of exiting traffic on a handheld counter. To start each interview, the interviewer records the time and exiting traffic value from hand counter. These function as time-stamped observations of exiting traffic volume. We interpolated the exiting rate between individual surveys to estimate the traffic exiting during each one-hour segment of the interview period. Assigned survey times vary from one day to the next and, in aggregate, cover nearly all of the daylight period in each season for each stratum within each forest.

For each forest, NVUM sampling strata of site-days are defined by up to 4 types of sites and up to 4 exiting traffic levels. We also grouped site-days across the country according to four seasonal definitions and four latitude groups to account for variation in length of daylight period through the year. As a result we had 256 potential groupings. Not all of these groupings existed in the field data; we had to estimate parameters for 184 groups.

Using a national set of data from FY2010 through FY2014, we calculated the mean exiting traffic counts for each hour for which we had field data on exiting traffic in each group-sampling stratum combination. Mean exiting volume per hour over the hours in the aggregate survey window was converted into a probability mass function and modeled using a beta distribution. Beta models have been used natural resource applications, including outdoor recreation (Zarnoch, English, and Kocis 2005). To account for twilight exiting traffic not observed in the empirical data we expanded the hours modeled to include the hour before and after daylight. The beta distribution is defined as

$$f(p) = \frac{\Gamma(a+b)}{\Gamma(a)\Gamma(a)} p^{a-1}(1-p)^{b-1} \qquad 0 < p < 1 \qquad a > 0 \quad b > 0$$

$\Gamma(z)$ is the gamma function evaluated at z.

The method of moments is used to estimate the beta parameters as

$$\hat{a} = \bar{p}\left(\frac{\bar{p}(1-\bar{p})}{\hat{v}} - 1\right) \quad \text{and} \quad \hat{b} = (1-\bar{p})\left(\frac{\bar{p}(1-\bar{p})}{\hat{v}} - 1\right)$$

An out-of-sample validation test was completed using data from FY2005 – FY2009 to ensure beta parameters were robust through time. For nearly all groups, the beta parameters were not significantly different over time. Final beta models were estimated using 10 years of data (FY2005 through FY2014 inclusive).

Results and Discussion

Figure 1 shows an example, the empirically derived hourly proportion of daily exiting traffic for the group of site-days defined by Middle latitude (between 40 and 45 degrees), Spring (April, May, June), General Forest Area dispersed recreation sites, and High daily exiting recreation volume. The recreation day for this group lasted 15 hours, from 0600 to 2100; the average exiting traffic volume per day was about 72 cars. The beta model of predicted exiting proportion is superimposed to compare the modeled hourly proportion to the actual. Sum of proportions over all hours equals 1.0.

Employing the beta model results to estimate 24-hour exiting traffic from a 6-hour interview window is straightforward. First, calculate the expected proportion of daily exiting traffic that occurs during the interview period. Consider a survey day starting at 0800 and ending at 1400, which is a commonly assigned survey window for NVUM. Assume that the interviewer observed 25 exiting vehicles. The model used in Figure 1 indicates that the sum of probabilities in that time window accounts for an expected 41.04% of all exiting traffic. Multiplying the observed exiting volume by (1.00/0.4104) gives the expected exiting traffic volume for the 24-hour period, or 60.92 vehicles.

The national average for beta method traffic means were about 20% less than the current method. The current method includes traffic exiting during nighttime, but the beta method only reflects daytime and twilight exits. We applied a ratio adjustment by forest and sampling stratum to bring the means into closer alignment. We performed a second out-of-sample test using field data from FY15/FY16 combined. Again, the beta parameters were not significantly different for nearly all groups. More importantly, comparing the ratio-adjusted beta method to the current NVUM method yielded a correlation coefficient of 0.94; the average deviation in estimates of exiting traffic was under 5%.

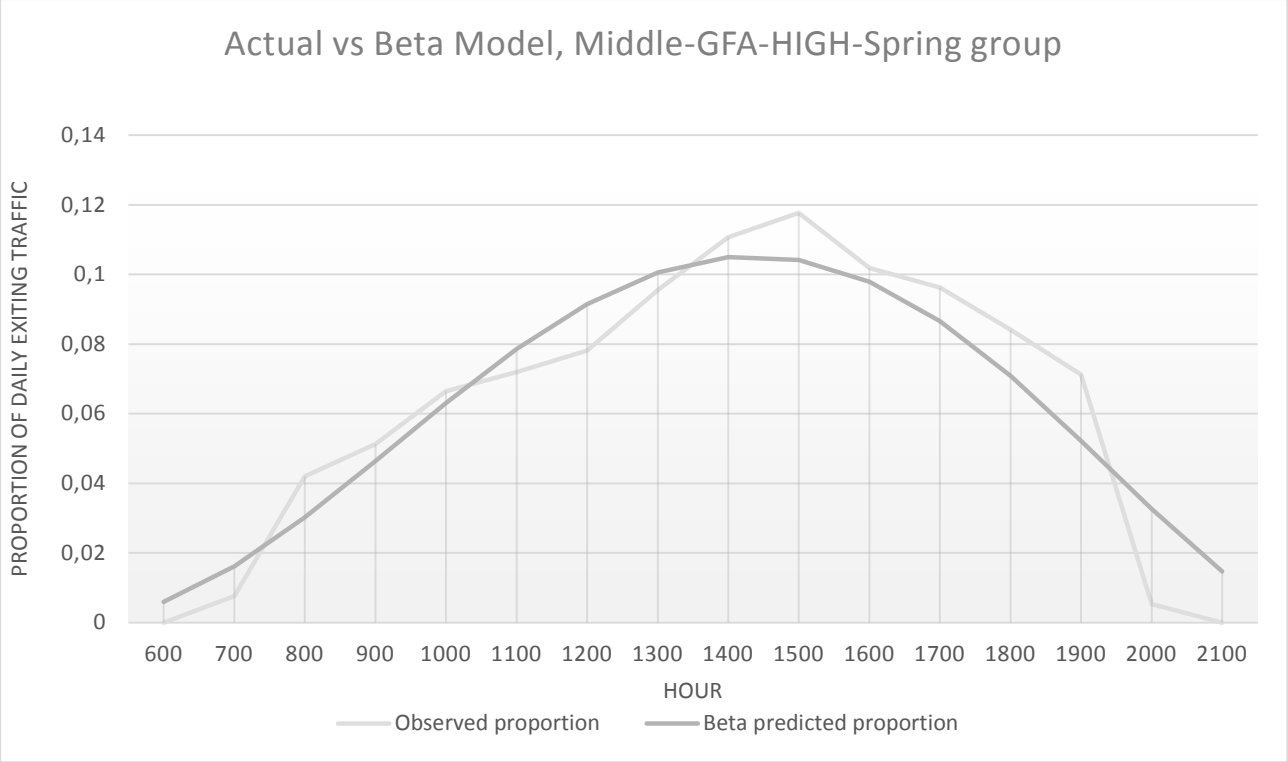

Figure 1. Empirical and beta-modeled hourly proportion of exiting cars for group Middle-Spring-GFA-High.

The results are more than adequate for our needs. Starting in October 2019 at the beginning of the next national data cycle, the NVUM program will eliminate the use of mechanical traffic counters entirely. Instead, estimates of daily exiting traffic counts will come from the ratio-adjusted beta means. This change eliminates national overhead costs of maintaining a cache of traffic counters for use by forests during their field year. The current field protocol is to set up the mechanical counter, complete a 6-hour observation and interview period, and go home. The next day, retrieve the counter after it was in place for 24 hours. The modeling approach eliminates the second trip to the interview site, often an hour's travel.

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Nature based sports in forest areas in France. Results from the 2015 French national survey “Forest and society”

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The French national “Forest and society” monitoring system implemented by the French forestry office (ONF) in charge of public forest management is structured around a barometer, a quantitative survey renewed every 5 years, the last one in 2015. It deals with forest recreation and social representations of forest and forest management in France. The aim is to provide ONF foresters with better skills to manage the public forests they are in charge of. Even though it is impossible to conduct interviews about recreation in public forests only, because people don’t make difference between the forests according to their ownership, the results are especially significant for public forests, which concentrate the majority of visitors, infrastructure and facilities for forest recreation.
To improve the results of the barometer, every national “Forest and society” survey focuses on a specific topic. Outdoor physical activities and nature-based sports are an important part of forest recreation. With their increase and diversification, foresters are facing new challenges to manage and sometimes limit these sport practices in forested environments whereas local communities are often interested in their development as part of an eco-touristic economy. In this context, the ONF chose to focus on physical activities and nature-based sports in the 2015 Forest and society national survey. This part of the survey was implemented on a 2000 people sample representing the French population aged 15 and more.

Importance of physical activities and nature-based sports in forested environments

The first part of the questionnaire intends to investigate the rate of practice for different activities: leisure activities like walking or outdoor games, outdoor sports (hiking, biking, horse riding, running, orienteering…) but also traditional activities such as hunting or fishing (Figure 1). The answer “others” gives people the opportunity to declare specific activities e.g new ones. If the overview is known, with walking (less than 2 hours) and hiking being the dominant activities, the range of some activities does not reflect exactly the importance given by the foresters in their management or relationships with sport stakeholders: for example, almost no relationships are established with runners and runners’ representative except for a few major events whereas running in the forest is in 2015 the 3rd most important sport practice. In contrast, relationships remain active with the equestrian Federation even though the relative weight of this activity historically connected to the forest is not so high.

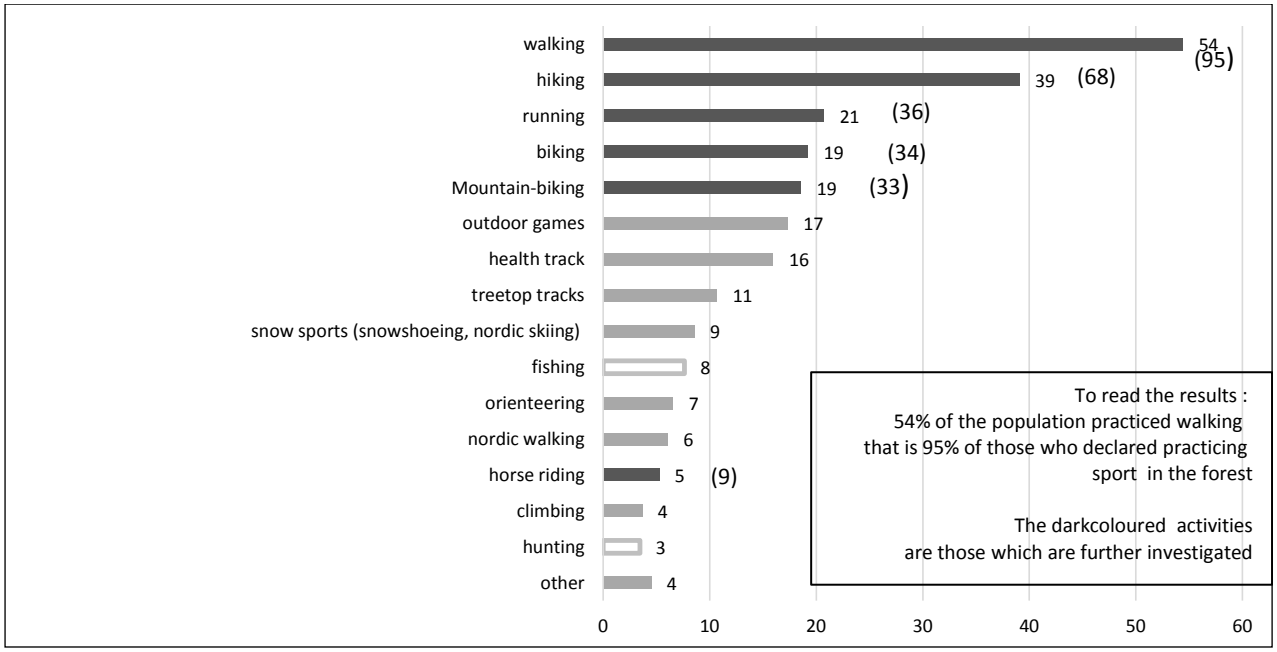

Figure 1: Rate of different sport activities practiced in French forests

French national survey "Forest and society", ONF-UCN, 2015

Another interesting result is the number of activities per person: the majority of people practice several activities, with only 9% who declare only one activity (that is short walks for almost all the people interviewed) and more than one third who declare 5 or more physical activities, i.e. 4 or more sport activities in addition to short walks.

Specific profiles for different sport practices

In the second part of the presentation, the focus is put on the profiles of forest-sports practitioners. An important determinant is age. Young people from 15 to 34 are over-represented in a majority of sports except hiking, the only activity in which people aged 50 to 64 are over-represented, and walking that is not favoured by the youngest (15-24 years old). This generational specialization between leisure or endurance activities (i.e. short walks and hiking) and more energetic sports should be taken into account for forest recreation management, especially in urban and peri-urban forests, or tourist areas with a high number of visitors.

To complement these general features, the questionnaire focusses on the main forest nature-based sports: short walks (less than 2 hours), hiking, biking and mountain biking (grouped together), running, and horse riding. The survey analyses the profiles of practitioners in terms of frequency, sociability and reasons for practice.

The comparison between hikers and runners practicing in the forest in terms of main reason for practice (to choose between fitness, performance, connection to nature and friendliness) is a significant example. Runners give a clear priority to physical issues, fitness (60 %) and secondarily performance (20%) whereas hikers favour in a more balanced way connection to nature (39%) and fitness (35%). Friendliness (18%) is also part of the motivation for hikers who enjoy being together with family members or friends contrary to runners who practice often alone. The other criteria confirm the differences existing between the practitioners' profiles.

Nature-based sports are not a new issue for research but the forest, often considered as a symbol of nature is also a very popular recreation area in France where 87% of the population declared at least one visit to the forest in 2015. This first exploration of sport activities inside

the French national “Forest and society survey” could help the foresters to understand the place of nature in the main traditional nature-based sports, the specific needs of practitioners according to the different activities and thus to improve their recreation management skills and avoid some use conflicts.

Recreation monitoring: experiences of responding in web-surveys and prospects for future

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Introduction

The objective in nationwide monitoring of outdoor recreation is to assess population level estimates of the number of annual visits to nature areas, and outdoor recreation participation rates in outdoor activities. One of the purposes is to offer estimates for monetary values of recreational visits in processes such as accounting and assessing of cultural ecosystem services. In addition the data offers understanding for recreation behavior by different population groups. The main impact is the knowledge for planning and management of recreation services.

Long term population trends in outdoor recreation are important for planning the recreation resources as well as for understanding the future trends. This information is most reliable when it is collected with systematic monitoring and is based on the representative data. However, survey participation is declining, and this trend is likely to continue in the future also. The responding has declined in all age groups, and among the men and women (Tolonen et al. 2006). With low response activity the results may not present the population average, its' also impossible to determine if the change is in the behavior or which are caused by the poor representativeness of the results.

Challenge of improving survey responding

The National outdoor recreation demand inventory (LVVI 2) survey was implemented as an Internet inquiry based on a population sample and probability sampling, and a supporting postal inquiry (Mixed mode). All data collection rotations of the LVVI2 survey had a similar inquiry process where the persons selected for the sample were sent a letter and a brochure concerning the survey in the first and second contact stage. In the third stage, those who had not responded were sent the postal inquiry form and also still offered the opportunity to respond on the Internet.

There were differences in the response willingness of men and women in all survey rotations in LVVI 2. Women were more active in responding in most agegroups, and the differences were largest (10-12%) in the youngest age groups (15 to 34 yrs) and among the age group (45 to 54 years).

Assessing temporal representativeness is also an issue in a case of surveys related to leisure time. This means that how leisure activities conducted both weekdays and weekends are present in the data. Another feature of the "temporal aspect" of outdoor recreation refers data collection during the different seasons. For example the estimate of participation in skiing reflects the annual variation in snow conditions (Sievänen & Neuvonen, 2011).

In LVVI2-survey we have tried to reduce the bias by offering the subsampling by collecting data both in the winter, spring and autumn. To reduce the bias among certain activities the continuous data collections has advantages. The data collection was conducted during different seasons as six separate samples over a two-year period during 2009 and 2010. Statistical weighting aims to fix the deviations in the response rates of different population groups. Age (15 to 24, 25 to 34, etc.), gender, region (NUTS3) and season (winter, summer and autumn) were used as weighting criteria.

In the future we are able to get more precise information in the surveys with more sophisticated and personalized questionnaires in the Internet. This is promising as daily Internet usage varies from 31% in age group of 74-89 years up to 100% in the group of 16-34

years (Official Statistics of Finland 2015). Also the smartphone coverage has increased rapidly in Finland. There is need to offer more flexibility to survey responding including easy access to the survey (e.g. Quick Response code).

A challenge of map-based data collection

A new challenge is to collect map-based data in a **random sample based** population survey across the whole country. Map-based data collection could provide totally new type of information. If people could locate the place of their **most recent recreational visits** on the map (the form of question comes from the monitoring process), many analysis of site quality preferences, distances to recreation site, and many other research topics could be analyzed when GIS-based information can be matched together with recreation demand data. Public participatory GIS method for this type of survey data collection exists, but there is still rather few experiences of using the methodology in large random sampling based surveys. The usability of the method in groups with low Internet skills can be challenging (Gottwald, Laatikainen & Kyttä, 2016).

This presentation will describe some recent experiences of monitoring outdoor recreation in LVVI2 and NatureMove-projects and discusses of the advantages and challenges of new type of data collection. Sharig experiences of the challenges in monitoring helps to improve and to harmonize monitoring in European wide context.

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Accounting for cultural ecosystem services: a case of recreation services in Finland

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Introduction

Ecosystem accounting is a coherent framework for integrating measures of ecosystems and the flows of services from ecosystems with measures of economic and other human activity. Ecosystem accounting complements, and builds on the accounting for environmental assets as described in the System of Environmental-Economic Accounting (SEEA) Central Framework (UN, et al., 2014, UN 2017). This presentation describes a study focusing on the accounting of cultural ecosystem services, particularly nature-based recreation. The case study is part of a wider project 'Towards ecosystem accounting based on innovations and insights on natural capital knowledge', financed by EUROSTAT that includes also cases of provisioning (fish stocks) and to regulating (carbon accounting) ecosystems services. The general objective of the project is to improve national capacity to implement ecosystem accounting by showing gaps and possibilities in existing data and knowledge. The project also increases the awareness of national key stakeholders such as the Ministry of the Environment, Ministry of Agriculture and Forestry, Ministry of Economic Affairs and Employment on ecosystem accounting and the related future needs.

In this study of cultural ecosystem service accounting the aim was to assess nature-based recreation in Finland by applying both physical and monetary measures. This presentation describes the methods and data sets used in analyses of indicators, thoughts of advantages and shortcomings, and identification of the gaps in data and methods. The presentation also discusses the opportunities to use the approach in broader European context.

The framework of main elements and models

We offer a framework how ecosystem services accounting is possible to construct, and how data gathering is possible to organize. The framework is a description of methodology and needed assets, which are suitable to be processed for the accounting system of cultural ecosystem services. The account includes an estimate of the annual volume of recreational visits to nature areas, an estimate of annual change of visits, and an estimate of the value in monetary terms of the recreational use of nature areas and natural resources. We illustrate how the nationwide data collection that provides the estimate of number of recreational visits in nature areas (Neuvonen & Sievänen 2011) is a solid base for physical measures, and also for monetary values of the recreational visits (Lankia et al. 2015, Jäppinen & Heliölä 2015). The assessment for the supply of recreational resources is based on land use categories (http://stat.luke.fi/tilasto/6219) and on data set of public recreation services (LIPAS - Geographic database for sport facilities, www.liikuntapaikat.fi.).

The European challenge

On European level the feasible accounting system could offer a solid framework and comparable estimates of recreational services from different parts of Europe. The challenge and a future task are to create a European wide ecosystem services accounting system that would harmonize the data collection and analysis. The first task is to discover which

European countries have recreation monitoring, the level of monitoring, and what kind of efforts is demanded for harmonization the monitoring both in Finland and in other countries. These evaluations will be based on the literature and experience of COST E33 and Diabolo projects as well as the experiences gained in this MMV9 session (Sievänen et al. 2018, Diabolo project 2015-2019, http://diabolo-project.eu/).

Discussion and conclusions

The presentation will provide the opportunity to discuss practical recommendations of actions to be taken in order to improve accounting of recreation in European wide context.

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A synthesis of recreation values of European forested areas and implications for national benefit transfers

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Introduction

Recreation represents an important ecosystems service provided by the natural areas that contributes to the human well-being. The knowledge on the recreational value of natural areas and its determinants may support the discussion on the allocation of financial resources for nature conservation. Our study focuses on European recreation values attributed specifically to forests. Since the last similar study published 9 years ago (Zandersen and Tol, 2009), the scientific evidence on new natural sites has emerged and may help to enhance the knowledge on the factors that affect the recreation value. Focusing solely on forest recreation values yielded by travel cost studies (as opposed to a very recent study by Schägner et al., 2018), we hope to elucidate the effect of the travel cost methodology and specific forest characteristics on the resulting estimate of value associated with the recreational experience.
Our particular aim is to assess the validity of the value transfer from Europe to natural sites in the Czech Republic and in other countries in the Central and Eastern Europe, where the evidence on recreation values is still scarce and which are not covered by most of the previous meta-analytic studies that incorporate forest recreation values.

Methodology

We first synthesize and discuss the central tendency and evolution of the values. Since the primary estimates are substantially heterogeneous across the studies, we disentangle the factors of variability in the reported recreation values using a meta-analytic model. Out of value transfer methods, meta-analysis represents the most complex technique (Navrud and Ready, 2007). The technique allows for synthesis of previous research results and for testing hypotheses with respect to the effects of particular determinants of recreation use values of natural areas. This technique also facilitates validity testing - we measure the accuracy of benefit transfer using benefit transfer error. We develop a value transfer function that uses the recreational value (consumer surplus) per person per visit as the dependent variable.

Data

Our analysis builds on a body of the primary valuation literature on forest recreation values published in Europe over the past 35 years. The meta-analysis includes primary environmental valuation studies that applied travel cost method (Parsons, 2003) and are employed to model forest recreation values across European countries. Relevant papers and studies were searched through databases such as EVRI, DEFRA UK and EPA US, further using the online research databases like ScienceDirect, JSTOR, EBSCO and peer review journals in environmental and resource economics. We have also reviewed EU funded projects that assessed impacts upon non-market goods relevant for climate change (e.g. ClimateCost) and their monetary valuations (e.g. NEEDS, PASHMINA). These data sources were complemented by grey literature (dissertation theses, working papers etc.). Our sample

is unique in the respect that it encompasses a significant portion of natural recreation sites in the post-transition area of Central and Eastern Europe.

Results and Discussion

One of the key results from our meta-analysis of European forest recreation values is that higher recreation values are associated with remote forests in scarcely populated mountainous areas which are preferably protected and constitute of denser broadleaved forests, with not much open space within the forested area. The results suggest that even within one environmental valuation technique (travel cost method), the particular methodology applied plays a significant role for the magnitude of estimated consumer surplus. We further discuss how the results fit into the context of primary estimates in the Czech Republic (single site models by Kaprová, 2015; Melichar, 2012, and a random utility model by Kaprová and Melichar, 2016).

Using a split sample analysis, we confirm that meta-analytic benefit transfer from Northern, Western and Southern recreation sites to those located in Central and Eastern Europe systematically overpredicts the recreation values in all quartiles of recreation value per trip.

Conclusion

Our results demonstrate that the outcomes of primary studies focusing on estimation of recreation demand and values associated with non-urban forests vary significantly across Europe. We successfully disentangle the effects of methodological and study site variables on the recreation value. However, in accordance with the previous works, the direct measurement of the effect of proxies for recreationists´ preferences or cultural differences across studies and countries is not straightforward, because the data available are very limited.

The findings suggest that value transfer across Europe, including Czech recreational areas, could be beneficial for cost-benefit analyses of minor prospective projects aimed at natural recreational areas, but a sensitivity analysis in CBA is recommended. The errors may differ (and may be substantially larger if the evaluated recreation site differs from those in the sample). This issue would deserve a more in-depth discussion and will be addressed subsequently.

Acknowledgement

This contribution was supported by the 7th FP EC grant Global-IQ: Impacts Quantification of global changes (No. 266992; 2011-2014). The support is gratefully acknowledged.

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Visitor Numbers for Protected and Nature Areas: A Global Data Sharing Initiative

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Introduction

Tourism is contributing about 10% to global GDP and is growing (4.6%) faster than the rest of the economy (WTTC 2018). Nature-based tourism, which is primarily to protected areas (PA), is widely considered a growing segment of the market. Globally, PAs receive about 8 billion visits a year generating about US $600 billion/y in direct in-country expenditure and US $250 billion/y in consumer surplus (Balmford et al. 2015).

However, nature-based tourism is a double-edged sword. On the one hand nature tourism constitutes a substantial recreational value and a significant contribution to local economies generating income and employment. Thereby it may increase acceptance for nature conservation across the local population and may be used as an argument for conservation. On the other hand nature tourism may present a threat to natural ecosystems and biodiversity due to over-tourism, wildlife disturbance, induced land-use change and travel related emissions (Liddle 1997; Ceballos-Lascurain 1996). Therefore, to exploit nature tourism opportunities, but avoid its adverse side effects, it needs to be managed with caution.

The visitation rate of a park or PA is a basic piece of information that is necessary to gain understanding about tourism and its impacts in any nature area. Thus, the analysis of all tourism-intensity effect relationships must start with visitor use data.

For economic impact analysis of nature tourism accurate, visitor statistics are of primary importance. Empirical findings from Finland suggest that across different PA visitor numbers differ considerably more than visitor expenditure data and regional economic multipliers[1] (METLA 2009). Analyses of European data show that also the economic recreational value of nature areas (in terms of consumer surplus) is primarily determined by the number of visits. Variations across different nature areas of the economic value per visit are relatively low and are therefore only of secondary importance (Schägner et al. 2016, 2018).

These findings seem surprising as most of the scientific literature focuses on the valuation, but not on the estimation of visitor numbers, even though the latter seems of greater relevance. Multiple meta-analyses have been conducted on recreational valuation studies, which build on international and global valuation data bases (Schägner et al. 2018).

[1] Economic multipliers are required to estimate indirect economic effects based on information of direct economic effects, such as expenditure data.

For the magnitude of tourism in nature areas no reliable, consistent and comparable data exist on the global level. This means that globally we do know only roughly how many tourists are visiting PAs, how long they stay, what they do, when they are there, how they benefit from the experiences, or what contribution their expenditure makes towards protected area budgets. First attempts of gathering available data have been made by Schägner et al. (2017) who have compiled visitor counts for more than 500 nature areas, but they cover Europe only (see Figure 1).

Method

To fill the gap on globally available visitor statistics for nature areas, a group of researchers from around the world including the authors of this paper formed an informal research project. The researchers' disciplinary backgrounds and interests in visitor data differ broadly. While part of the team originates in the domain of visitor monitoring, some focus on the economic impacts of nature tourism (TAPAS group), others concentrate on the modelling and mapping of cultural ecosystem services using earth observations (FAWKES-project) and again others work on nature conservation and how it may benefit from nature tourism (BIOPAMA.org). A kick-off workshop was held at the Joint Research Centre of the European Commission, Ispra Italy (January 2018) to discuss the different perspectives and interests and to elaborate the following key questions:

- What visitor data for nature areas exist around the world?
- How to obtain existing data most efficiently?
- How to store and share gathered visitor data?
- How to deal with data quality issues?
- What kind of analyses can be done with the data and what conclusions and messages may be elaborated?

A follow-up workshop was held in the end of April at UFZ, Leipzig Germany focusing on the so far gathered data and its geo-statistical analysis. The data collection will be pre-tested with at least two case study countries, one of which is Finland. Additional countries may be selected among the ACP-countries (Africa-Caribbean-Pacific) that are the case study countries of the BIOPAMA project. The approach of the visitor data collection will be presented to representatives of the ACP countries during six regional inception workshops within each of the six BIOPAMA project regions.

Results

As a starting point for future data collection, and to ensure data quality standards, a required metadata schema was developed, the GD-PAVIS (Global Database-Protected Areas Visits), which matches the WDPA metadata format. The GD-PAVIS schema includes information on the study site, a definition on the type of the data collected, basic information on the data collection method and a data quality indicator.

A data collection web-interface has been developed that allows anyone to submit data online and thereby to contribute to the data base http://rris.biopama.org/visitor-reporting.

So far, data collection resulted in total annual visitor counts for approximately 1,500 separate nature and/or protected areas (see Figure 1).

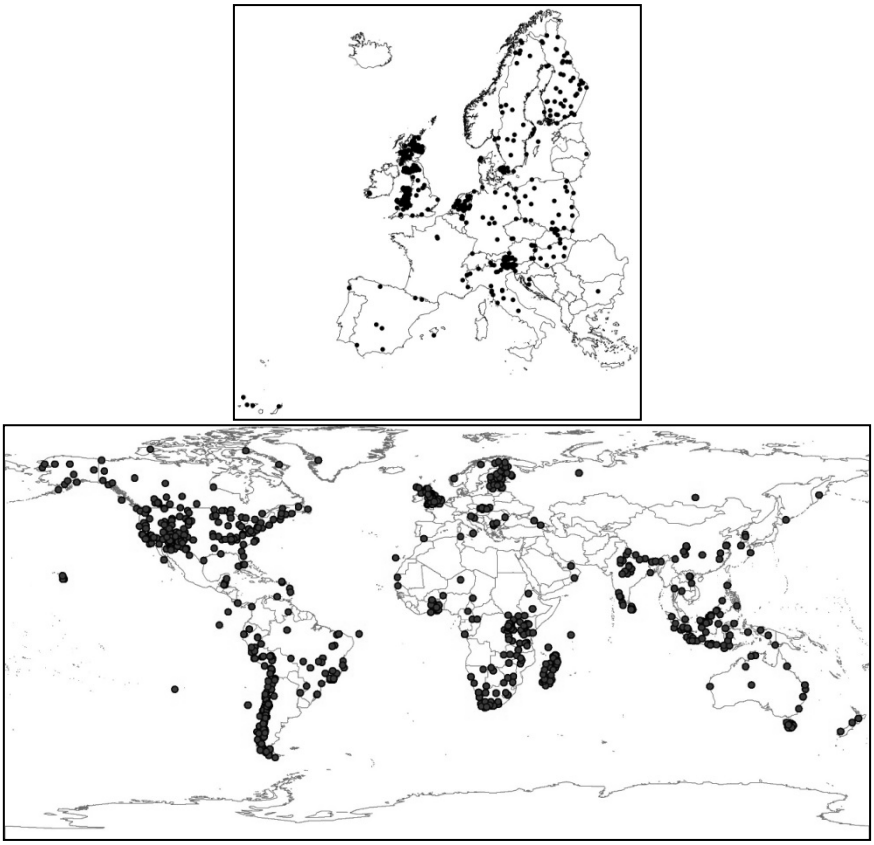

Figure 1: Nature and protected areas with annual visitor statistics; left: data presented within Schägner et al. (2017); right: extended global data collection (unpublished).

Conclusion

Pure accurate annual visitor data for nature areas are basic, but very relevant piece of information. They are not only the primary variable determining the economic value of nature recreation and tourism, but also the starting point for the analysis of any adverse environmental effects that intense visitation may cause.

There is still insufficient aggregated visitor data on the international scale; far less than for example on recreational valuation accounts. This is somehow surprising, as visitor numbers seem to be the driving force in the overall economic value of different nature areas.

To overcome this gap in data availability we aim at constructing a global visitor database that is to be up-dated on an annual basis.

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Post-data collection uses of visitor monitoring data 1

Use of various types of data in decision-making: A transportation case study in Seattle, Washington, USA

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Access to outdoor recreation settings can be defined and operationalized in many different ways, including access through transportation methods that enable people to visit recreation areas. This roundtable discussion paper focuses on understanding residents' preferences for a potential transportation method from a major urban setting (the Seattle-Metro area) to the western, more accessible fringes of the Mount Baker-Snoqualmie National Forest (MBS), in the US state of Washington. The study involved a series of quantitative studies, focusing on MBS users and non-users. These themed studies focused on race and ethnicity using constraints and negotiation strategy (Covelli, Burns, Graefe & Dong, 2007), understanding low income users, summer visitors (Burns, Caplinger & Chuprinko, 2013a) and winter visitors (Burns, Caplinger & Chuprinko, 2013b). The current study built upon these previous studies, using a qualitative methodology, to understand access preferences for alternative transportation systems of Seattle-Metro area residents. To develop an effective, efficient alternative transportation system to keep the MBS accessible to a diversifying population in the Seattle-Metro area, managers sought to hold a series of focus group meetings with community members. The primary emphasis for this set of focus group meetings was access to the MBS via potential alternative transportation methods. Participants in three meetings were varied, and included local, interested residents, leaders of non-profit entities (YMCA, Mountains to Sounds Greenway, etc.) and others. Researchers then took several variables into account when determining potential focus group meeting locations. First, the areas should have low survey response rates. Second, the areas should be within an accessible distance to one of the major MBS corridors on which data was collected. A third variable was median household income. This was used in order to seek community members that may be deterred from using the MBS because of financial limitations. Lastly, since a goal of the study was to make the forest accessible to the diverse Seattle population, race and ethnicity also served as determining variables. Once the zip codes were analyzed by the GIS, researchers used data from the King County GIS (KCGIS) Center and City-Data (www.city-data.com) to seek out specific neighborhoods within zip code blocks to hold possible Focus Group meetings. Two zip code blocks yielded a lack of visitor a response. However, upon further investigation these two zip codes were omitted from the list of possible locations because they did not fit the aforementioned criteria. The first zip code block, 98195, was omitted because this zip code was used for the University of Washington campus only. Therefore, this block lacked any form of permanent residence. The second zip code block, 98039, included those residents that reside along the shores of Lake Washington in the Medina community. The median household income in this predominantly white community was over $175,000.

Conclusions

The role of transportation was clearly important to all of the participants, and the participants were all in agreement that transportation is merely a method of increasing access to the MBS, and should be considered as such. Much discussion focused on the "social" nature of transportation, or transportation sociology. The group reported several different transportation schemes that had been implemented over the past 10-15 years—all with little success. It is important to realize that people recreating are doing so on their own free will

and on their own free time. Accordingly, these transportation barriers act as constraints for recreating on the MBS. Several transportation specific challenges and potential solutions were identified. Although transportation systems are an integral part of the solution to increasing access, USFS and Forest-scale policies may present a problem. There is a link between transportation and USFS Special Use Permitting (SUP) policies and processes. Much discussion focused on the "social" nature of transportation, or transportation sociology. The group reported several different transportation schemes that had been implemented over the past 10-15 years—all with little success. It is important to realize that people recreating are doing so on their own free will, on their own free time. The three major constraints for recreation are lack of money, lack of time, and transportation. A person may be willing to ride a bus to work, or a car pool to work, even if it is a cold and crowded bus, or if it is a van pool that runs at an inconvenient time…but people will not accept these conditions to participate in outdoor recreation. If we address only the infrastructural issues related to transportation, we may lose sight of the overall goal—to increase use of the MBS through increasing access with alternative transportation systems. An understanding and adherence to this simple process shows that transportation plays a huge role in the outdoor recreation experience. It is incumbent upon recreation resource managers and researchers to continue pushing for more access for all US residents to achieve a high quality recreation experience.

Acknowledgements: Funding for this research study was provided by the US Forest Service (Agreement14-DG-11132762-156), the National Institute of Food and Agriculture (NIFA).

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Managing geocaching in a protected area – what actions were taken in the Donau-Auen National Park, Austria over the last three years?

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Introduction

Geocaching, a leisure activity in which the recreationists try to find containers (so-called geocaches) based on coordinates, has proven to be popular in Austria and is even taking place in the country's protected areas such as national parks. Previous analysis, based on desk research only, has shown that the Donau-Auen National Park, which is partly located within the boundaries of Austria's capital city of Vienna and which is under a large amount of public use pressure (Arnberger and Hinterberger, 2003; Tazcanowska, Arnberger and Muhar, 2006), is most heavily affected by geocaching amongst all six Austrian national parks, both in terms of the number of caches hidden as well as in terms of the number of visits logged online (Hödl, 2013; Hödl and Pröbstl-Haider, 2017).

Due to these findings, each cache hidden in the national park was visited and evaluated in 2015. The results have shown that, although a large share of caches are located within relatively small distances from the nearest trails, some of them require walking off-trail for longer distances or even climbing trees, which is both not in line with desired visitor behaviour. Also, damages to woody vegetation, mostly caused by nails and wires used to attach geocaches to trees, were found quite frequently (Hödl, 2016).

Altogether, these findings strongly suggested the need for appropriate management actions to regulate geocaching within the park.

Method & results

Based on the results of the field work performed in 2015, park officials of the Donau-Auen National Park decided to take a closer look at the situation and to identify those geocaches that needed to be removed. Additionally, it was decided to implement measures to raise awareness amongst geocachers visiting the park about the potentially negative effects of their hobby on the natural environment.

Awareness raising

A set of geocaching guidelines was developed, consisting of 16 rules for proper geocaching behaviour within the park's boundaries. These guidelines include information about natural structures that are not fit to serve as hiding places (e.g. burrows, crevices and hollows in trees), appeals to stay on the designated trails, not to take shortcuts between different geocaches, not to search for geocaches during the night or at dawn, to leash dogs at all times (sometimes they actively help with searching for a geocache and are referred to as "cache dogs") as well as to pay attention to all signs present along the trails and to act accordingly. In addition, they also address the geocache owners by asking them to include a note in the online cache listing informing fellow geocachers that the cache is located in a national park and that they should be careful with regards to their natural surroundings when searching for it. Geocache owners are also asked to give a clear hint and/or to provide so-called spoiler photos in order to prevent people from intensely searching for the cache in an extended area.

These guidelines were completed in late 2016 and meant to be published online, either in a full or reduced version. As of May 2018, the guidelines are yet to be found on the park's official website.

Identification of geocaches that need to be removed

Foresters of the national park were tasked with identifying those caches that needed to be removed in their eyes. This was performed separately for caches located in areas that fall within the competence of the city of Vienna and for those within the responsibility of the province of Lower Austria. Whereas the forester responsible for this task for the Lower Austrian park areas marked all caches needing removal in an excel spreadsheet, the forester(s) managing the Viennese parts of the national park crossed them out on printed maps.
All in all, this evaluation lasted from 2016 to 2017 and resulted in the identification of 56 problematic geocaching sites in Vienna and 8 in Lower Austria.

Updating the current number of geocaches within the national park

To assess the current number and exact locations of geocaches hidden within the national park the operators of the biggest geocaching platform worldwide, geocaching.com, were contacted and asked to provide a list of all caches hidden in the park as well as in possible future expansion areas. The provided excel spreadsheet was then cross-checked with the list from the 2015 field work.
The results show that by February 23rd 2018 a total of 307 geocaching sites (hiding places and stages alike) were located within the defined area. In comparison to 2015, this means an increase of about 1 %. Although 61 new cache sites were recorded (50 caches and 11 stages), a total of 49 sites (40 caches and 9 stages) have been archived since 2015, resulting in a more or less stable total number of cache sites over the last three years.
Some of the archived caches were amongst those identified for removal, leaving 53 active problematic cache sites by February 23rd 2018 (45 in Vienna and 8 in Lower Austria). But this number may increase again since most of the 61 new cache sites still need to be evaluated by the national park foresters.

Contacting geocache owners about the removal of their caches

In a next step, park officials are planning to contact the owners of all geocaches that need to be removed via the online platform geocaching.com. They have created their own official geocaching account for that purpose in early 2018 and prepared an according information letter for distribution. Contacting the respective cache owners should take place over the course of 2018.

Conclusions

Although geocaching is certainly not the biggest challenge the Donau-Auen National Park is facing (Arnberger et al., 2012), it still is an important factor for visitor management since it may encourage people to walk off-trail and impair sensitive areas by doing so. The results show that there are various actions that can be taken to make an attempt at regulating geocaching within the park. But how effective strategies like awareness raising by publishing behavioural guidelines and contacting geocachers about the removal of problematic caches are going to be remains unclear for the time being since these measures have not been implemented yet. This may be due to the different administrative bodies respectively

provinces involved in the park's management, which may be a factor impeding fast decision making, as well as due to limited resources and the multitude of other tasks park officials are charged with resulting in a lack of time that can be dedicated to managing geocaching.

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Quantifying effects of signs on visitor flow in NP Krka

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Krka National Park is the second most visited National park in Croatia. It covers an area 109 km^2 centered on the Krka river, a natural and karst phenomenon, and the lower course of the Čikola River. The Krka river has seven travertine waterfalls, which are fundamental phenomenon of the park. The Park is visited by about a million people every year, with 95% of them visiting the most popular waterfall, Skradinski buk, with an an area of only 0.3 km^2. Consequently, crowding has become a problem there.

The area of Skradinski buk can be traversed by a roughly circular path with two entrances. Historically, conuterclockwise (CCW) direction of visitor movement has been dominant. Previous research suggested that visitors taking the clockwise (CW) direction are more dissatified than those taking the CCW direction, and suggested that this is because visitors moving CW experience much more opposing traffic than those moving CCW. It was suggested that installing signs reinforcing the dominant (CCW) direction would decrease the proportion of visitors taking the CW direction, thus decreasing the proportion of visitors experiencing high traffic against their movement and, consequently, improving the visitor experience. In 2017 signs with permissible direction reinforcing the CCW movement were set at key places. Signs forbidding CW movement were placed at the end of the footpath and at a point mid-way between the two entrances asking visitors to turn around if going CW towards the bridge, while signs suggesting CCW movement were placed at the beginning of the footpath. No signs were installed near the main bridge facing the waterfall. Other than sign installation, no other enforecement was undertaken.

To quantify the ensuing effects on visitor movement, data on visitor movement before (2015) and after (2017) sign installation were analyzed. Data were collected using an app written for Android where each visitor (time of passage and direction of movement) was recorded on two locations at Skradinski buk - near the bridge and on the footpath in both years. Measurements were carried out in August during the summer season, when crowding is highest.

In total, 80633 digitalized records of time and direction of visitor movement were collected: 39266 in 2017, and 41367 in 2015. Using the records of visitor movement, binomial parameter estimates were determined and visitor flow in each direction (CW and CCW) was calculated. Binomial parameter estimates with the 95% confidence intervals were obtained using *binofit* function in Matlab Software. Visitor flows were calculated (Figure 1) as the number of visitors per minute averaged over a ten-minute intervals of data on passage time and direction of movement.

There is a noticeable drop in CW movement following the installation of the signs. CCW movement has increased from 77% in year 2015 to 90% in 2017, suggesting a marked efficiency of signs even without additional enforcement. The number of visitor moving in the suggested (CCW) direction, however, is much higher on the footpath than it is near the bridge for both years. In 2015, 83% of visitor were moving CCW on the footpath, while only 73% did so at the bridge. After the signs were installed, the number of visitors moving CCW

increased to 97% on the footpath, and to 85% near the bridge. Therefore, even though the CCW movement over the bridge was lower than on the footpath, the signs resulted in similar increase in percentage points (pp) of CCW movement at both locations: 14 pp on the footpath, and 12 pp over the bridge. Higher CW flow over the bridge than on the footpath could be a consequence of several factors: i) positioning of the signs, ii) infrastructural considerations (e.g. placement of free toilets and water fountain), and iii) additional activities (e.g. swimming) in which the visitors near bridge are involved.

Even though the ratio of visitors moving in opposite directions differs before and after the sign installation, the mean total visitor flow (CW+CCW) does not. The total visitor flow near the bridge in 2015 varied from 1.2 to 62 visitors per minute, with a mean of 24.34 (std 12.26), while in 2017 it varied from 3.1 to 44.70 visitors per minute, with a mean 24.07 (std 11.69). The mean total visitor flow on the footpath is lower compared to the total visitor flow near the bridge for both years. The total visitor flow on the footpath in 2015 varied from 0.3 to 69.87 visitors per minute, with a mean of 20.21 (std 12.77), while in the 2017 the flow varied from 0.9 do 87.1 with the mean of 20.09 (std 15.68).

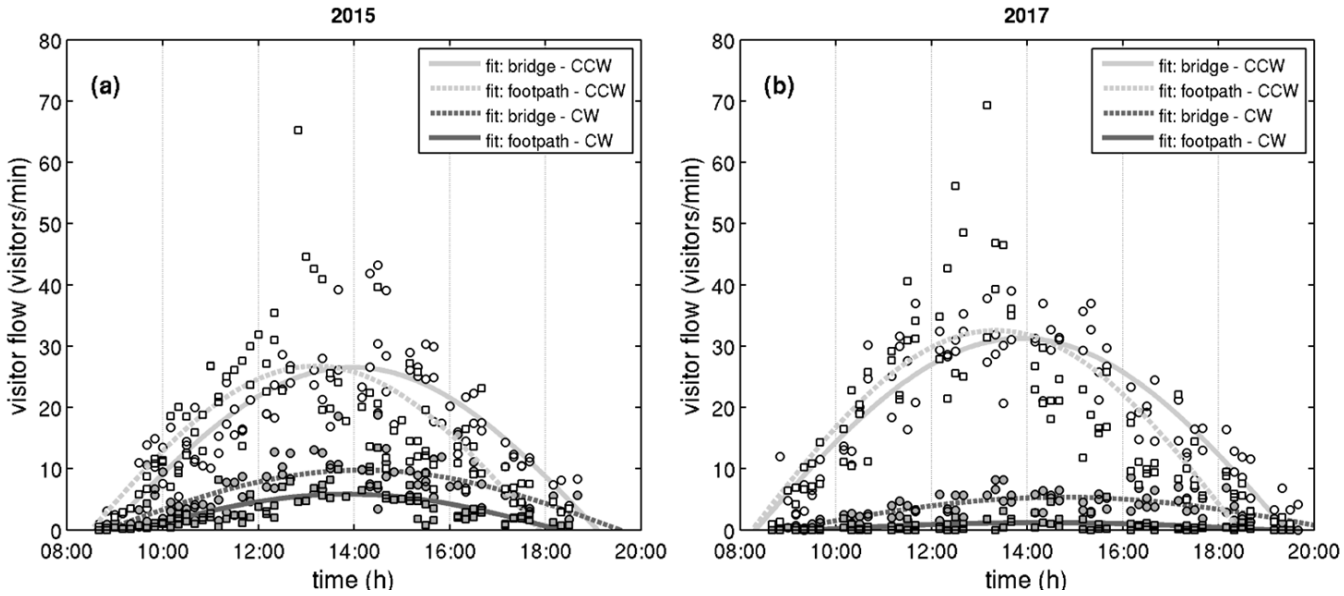

Figure 1: Difference in visitor flow and it's direction (counterclockwise - CCW and clockwise - CW) on two location during working hours in NP Krka: panel (a) in August 2015, and panel (b) in August 2017. The symbols represent the visitor flow expressed as a number of visitors in a minute calculated as the average of 10 minute intervals. The flow was monitored on two locations: near main bridge (circle symbols) and on footpath (square symbols) in counterclockwise (white symbols) and clockwise (dark symbols) direction. Lines represent the sine fit on the visitor flow data. Lines were included for illustration purposes only, and represent fits of one-term sine model.

The increase in CCW movement indicate the signs are an effective management tool. Additional enforcement would increase the desired direction movement, but may not be advisable as it could create an environment uncharacteristic of protected areas. Further research will focus on testing whether the changes in movement patterns decreased perception of crowding as expected, and how overall visitor satisfaction has been affected.

Use of game cameras and interviews to monitor visitors: is there crowding in the Iguaçu National Park - Brazil?

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One of the priorities of the Ministry of the Environment of Brazil is the strengthening of the National System of Conservation Units, and the number of visitors is an important indicator for the public policies of visitation in the PAs. Of the more than 300 federal conservation units, only 71 record or estimate their number of visitors (ICMBio, 2017). Data on the satisfaction of visitors are also scarce, as well as their perception regarding crowding.
Since 2014, with the support of USAID and USFS, West Virginia University (USA), in partnership with the State University of Ponta Grossa (Brazil), has been developing the Project "Tourism, public use management and visitor perception," in protected areas of the Amazon, such as Tapajós National Forest and Anavilhanas National Park (Burns et al, 2017).
The Iguaçu National Park (PNI) has one of the most impressive waterfalls in the world. Named a national park in 1939, it is important not only for biodiversity but also for the landscape of rare scenic beauty. PNI is located in southern Brazil state of Paraná, and it shares the title of World Heritage Site with the Iguazu National Park located on the opposite side of the river in Argentina. Three-quarters of the 275 waterfalls are on the Argentina side, which makes the Brazilian side more suitable for observation (Moreira, 2012). The PNI received in 2017 around 1,600,000 visitors, and is the second most visited National Park in the country (ICMBIO, 2018), second only to the Tijuca National Park in Rio de Janeiro (Christ the Redeemer Statue).
The objective of this effort was to collect data with cameras and to verify the satisfaction of the visitor and their crowding perception. The methodology involved interviews with 920 visitors and on-site data collection using a Plotwatcher camera. Camera images were collected each day, between 09h and 19h. Visitors were asked about their perception related with the number of people who were on the park at that time. The interviews took place between December 2017 and January 2018. Photos were also presented with 3 different scenarios to obtain visitors' perceptions of the number of other visitors in the park. The three options were pictures with few people, with many people and a vast number of other people, so the visitor could answer which photo he preferred.
Of the interviewees, 70.9% were female and 29.1% were male. A little more than half (50.9%) had a Bachelors degree, 32% had a high school education, 9% had primary education and 8.2% had a postgraduate degree. Most of the visitors (71.2%) were Brazilian, with interviewees also visiting from Argentina (17.3%), Paraguay (4%) and Chile (1.1%). Another 20 countries were also represented in smaller amounts. A little less than half of the visitors (44.1%) classified the visit as perfect, 34.9% rated the visit as excellent, 13.2% as very good, 7.5% as good and only 0.3% as reasonable. Respondents were asked to express how the number of people at the site affected their satisfaction using a scale of -4 to 4, with 0 being the neutral point. For more than half (59.8%) of the respondents, the number of people in the place did not reduce or increase their satisfaction (0). Just over one-quarter (26.6%) of respondents said that the number of people on the site reduced their satisfaction (-4); 11.8% said that the number of people on the park partially reduced their satisfaction (-2) and 1.5% of the respondents said that the number of people in the area increased their satisfaction (+3 and +4).

In the scenarios presented through photos, more than half of the interviewees (55.7%) preferred scenario 2, with many people; 27.7% of respondents preferred scenario 3, crowded and 16.6% of respondents would prefer scenario 1, with few people.

Figure 01 – One of the boardwalks at Iguaçu National Park, on a crowded day

Conclusions

This research assists in the monitoring of the visitation in the Iguaçu National Park, with the goal of developing appropriate public use planning in protected areas. Regarding crowding, most respondents (61.2%) were unaffected or said that the number of people at that time increased their satisfaction. In further analysis, data were compared across several segments, the images collected, and related to specific places. Results will be used by managers to alleviate possible crowding.

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Acknowledgements

The authors would like to thanks Fundação Araucária, ICMBio, USAID and United States Forest Service – International Programs.

Elaboration and implementation of a cultural services' indicator of impacts in the Mediterranean: a first diagnosis

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Introduction

Since 2009, the Observatory of Mediterranean wetlands, managed by the Tour du Valat and covering 27 countries, is increasing awareness about the necessity to maintain these specific natural environments and their unique properties in terms of biodiversity, water and land resources, and other and specific ecosystem services. The observatory has adopted a DPSIR (Driver-Pressure-Status-Impact-Response) model in order to define the main indicators to be followed. This was realized in order to give a regular overview and analysis of each state and tendencies of these ecosystems at the regional level. The only impact indicator of this DPSIR model for the Mediterranean wetlands, elaborated in 2016, concerns the impacts of recreational services provided by these areas.

The structure of this indicator has already been developed in the MMV8 session (Serbia, 2016), based on the main capitals to be considered: it differentiates the conditions capitals (natural capital and accessibility capital) from the impact capitals (social capital and human capital); it aims at measuring the impact of recreational visits to the social and human capital of visitors and at linking the state of the condition capitals to the state of the impact capitals. Specific indicators of performance have been defined for summarizing the level of each kind of capital. This impact, composite and non-monetary wetlands cultural services indicator has been conceived as an index, ranging from 0 to 1.

Objectives

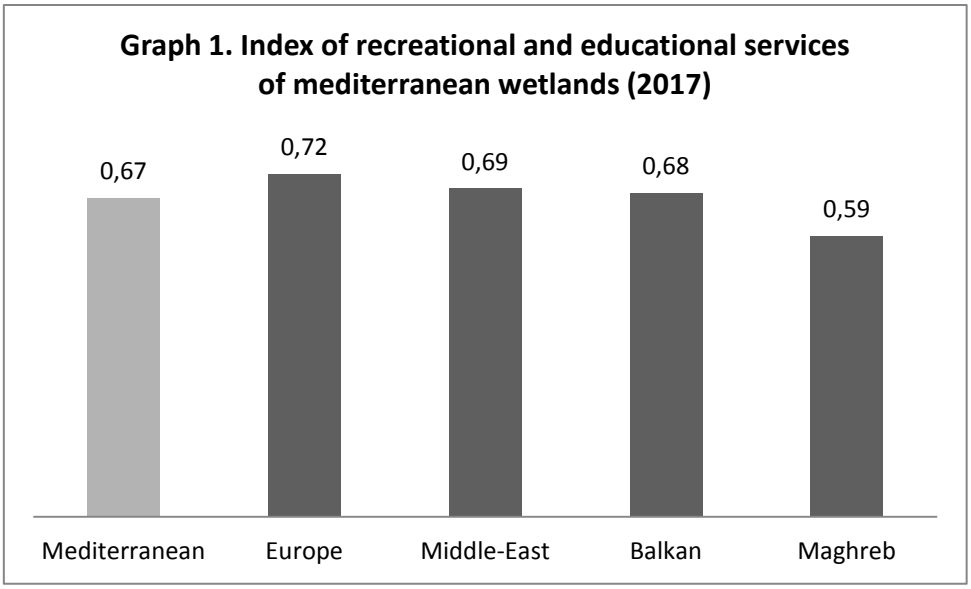
The purpose of this presentation is to develop on the original results that have been obtained, based on the first review of the available data for OZHM sites: 27 sites that have significantly contributed to this project will therefore be considered in this study. Specifically, 6 sites in the non-EU Balkans countries (Albania, Montenegro, and Serbia), 8 in the Maghreb (Algeria and Tunisia), 4 in the Middle-East (Lebanon and Jordan) and 9 in Europe (France, Slovenia, Croatia) are considered. The needed information is collected mainly from the 27 sites managers and a total of 3986 visitor questionnaires, with an average of 148 visitor questionnaires per site.

Results

High heterogeneity of services between sites: the results show that heterogeneity of index value is higher between sites than between countries in terms of capitals of condition and impact; the analysis of sensitivity (that consists in changing the weight of each capital in the global indices calculation) results in no significant change of the classification among the 27 studied sites according to their global performance (aggregation of all capitals' results).

Mediterranean index of wetlands cultural services above average: In 2017, with a value of 0.67, the Mediterranean index (Graph 1) is scoring more than two thirds of the maximum score. This value includes sites where the index varies from 0.48 for less performing sites, to 0.80 for sites providing the largest impacts. For sites obtaining an index above 0.62 (70% of studied sites in 2017), the general public indicates an acceptable level of satisfaction for both

natural capital and quality and diversity of infrastructures and services provided by site managers. Overall, this index value is reached except in sites located in the Maghreb region, due to the lack of sustained and permanent quality and managed visitor services.



Source: Mediterranean wetlands Observatory, 2018

Human and social impact on visitors directly correlated with efforts of managers: desegregated results show that the level of visitor satisfaction and social impact increase with managers' efforts to provide adequate services (path, information board, toilet, coffee corner, parking, etc.) allowing easy and comfortable visit for general public. Human impacts among visitors are also correlated with managers' efforts in areas like the Balkans, the Maghreb region and Lebanon. In Europe countries, although manager's efforts to provide quality services and information in wetland sites, visitors acquire less knowledge in proportion compared to non-EU countries because they are usually more aware of ecological issues and have already experienced the visit of wetlands.

Landscape aesthetic and educational services, key elements of human and social impacts: results show that landscape aesthetic and perception, including waterbirds, water, greenery and quietness, are the key reasons and attractive elements mentioned by recreative visitors for their well-being. Wetlands sites organizing educative visits for schools and clubs score high on human impacts in term of acquisition of new knowledge.

The perception of wetlands ecosystem by visitors penalized by external pressures: the disaggregated analysis of the natural capital of all wetlands studied show that their status of protection and site notoriety obtain the highest score. However, in the cultural service index of wetlands, the natural capital is losing value due to external pressures such as surrounding urbanization, public infrastructure and pollution depleting landscape integrity and reducing quietness.

Implications and recommendations

Boost wetlands managers' efforts, especially in improving visitor services and ensuring comfortable and easy visit conditions for the general public; conditions considered essential to strengthen visitor interest to positively discover nature, wetlands and their biodiversity.

Favor service quality instead of quantity for wetland visitors to increase the efficiency of recreational and educational services and wetlands image. Indeed, without adequate wetland and service management, visits may become counter-productive for a wetland's image.
Increase human impact among recreational visitors, by motivating wetland managers to regularly adapt information and messages for visitors, in line with evolving societal and environmental challenges, and communicate them in an innovative and attractive manner.
Influence land use decisions in and around wetlands, among development sectors and local administration, in order to protect and restore landscape integrity and quietness, considered the two key values on which most recreative visitors plan their visit.
Develop this monitoring in additional wetlands to cover a good representation of wetland diversity in the Mediterranean region and its sub-regions (total of 40 sites (10 by sub-region)).
Last, the indicator is useful for the RAMSAR convention that is currently missing indicators that can evaluate the contribution of the cultural services of wetlands to the society's well-being.

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Counting visitors in Marine Protected Areas and after? A statistical modelling experiment to estimate the spatial and temporal distributions of recreational coastal activities

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Introduction

Sustainable management of marine and coastal environments implies having a realistic and dynamic knowledge of human activities, particularly in marine protected areas (MPAs). Coastal recreational activities are difficult to monitor due to the diversity of practices involved, and to the fact that this population is often highly mobile. Recently, a three years survey on recreational shore fishing has been conducted in French MPAs during European LIFE project. This survey has been extended to other concomitant recreational activities in the "*Parc Naturel Marin des Estuaires Picards et de la Mer d'Opale (PNM EPMO)*" (Meirland et al., 2015). Results of this survey has provided amounts of count data for diverse activities and have drawn precise snapshots of their localisation during the days and for the sites monitored. However, the extraction of a knowledge providing a homogeneous vision (in space and time) of recreational coastal activities from such count data still remain a challenge.
This contribution aim to estimate the distribution over time (by season) and space (by counting site) of leisure activities on the PNM EPMO territory using statistical modelling of counting data.

Material and method

Count data

Counting operations (n = 5,415) were conducted from 15-05-2014 to 12-31-2016 and spread over 36 sites. The database contains 185,533 observations of diverse recreational activities such as recreational shore fishing (for Blue mussels, Brown shrimps, Common cockles, marine worms..), walking and swimming, horse riding, dog walking, kayaking, kite-surfing, wind-surfing, surfing, sailing...

Covariates

The explanatory variables tested (n = 17) are related to meteorological conditions (wind speed and direction, hours of sunlight…), tidal coefficient and height, time dependant variables (month of year, day of the week, holidays …), demographic pressure, or accessibility proxies by car.

Algorithm selection

Eight different algorithms were trained and evaluated for the blue mussels' hand fishing activity. The best model explaining the classified relative density of fishers was the random

forest algorithm (Breiman, 2001). This algorithm was selected for modelling the other activities.

Modelling

We performed repeated (n = 3) k-fold (k = 10) cross validations (Hastie et al., 2009) on data divided in a training set (80% of data) and in a test set (20%).
In order to reduce the risk of error in the statistical models, criteria of null variance (or near zero variance) and criteria of multi-collinearity between co-variables (threshold > 0.75) were checked and corrected (Zuur et al., 2010). To account for unbalanced multi-class problems (Wang and Yao, 2012), the class distribution was modified by the up-sampling method.
A random forest model is fitted for each activity (n = 22). Each model aims to minimize the multi-class logloss index.

Models evaluation

The importance of explanatory variables is identified for each model. In addition, each model is evaluated with the Area Under the Curve (AUC) value. The training set AUC ranges from 0.57 for the aquatic hiking activity to 0.9 for the marine plants shore fishing.

Estimates of the spatial and temporal distribution

A matrix (866,448 rows) is created to associate each co-variable (n = 17) with each activity (n = 22), with each site (n = 36) and with each day (from 01/01/2014 to 31/12/2016). Relative abundance classes are then predicted for each activity. The observed median relative abundance for each class and for each activity is assessed and associated with the estimates. Finally, daily abundances and associated median absolute deviation (MAD) are summed by season and then averaged over the three years, for each site and for each activity.

Results

The spatial distribution of abundance for each leisure activity, for each site and for each day of the period between 01/01/2014 and 31/12/2016, is modelled using 22 statistical models. These models can be considered with a good predictive quality (median AUC = 0.75). The mean spatial distribution (by season) of abundance is mapped for each of these activities (*e.g.* Figure 1). A measure of the uncertainty of the results is also proposed.

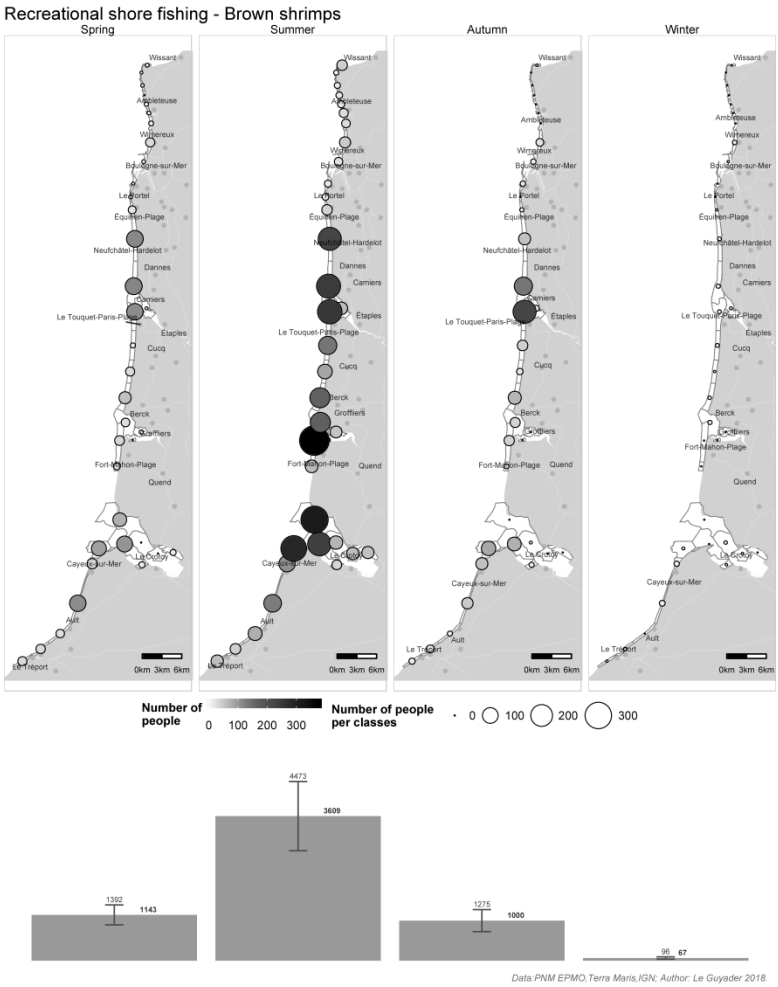

Figure 2.Mean seasonal abundance distribution for the brown shrimps recreational shore fishing (mean sum for 3 years from 01/01/2014 to 31/12/2016).

Conclusion

Results of the study provide estimates of the distribution over time (by season) and space of leisure activities on the PNM EPMO territory using statistical modelling of counting data. Potential contributions and limitations of such approach in providing knowledge on recreational activities in marine protected areas will be discussed.

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Trail running and sporting events in protected areas: Progress on research and management

Environmental perception of long distance runners in the Icelandic highlands: a comparative study between 2007 and 2018

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Long distance running has become increasingly popular over the course of the past decade. Today a significant number of people regularly travel around the world to take part in running events in new and exotic locations. The Laugavegur Ultra Marathon, which takes place in the southern Icelandic Highlands, is one such event and one of Iceland's oldest mountain marathon events, dating back to 1997 (Sæþórsdóttir & Lund, 2008). The route is 55 km long (Figure 1). It starts in the Fjallabak nature reserve, passing through a varied landscape characterised by wilderness, volcanos, hot springs, lava fields, canyons, basalt desert, glacial moraines and glacial rivers, ending in the birch woodland of Þórsmörk, which is surrounded by three ice caps. The marathon is both demanding and an exotic experience for the majority of the runners. The number of participants that finish the race increased by nearly 800% between 1997 and 2017, or from 49 participants in 1997 to 430 in 2017 (*cf.* hlaup.is). The number of registered participants is however much higher than these figures suggest. In 2017 a total of 724 participants started the race (*cf.* www.hlaup.is). The increased pressure placed on the Laugavegur hiking trail, its ecosystems and facilities during the ultra-marathon event increases environmental impact along the trail. Subsequently, demand for improved infrastructure and services increases, which in turn is likely to impact both the hikers' and the runners' overall experience of the environment. This study aims to investigate environmental issues concerning trail runners in the Laugavegur Ultra Marathon by: i) assessing runners' perception of environmental and social issues during their run; ii) identifying and examining what environmental values are held by trail runners as a group, and investigating whether these values have changed since 2007.

The study is based on a quantitative approach. In 2007 a questionnaire was distributed among all participants in the Laugavegur Ultra Marathon that finished the race. A total of 73 fully completed questionnaires were submitted, corresponding to 56.2% of potential respondents. The results of this questionnaire indicate that participants' major motivation for participating in this run was the Icelandic nature, the diverse landscape, along with personal goals (Sæþórsdóttir & Lund, 2008). Nearly all participants consider untouched wilderness to be a significant factor in the trail's attractiveness. It is notable that nature scored highest as regards the runners' satisfaction, and much more highly than physical capacity. Most participants did not notice any damage to vegetation or soil erosion, and nor did they notice litter along the trail. In order to identify what environmental values are held by trail runners today and to compare potential changes over the course of the past ten years, an identical questionnaire will be distributed to all participants registered to run in the Laugavegur Ultra Marathon taking place on the 14th of July 2018. This new question will include additional value statements focusing on specific issues so as to better be able to examine runners' environmental values and how these values potentially affect their perception.

The results of this study will provide a basis for the assessment of potential impacts and the formulation of proactive measures to manage and mitigate impacts that are likely to arise and increase as a result of the running of the ultra-marathon. As such this study will provide a better understanding of the environmental challenges facing the organisers of the race as well

as the administration of the Fjallabak Nature Reserve in terms of how to encourage sustainable use of wilderness and protected natural areas. The initial results of this study will be presented at the conference.

Figure 1. The Laugavegur hiking trail, the venue of the Laugavegur Ultra Marathon. The trail stretches over 55 km from Landmannalaugar in the north to Þórsmörk in the south.

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Monitoring and Management of recreationists along long-distance National Scenic Trails

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Recreational visits to public lands in the United States have increased over the past decades in part due to population rise and in part due to increased participation in outdoor activities by Americans and tourists from other countries. Unless managed carefully, recreation visitation inevitably degrades natural resources, creating tension between recreation provision and resource protection mandates. Use along two U.S. based long-distance National Scenic Trails, the Appalachian National Scenic Trail (AT) and the Pacific Crest National Scenic Trail (PCT), have increased significantly placing unique pressures on these trails' corridors and managers. These trail corridors span a multitude of public land managing agencies' boundaries, are managed through cooperation of NGO partners and volunteers and interface with federally designated Wilderness areas.

Significant concerns over recreational impacts to natural resources as well as experiential conditions along these trails have created a need among trail managers for relevant and actionable information.

However, conventional approaches for collecting and analyzing monitoring and assessment data are challenged by the geographic scope of the AT and PCT as well as the unique combination of varied and high use levels and extensive trail infrastructure.

This combination of circumstances has spurred independent and ongoing research studies, conducted by the authors, along the AT and PCT. These studies have evolved data collection, analysis, and modeling approaches to fit the high use, long distance, and multi-jurisdictional challenges of these trails and their use. New and novel methods employed by these studies include:

- Smartphone-based data collection.
- Spatially explicit visitor surveys.
- Near real-time and context sensitive delivery of visitor information.
- Integration of watershed- and viewshed-scale data for trail sustainability and experience assessment.

The findings of these studies have led to ongoing collaborations with NGO partners and the federal land managing agencies responsible for both the AT and PCT.

This session will present a brief overview of the monitoring and assessment data generated from the ongoing studies, discuss implications for management, and focus on a suite of new tools and methods for application of the findings. Discussion will focus on issues, obstacles, and limitations of these new approaches in their current state, while focusing on the potential for broader future use with proper development and strategic deployment.

Trail degradation and organized sporting events in Hong Kong

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Extended Abstract

Trail degradation has been a common management challenge in protected areas (Marion et al., 2016), this challenge can be aggravated by increasing demands and emerging forms of public use. A case in point is trail degradation concerns in protected areas that accommodate organized sporting events and extreme sports.

The growing phenomenon of organized sporting events in protected and natural areas in different continents have prompted calls for research, policy and management responses (Newsome, 2014). Similar to other protected areas around the world, extreme sports are becoming popular in Hong Kong and more park users expect the government to open up more protected areas to meet their demands. Although extreme sports are believed to produce very intense impacts on trails and their surrounding environments, limited research exists to quantify and characterize these impacts to inform policy and management responses. This study was intended to fill this knowledge gap by empirically examining and evaluating trail degradation effects generated by extreme sports in Hong Kong (Ng et al., 2018).

We adopted a before-and-after approach to assess trail conditions associated with the "MSIG HK50 – 2015" trail running competition (Action Asia, 2015) in Tai Lam Country Park. Trail conditions were assessed 3 weeks before the event, and 1 day, 1 month and 7 months after the event. A parallel set of measurements was conducted in a nearby, environmentally similar control trail. We applied systematic point sampling and census-based problem assessment methods (Marion & Leung, 2001) to record tread morphology, surface composition, soil compaction, soil texture, soil aggregate size, topographic variables, and trail degradation features (e.g., rills, gullies, etc.).

The results revealed that the intensity and rate of trail impacts by the organized running event were significant as compared to the controls. Significant problem of soil compaction was found at the tread center only. Surrounding vegetation appeared to play an important role in the process of recovery. Not only did vegetation prevent the trail from further widening, it also contributed materials (i.e., litter) for the recovery of the trail. Among the trail degradation features, moderate and severe exposure of tree roots persisted longer than 7 months (Figure 1).

The findings of this study point to the need for cautious permitting, planning, and management of organized sport events in protected areas with respect to event size (e.g., number of participants), trail routes, environmental conditions, and appropriate
actions to contain traffic and assist in recovery. It is recommended that organized sporting events and extreme sports be regulated and trail maintenance is crucially important for keeping the protected areas in good condition.

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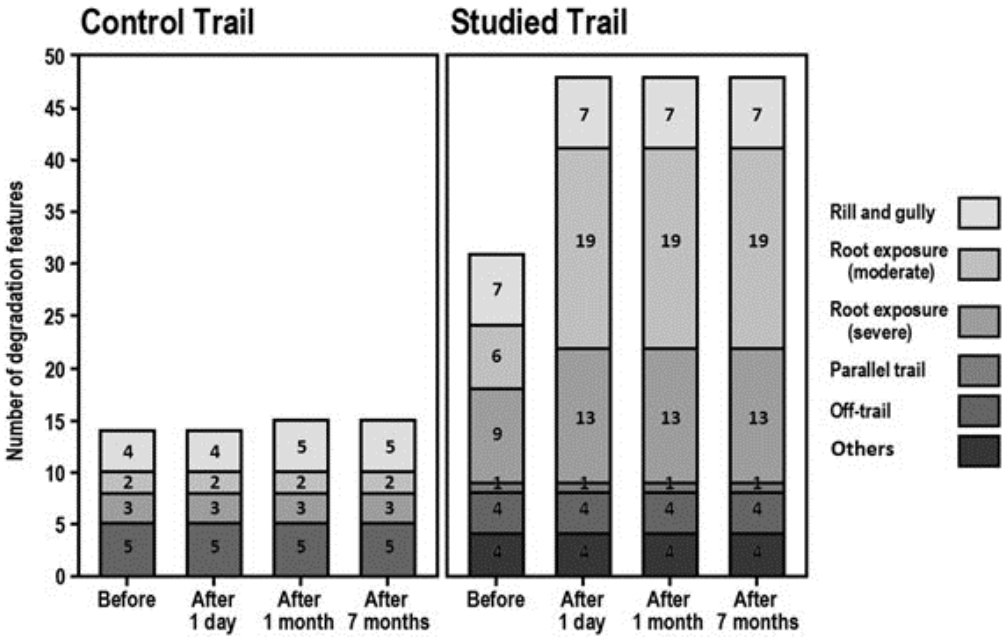

Figure 1. The occurrence of trail degradation features in control and studied trails, 3 weeks before the organized event, and 1 day, 1 month, and 7 months after the event (Source: Ng et al., 2018).

Issues on Trail runners, Trail running and recreational and protected areas in Portugal

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Introduction

Trail running (TR), according to International Trail Running Association (ITRA), is a pedestrian race in a natural environment with minimal possible paved or asphalt road and has emerged over the last decade as one of the most popular outdoor sports in the world leading in some situations to what can be called the TR boom (Urbaneja & Farias, 2015). Like other well-established recreational activities such as trekking and mountain biking, the demand for rural, recreational and protected areas for this activity in Portugal is intense, and events can easily reach over two thousand participants. Environmental impacts of such use intensity has been studied by several authors, but management of these users and their events in the perspective of land management plans still needs baseline research especially in what regards its social aspects.

Total number of TR events in Portugal is not fully known, but the most important competitions and the national TR championship is managed by *Associação de Trail Running de Portugal* (ATRP) an affiliated body of the Portuguese Athletics Federation and of ITRA.

ATRP created in November 2012 quickly increased from a few hundred members to the actual figure of over 7.500 athletes. During the last 3 years the number of members has tripled, what could be an indicator of this sports popularity.

Present paper delivers a tentative picture of TR in Portugal, providing the first systematic research of this recreational activity. A geographical analysis is done to the race events of 2017 and analyzed according to the trail runners profile in order to understand the main motivations and characteristics of this activity. Comprising the practitioners expectations is an important step to support land managers and decision makers to accommodate those within the main objectives of classified and protected areas - nature conservation, local and sustainable development, etc.

Materials & Methods

ATRP 2017 Circuit

In order to picture trail running in Portugal mainland, competitions of ATRP 2017 circuit (including 68 official races organized in 35 Events) were studied and mapped (figure 1). Among these races events, and following ITRA classification, 8 were Endurance TR (>100 km), 26 Ultra TR (between 42~100 km) and 34 TR (<42 km), but parallel trail running races are common to each event, totalizing 130 races gathering over 35.000 participants and almost 30.000 finishers.

To better know and understand trail runners a two-step approach was established. A major ATRP event was selected for its meaning for trail runners - Portugal Ultra Trail Cup -

Território CC Proença-a-Nova (http://territoriocc.com/) - and a survey was conducted among the enrolled runners.

Portugal Ultra Trail Cup - Território CC Proença-a-Nova

This event was helded in March 10, 2018 in the center of Portugal, and provided direct entrance to the national team to winners, making it one of the most important event of the circuit, with a total of 361 enrolled runners (157 in 28 Km trail and 204 in 51 Km). Due to severe weather conditions (Storm Felix) total number of finishers was lower than expected: 132 in 28 Km and 173 in 51 Km trail.
Participants were mainly man (77% and 85% for each distance) and more than 60% of Ultra TR runners were over 40 years old.

Portugal Ultra Trail Cup - Território CC Proença-a-Nova Survey

The trail runners' profile was produced through an on-line survey distributed by email to all participants 2 days after the race, and re-enforced by a second call done 4 days after. This survey included 21 questions organized in 3 groups: first one regarding the TR habits and motivations (including a subsection dedicated to other and previous sports practices); second addressed directly to *Território CC* race; and a final third towards socio-economic aspects.

Results and Discussion

ATRP 2017 circuit spreads all over Portugal mainland, sometimes overlapping with recreational and protected areas, as shown in figure 1. Considering Portugal Ultra Trail Cup participants, the majority are coming from Lisbon and Porto metropolitan areas, but also from remote places, showing that distance is not a restricting factor for their participation.

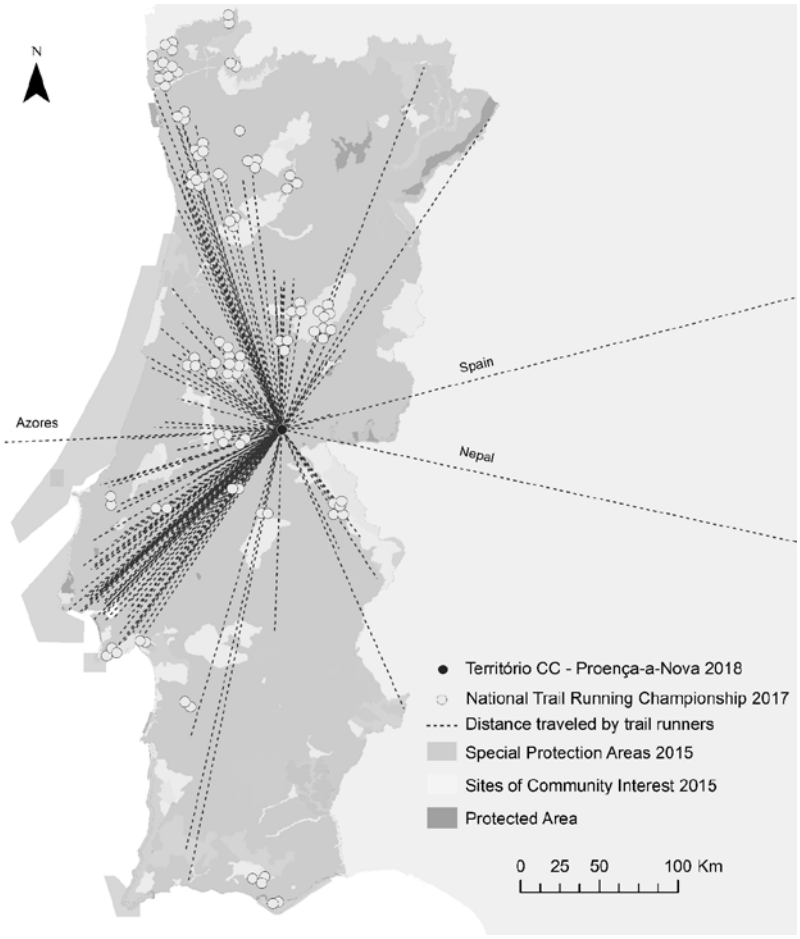

Figure 1 – ATRP 2017 circuit and Portugal Ultra Trail Cup participants geographic distribution

Due to low response rate (75 within 6 days), results should be considered as a pilot test, to be reinforced on future circuit events. All respondents are usual TR practitioners as expected, and the majority are members of ATRP (78%) and ITRA (61%) what could be a proxy to the commitment TR's activity and evolvements. Participants also proved the impact and growth of this activity in Portugal as the average of TR practice was of 4 years.

Motivations

Major motivations for trail runners (on a likert scale from 1 "doesn't motivate me" to 5 "motivates me a lot") were the fact that TR approaches them to the natural environment (4.8) and provides pleasure (4.7), linking this sport to recreational and protected areas. Respondents also stated that TR makes them feel good in various ways and disconnect from the daily concerns (4.6). Lower scores were related with friends or family members approval (3.2), meaning that is comfortable to practice with them but isn't the most important condition, or that TR is a reference or fashionable sport (3.3).

TR and other activities

TR requires intense training, but is also a recreational activity what explains the enrolment with other sports. 77% are regular practitioners of Gymnasiums, MTB, road cycling, and other tracks and field activities are common. Regarding previous recreational activities bicycle rides were favorite with 35%, but MTB was the most common with 29%.

Preferred distances

Trail Longo (21,0975 Km to 42,195 Km) is the favorite distance for the majority of trail runners. As distance increases, the number of participants decreases progressively. This can also be confirmed in ATRP rankings where Endurance Trail Running has fewer competitions and competitors.

Training practices

Solo training sessions are preferred by 79% of the respondents, followed by ones with friends within organized groups. 3 to 4 days a week is the most common training frequency and usually (97%) near residence area, but 87% of the runners has travel previously just to prepared for a specific type of practice/terrain or following friends' invitations.

GPS use is almost mandatory (94%) and tracks are uploaded to online services, such as Strava, Garmin Connect or Suunto Movescount by 82% of respondents.

Conclusions

TR is today a major outdoor sport with increasing popularity, gathering runners of every ages and gender. Portugal is no exception with a wide distribution of runners and competitions through all country.

Runners are mainly looking for personal wellbeing and proximity with nature, and they are also tech geeks and VGI providers through online sports APPs.

The general feeling is that TR is generating a positive impact in local economies, particularly in small villages in rural areas, but with potential negative impact on natural and sensitive environments, requiring further research in order to support new measures for managing environmental impacts in recreational and protected areas.

Acknowledgements

This research was supported by CICS.NOVA - Interdisciplinary Center of Social Sciences of the Universidade NOVA de Lisboa, within the framework of the project UID/SOC/04647/2013, supported by FCT/MCTES through National Funds.

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Assessing and Managing Trail Use and Endurance Activities in Grand Canyon National Park, USA

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Recent research at Grand Canyon National Park demonstrates that participation in endurance activities, including trail running, tends to be concentrated over a few weekends of the year (Pettengill 2017). When visitor use is concentrated like this, it can create or exacerbate impacts with potentially dramatic and lasting consequences. Impacts can be environmental (e.g., erosion, vegetation damage, contamination from human waste), social (e.g., crowding, conflict, degraded experiences), and administrative (e.g., exhausted employees, overtaxed facilities).

Multi-phase research authorized by Grand Canyon National Park explores relationships between visitor use and park environmental, social, and administrative conditions. The initial study considered implications of high-use events, many of them trail running- and endurance activity-related, for park policy and management (Pettengill 2015). As a result, park managers now emphasize minimum impact practices through social media during periods of peak use.

A current study builds upon the initial research. It will help refine estimations of visitor use during peak periods and tie visitor use levels and patterns to key environmental, social, and administrative conditions in the park, including: crowding and conflict among visitors; the relative impacts of trail running on experiential conditions in the canyon; wastewater treatment demands and capacities, and search and rescue demands and capacities.

This presentation considers this new information and highlights conceptual frameworks for addressing impacts associated with endurance activities and trail running along Grand Canyon's most used backcountry trails.

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The development of Trail Station: an innovation to serve tourist development of territories? Two examples of Saint-Pierre de Chartreuse (Alps) and Ossau-Pyrénées (Pyrénées) stations

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The development of Trail Running, envisaged through its innovations, tends to provide structure for the mountain-oriented touristico-sports areas in favour of a new tourist appeal. Considered as "fragile", these spaces are faced with various difficulties in terms of climate changes (OCDE, 2007; Paccard, 2010), transformation of tourist demand (Bourdeau, 2009; François & Billet, 2010) and slowdown in visitation. In order to face these challenges, different actors in these spaces are undertaking adaptation strategies to changes, by means of promoting the diversity of tourist attraction.

Today, there has been little research carried out on the new tourist stakes for trail running in mountain regions. If this research appears to show Trail Running as a lever of development for these areas (Bessy, 2010, 2012, 2015); Jacquard, 2017; Savelli, 2008),such activity is often analysed as a sporting event. Still, one can observed a shift from events strategies towards the development of lasting infrastructures promoting at the same time the attractiveness of these areas (Bessy & Pabion-Mouries, 2017).

The challenge of this communication is to shed light on the conditions under which the development of 'Trail Stations' can become a territory resource participating in the improvement of tourist appeal of mountain territories. We shall illustrate our point by taking the example of Trail Stations such as St-Pierre en Chartreuse and Ossau-Pyrénées.

Place based knowledge and environmental engagement

Involving recreational users in environmental management: invasive aquatic plants in lakes on France's Atlantic coast

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Introduction

Biological invasion is a major threat to biodiversity globally. In the scientific literature, an 'invasive' species is one that is not indigenous to a given ecosystem, and whose introduction is likely to cause harm to ecosystems and (potentially) human health and they can be introduced into new environments intentionally and/or unintentionally. Not all non-indigenous species become 'invasive'. Some fail to thrive in their new environment and die off naturally. Others survive, but without destroying or replacing native species. Invasive aquatic plants (i.e. weeds) can severely impact lake ecosystems and related human uses, notably recreation and nature based tourism (Villamagna et Murphy 2010). Many activities are affected, such as watersports, fishing and hunting. Dealing with such plant infestations is complex. Often, preventing infestation in the first place is more cost efficient than trying to remove plants once established although views on this vary among stakeholders. In addition, the results of technical intervention are often disappointing.

In this context, recreational users play a mixed role. For instance, anglers and owners of pleasure boats may contribute to the spread of invasives as the plants can become stuck on propellers. However, these same users can also help to reduce invasions by monitoring conditions in lakes, removing exotic plants from lakes, and/or taking particular precautions to limit their spread. While the advantages of involving users in the management of recreation and/or conservation of natural sites is increasingly recognized (Granek, Madin *et al.* 2008, Newsome, Stender *et al.* 2016), it has yet to be examined in the context of complex environmental issues such as the spread of weeds in lakes.

Methods

This presentation is based on an ongoing multidisciplinary research project (AquaVIT), combining scientists from the fields of economics, geography, sociology and ecology. It focuses on the ecological and socio-economic impacts of four macrophytes, i.e. *Egeria densa*, *Lagarasiphon major*, *Ludwigia*, *Myriophyllum aquaticum*, within freshwater Atlantic lakes in France. The lakes are used for a variety of recreational activities, including sailing, wind and kite surfing, fishing, hunting, scuba diving, swimming, or simply walking. These activities are affected by the spread of the four weeds to different degrees. In some areas, the weeds have been present for over forty years, while in others, they are relative newcomers. A number of techniques have been tried to remove these weed since the 1980's, sometimes involving end users.

The social scientists within the project share two objectives among others: i) describing individuals' activities and perceptions (in particular those related to the weeds) ii)

understanding how recreational users are (or are not) associated into the current management processes.

Our preliminary results are based on

- an extended bibliography (scientific, technical, internet websites) on the social issues associated with the weeds,
- a socio-historical analysis of the management of the lakes,
- participation in various local meetings and councils (including participation in cleaning operations)
- a set of semi-structured interviews with recreational users (lakeshore homeowners, anglers, hunters, boat owners) and managers (natural reserves, public administration, cities and local public organization, etc).

Results and discussion

Our preliminary analysis identified numerous types of organization, with equally varied levels of public involvement. In some cases, lake users themselves (i.e. home owners, members of fishing clubs, etc.) decide to clean a particular area using a particular technique. In other cases, work takes place based on a traditional "top-down" system of action, with little (if any) involvement of the public. We identified a number of factors which may impact on the ability of recreational users to take part in conservation programs.
Some factors are linked to institutional issues, such as property rights and environmental regulations, responsibilities (who is in charge ? who pays?) and, to a certain extent, management goals, i.e. total eradication, occasional cleaning. Physical attributes (e.g. plants, hydrology, topography) also play an important role in selecting the methods to be employed.

Some other factors appear to be more subjective, as they derive from the representations and attitudes of recreational users toward invasive plants. The attitudes among interviewees varied greatly. For example, while *Egeria densa* and *Lagarasiphon major* are frequently seen as a "pest" by many stakeholders, many anglers think the plants may play a positive role in ensuring an abundant supply of fish. This belief would appear to be based on personal observations or 'alternative' sources of information (personal networks) rather than "official" ones (i.e. environmental norms, scientific sources). Broadly speaking, it is possible to connect such categorization of plants with the overall perception of the natural environment by individuals. Interestingly, the range of representations between users does not fit into standard categories. For instance some hunting associations, which are usually opposed to environmental organizations, now exhibit very ambitious ecological goals. At the same time, other users (i.e. practitioners of nature-based sports), who are frequently presented as "environmental" citizens, pay little or no attention to the problems.
Another group of factors seems to depend heavily on place-based values. In many cases, the implications of users reflect a strong attachment to places, which is built up over time, based on individual (i.e. personal experiences) and social (relationships) considerations. While this kind of attachment would appear to be of great interest when measuring user involvement, (e.g. people volunteering regularly), it is generally limited to a very small area, and is difficult to reproduce. This is critical when considering the potential replication of previous policy models.
While results at first appear promising, the above mentioned assumptions need to be confirmed with additional research including

- An additional quantitative survey to improve the representativeness of our sample, focusing particularly on “floaters” – i.e. individuals who are present in and around a lake but who are not involved with local associations and user groups. Among other things, the analysis we have already carried out allows us to relativize the importance of individual decision making when faced with social norms and collective organizations.
- Interviews with stakeholders in charge of the invasive “problem” (managers, policy makers). Our study focused mainly on whether or not users are willing to become involved in issues relating to invasive plants, but it is important to also focus on how managers are willing to work with end users. In this regards, our preliminary works suggest that new barriers have to be overcome too!

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Sharing the Stewardship of a Canadian Conservation Park

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Sharing the Stewardship of a Canadian Conservation Park

Gatineau Park, Quebec, Canada: A conservation challenge

Gatineau Park is a federally managed natural area located within Canada's Capital Region. Accessible directly from the urban core, it the most intensely visited park in the country. Some 600,000 visitors make 2,65 million visits annually to its 361 km^2 of forests, lakes, rivers, and wetlands. It is a year-round attraction with 200 km of recreational trails used for hiking, walking, cross-country skiing, mountain biking, winter biking, and horseback riding. In addition, its scenic parkways draw motorists and cyclists and its shorelines draw beachgoers and campers.

Now in its 80^{th} year, the park has evolved from an informal playground and ski area, to a highly coveted recreational park. Intensive use notwithstanding, it retains significant ecological values, with various high-quality ecosystems and habitats and harbouring over 150 legally designated species at risk. Federal environmental laws require increasingly careful management of recreational activities and infrastructure.

In 2005, the Gatineau Park Master Plan stated, for the first time, that the primary purpose of the Park is natural and cultural resource conservation, and that recreational activities must be respectful of the environment. Numerous actions were accomplished through the Master Plan, and yet users continue to regard the park as a personal "playground" with little regard for the conservation of its natural values. Examples of this behaviour include the unsanctioned creation and use of a vast network of unofficial trails, and disrespect of regulations and behavioural codes. In the context of very limited enforcement capacity, the Park has little ability to ensure regulatory compliance.

Affecting a culture change

Gatineau Park's managers have recently undertaken a long-term, multi-pronged approach to try to engage its users in the conservation of the park. Certain activities, such as rockclimbing and horseback riding, have been delegated to user groups to ensure trail maintenance and appropriate user behaviour. A similar approach will be put in place for mountain biking. A major initiative to curtail the creation and use of unofficial trails is underway, starting with raising public awareness of the numerous impacts of these practices. Over a number of years, park staff has been working with user groups to find and implement solutions to reduce overall habitat fragmentation, ecological impacts, and safety issues caused by the trails. The park is also moving to place youth ambassadors and volunteer patrollers on the trails to educate users and increase regulatory compliance.

Currently, the Park management is in the process of renewing its Master Plan. The primary focus of the plan is to institute a cultural shift, whereby users move from assuming "ownership rights" to assuming a sense of responsibility for the park's stewardship. Additionally, regional partners need to be engaged to ensure ecological connectivity and resilience to a changing climate. The long-term ability of the park to maintain its remarkable biodiversity and ecological functions and services depends upon the success of this major effort.

Unplanned trail creation in Gatineau Park, Canada: engaging users in finding a sustainable solution

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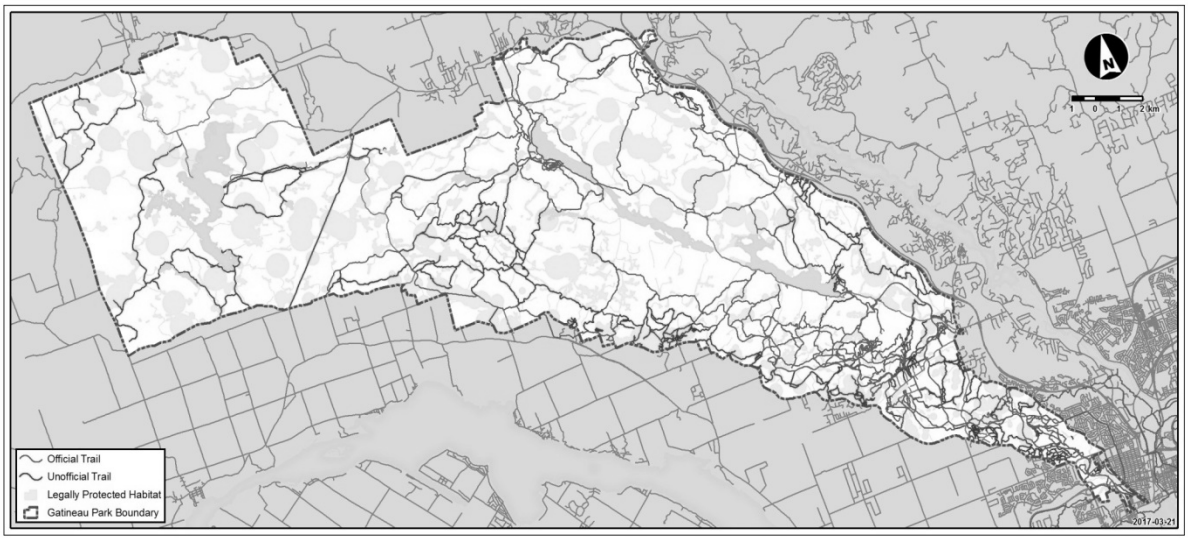
Unplanned trail creation in Gatineau Park, Canada: engaging users in finding a sustainable solution

Gatineau Park responsible trail management initiative

Gatineau Park, Quebec, Canada, receives 2.6 million visits per year. Visitors enjoy hundreds of kilometres of hiking, skiing, snowshoeing, and cycling trails. While the official trail network has remained essentially the same, unauthorized new trails have been continuously created by users, such that the network of "unofficial trails or social trails" has become larger than the official network: 330 km of unofficial trails vs 200 km of official trails. Unofficial trails are created and used by users seeking experiences not offered on the official trail network. Studies conducted on the Park's ecosystems indicate that habitat fragmentation created by trails conflicts with habitat protection for species at risk and have become significant problems for the Park's ecological health. The cumulative impact of the trails and the access they provide reduce the overall amount and quality of habitat available for the park's wildlife. The National Capital Commission, the federal Crown corporation managing Gatineau Park, has initiated a series of consultations with over eighty user groups and adjacent communities to engage them in finding a sustainable solution. Awareness of the negative environmental and public safety impacts caused by unofficial trails was enhanced among user groups and solutions to reduce these impacts were found collaboratively and are now being implemented. Recreational, operational, and natural resource management requirements have been taken into account to arrive at a sustainable solution.



The problematic: Map of Gatineau Park, Québec, Canada showing official (in blue) and unofficial (in red) trail networks, with species at risk legally protected habitat (yellow circles).

A framework for integrating values into persuasive communication: Value orientations, elaboration, and the theory of planned behaviour

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Communication, such as interpretation and education, is an important tool for managing visitor use in park and conservation areas around the world. Particularly in wildland settings, communication is often preferred as a tool for visitor use management by both managers and visitors because it is less intrusive, less expensive, and can be highly effective when designed correctly. To design effective communications, two theories have been widely used in visitor use management: the elaboration likelihood model (Petty & Cacioppo, 1986) and the theory of planned behavior (Ajzen, 1991). Additionally, value orientations have been cited as an important component of communication, but empirical evidence is lacking (Miller et al., 2018a). This presentation presents empirical findings that merge value orientations, the elaboration likelihood model, and the theory of planned behavior into a single framework. Collectively this research enhances communication for visitor use management.

Background

The theory of planned behavior (TPB) (Ajzen, 1991) is used to model human behavior in a variety of research, including visitor use management. In this theory, behavioral intentions are predicted by attitudes towards a behavior, subjective norms associated with the behavior, and perceived behavioral control in performing the behavior. Although this theory provides us with an understanding of the components that indicate *why* people intend to behave, it does not explain *how* to influence those components. To explore *how* to influence behavior, the elaboration likelihood model (ELM) is often used
(Petty & Cacioppo, 1986). ELM suggests that attitude change occurs by receiving and processing information through either a central or peripheral route, with the central route being indicative of long-lasting attitude change. Importantly, this change in attitudes may lead to an increase in appropriate behaviors (Ajzen, 1991). ELM has been used to construct and frame communications in a few protected areas, but empirical evidence regarding the process of elaboration is only beginning to emerge (Miller et al., 2018b). The emerging research shows that higher levels of elaboration (defined as interest, awareness, and cognitive engagement) are indicative of the central route of processing and have a strong relationship with intended behaviors (Miller et al., 2018b).

A key component of ELM is increasing message relevancy. Message relevancy is particularly important in non-captive audiences, such as visitors. Visitors are exposed to numerous messages, but if the message is not perceived as relevant, they may not process them (Ham, 2013; Petty & Cacioppo, 1986). Although there are numerous approaches to increasing relevancy (Ham, 2013), one proposed way is through value-framing (Miller et al., 2018a). Protected area visitors hold a diversity of beliefs and interests, and these characteristics influence the persuasion process (Ham, 2013). When addressing human–

wildlife interactions, wildlife value orientations (WVOs) are a useful for understand differences among visitors. Visitors with different WVOs are likely to find different types of messages about wildlife relevant (Bright, Manfredo, & Fulton, 2000). Few studies, however, have explicitly investigated this relationship.

Methods

We conducted intercept surveys of day hikers at Yellowstone National Park Facebook on several trails during from July 1st to August 10th, 2016. This method obtained over 600 completed surveys. The survey focused on measuring elaboration, components of TPB, an adapted WVOs scale, and the importance of a variety of wildlife-related messages. We used confirmatory factor analysis, ANOVAs, and structural equation modeling to explore components of the conceptual framework (Figure 1).

Results

We found that the importance of messages were significantly different among a typology of WVOs (Miller et al., 2018a). Messages that more closely matched visitors' WVOs were rated as significantly more relevant. Additionally, a CFA and SEM showed that elaboration significantly predicted visitors' behavioral intentions (Miller et al., 2018b). When the components of TPB were placed as mediators between elaboration and behavioral intentions in a SEM, the TPB components partially mediated the relationship. When viewed collectively, we believe the results from these studies provide insight into the role of values in persuasive communication. (Figure 1).

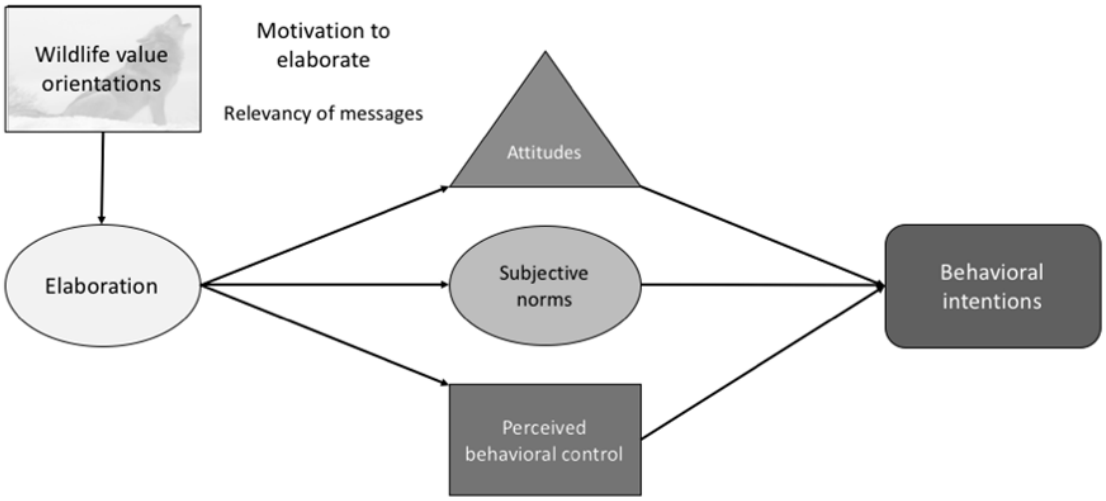

Figure 1. A conceptual model of the relationship between value orientations, elaboration, and the theory of planned behavior. If messages match values, elaboration increases. In turn, elaboration impacts the components of the theory of planned behavior. The end result is a shift in the behavioral intentions of visitors.

Discussion

Using empirical findings, we believe that the conceptual model (Figure 1) provides guidance for integrating values into the communication process. In one study, we found that messages that more closely aligned with a person's WVOs were significantly more relevant (Miller et al., 2018a). This relevancy interrupts the more common peripheral processing and increases elaboration likelihood (Ham, 2013). Another study showed that elaboration has a

significant, positive impact on behavioral intentions (Miller, 2018b). Furthermore, this elaboration-behavioral intentions relationship is partially mediated by components of TPB. Viewed collectively, values can be integrated into the communication process as a way to frame messaging and increase message relevancy, which in term should increase elaboration and impact behaviors. Future research should include examining the relevancy of value-framed messages through other methodological approaches and in other populations. Also, a pre-post testing of elaboration after a treatment of value-framed messaging could provide additional insights.

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Understanding the value of opportunities for tourist support in managing non-native invasive species

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Introduction

This paper examines the value of opportunities for tourist support for managing non-native invasive species while on their trip. Recently, an approach for involving the public, especially tourists, in the management of non-native species has attracted much attention. Many previous studies showed that it is important to effectively manage wildlife, especially non-native species, to get tourist support (García-Llorente et al., 2008). In Green Island, Taiwan, for example, the common sun skink (*Eutropis multifasciata*) has been managed through tourist support and the ratio of captured skunks has been decreasing (Chao and Lin, 2017). Although it is assumed that involving tourists in such conservation is effective for non-native species management, little research has been conducted focusing on the demand for opportunities of tourist support for invasive species management. We examined the eradication program for carp and the mangrove canoe tour as a case study.

In addition, this research contributes to the development of volunteer tourism. Tourists have been working voluntarily while travelling for short periods of time; such volunteer tourism has been growing rapidly across the world (Wearing 2001). Although the motivation and/or educational effects of volunteer tourism for wildlife conservation have been studied, few studies have focused on the demand for volunteer opportunities. Wearing and McGehee (2013) suggested that further researches should be conducted to identify most desired the form of volunteer tourism. That can show the unique potential of volunteer tourism. Thus, this paper contributes to developing the branch of volunteer tourism and our understanding on the value of voluntary conservation action, especially the conservation of ecosystems and environments.

Method

Research Site

We conducted our study at Amami Oshima Island in Japan that is located to the southwest of the Japanese archipelago and is the second largest island among the Nansei Islands of Japan (712km^2). Because the island has rich and endemic ecosystems, a part of the island becomes a national park and a world natural heritage site candidate. The mangrove forests on the Amami Oshima Island especially have rich biodiversity and are visited by tourists and locals for recreation. However, in the mangrove forests and the river flowing though the forests, non-native species, such as koi carp, have contributed to biodiversity loss and ecosystem deterioration. Although the carp is considered a pest species and the managers and nonprofit

organization have tried to eliminate it, the managers recognize their lack of labor for undertaking this task. Thus, the managers expect support from the public, including tourists.

Questionnaire design

We used a choice experiment that has its origin in conjoint analysis and that has been employed in marketing, transportation, and other fields. Based on previous studies, current tours, and discussions with managers on the Amami Oshima Island, this study selected attributes and levels that are required to design the Profiles and choice sets: "availability of pick-up by guides (2 levels)," "time of tour (5 levels)", "the availability of options for carp capture (2 levels)", "fee for the tour (5 levels)". To reduce the number of profiles handled and to avoid multicollinearity, we used D-efficient designs (Huber and Zwerina, 1996). We created choice sets that consist of "not attendance" and two profiles selected randomly; we then created six groups with five choice sets and provided each respondent with one of them selected randomly.

We divided the sample to distinguish the use value of carp captures: recreational value and non-use value: the value of voluntary management for non-native species. Thus, the information that "the option of carp capture contributes to non-native species management and conservation of ecosystems" was provided to only some respondents; the other respondents were not provided with this information.

Sampling procedure

We conducted a questionnaire survey among the tourists on the Amami Oshima Island during the summer vacation in August 2017 for data collection. Questionnaires were distributed to 924 tourists at the Amami Airport. A total of 341 questionnaires were returned via mail (with a response rate of 36.9%). For this analysis, we used the data of 319 respondents who answered all relevant choice experiment questions.

Statistical Analysis

Data obtained from the choice experiment were analyzed using a random utility model. In this study, we used a conditional logit model (McFadden, 1974) to assess the results of the choice experiment. In this model, it is assumed that the utility function is the sum of the deterministic term that can be described as a function of factors that influence respondents' utility and the random term that is unobservable and stochastic for researchers. In addition, we calculated the marginal willingness to pay (WTP) value from the estimation results using the conditional logit model.

Results and Discussion

The estimation results obtained using the conditional logit model show that carp capture programs lower the utility regardless of whether they were provided with information (Table 1.). Although the marginal willingness-to-pay (MWTP) value of respondents, regardless of whether information was provided, had a negative value, the respondents who were provided with information could be involved in the management of non-native species without preventing the current tours because their MWTP value for adding the option of carp capture was only -42 JPY (about 0.42 USD).

Although the respondents did not prefer the carp capture option, they valued the voluntary management of non-native species. The cross term refers to the difference between respondents to whom information was provided and those to whom information was not provided, that is, the non-use value of the carp capture option.

These findings suggest that although the tourists value non-native species management, the option of carp capture is not accepted by tourists because it probably does not have

recreational value. Thus, managers should consider effective management of non-native invasive species by adding more recreational value to such tasks.

Table 1. Estimation results using the conditional logit model

Variable	Coefficient (Standard Deviation)	Marginal Willingness To Pay (JPY)
Trans	0.174 (0.0408) ***	440
Time		
(Based on 60 minutes as a reference)		
90 minutes	0.209 (0.0082) *	527
120 minutes	0.089 (0.0774)	224
150 minutes	-0.008 (0.0708)	-19
180 minutes	0.014 (0.0847)	36
Carp	-0.233 (0.0557) ***	-589
Carp*Explain	0.208 (0.0664) **	526
Fee*10^{-3}	-0.395 (0.0026) ***	–
Non-attendance (alternative-specific constant)	-1.480 (0.1050) ***	-3731
Log-likelihood	-1467.9	

1) *Trans*: availability of pick-up by guides; *Time*: time of tour; *Carp*: the availability of options for carp capture; *Carp*Explain*: cross term of carp and presence the information provision; *Fee*: fee for tour;

2) ***p<0.001, **p<0.01, *p<0.05

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Reconciling Traditional and Recreational Activities in the 100 Wild Islands

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Established in 1994, the Nova Scotia Nature Trust is an incorporated charitable conservation organization dedicated to protecting ecologically important natural areas in the province of Nova Scotia, Canada with a focus on rare, outstanding and imperiled habitats and critical habitat for at-risk species. The Nature Trust works with private landowners to protect their land through donation, purchase and conservation easements, and once a property is protected has a rigorous, science-based program of ongoing stewardship and management to ensure that the lands' natural values are protected in perpetuity. This work involves hands-on public education and engagement that builds knowledge and support for nature conservation, and helps Nova Scotians to take an active role in environmental stewardship.

The Location

The 100 Wild Islands, located in the Canadian province of Nova Scotia, includes more than 280 offshore islands, and ecologically significant mainland properties stretching along some 30 kilometres of the Atlantic coast.

Once considered for national park designation, and later as a provincial park, this island archipelago represents one of the last remaining intact and ecologically rich island groups of its size in North America, and the only island group of its kind in Nova Scotia. The islands support a mosaic of undisturbed and interconnected coastal habitats, including boreal forest, coastal barrens, beaches, wetlands, bogs and salt marsh. The area provides habitat for more than 100 species of migrating and breeding song birds, sea birds and shore birds, including Common Eider, Leach's Storm Petrel and Great Blue Heron.

The 100 Wild Islands has been identified by the Nova Scotia Nature Trust as a priority conservation area due to the area's ecological integrity, richness, uniqueness and representativeness. In 2014, it launched an ambitious campaign to protect the area comprised of approximately 1,150 hectares (2,840 acres) of privately owned islands and mainland parcels, as well as 1,650 hectares (4,080 acres) of provincial government (Crown) owned islands. The Province has acknowledged the significance of the area and, in 2015, designated all Crown-owned islands as the Eastern Shore Islands Wilderness Area. To date, approximately 85% of the 2,800 hectares (7000 acres) of wilderness has been protected, with more in progress. More recently, the Eastern Shore Islands have been identified by the federal Department of Fisheries and Oceans as an area of interest towards the possible designation as a marine protected area.

The islands were first used by the indigenous Mi'kmaq people as a location for coastal camps from which to gather a variety of fish, invertebrates and mammals. More recently, the islands and coasts have been sparsely settled by European descendants with fishing and forestry as the primary economic activities. The islands continue to be used by both local residents and visitors for a variety of recreational activities. This includes pastimes such as sea kayaking, motor boating, hunting, fishing, bird watching and camping. These activities are primarily self-directed with a limited number of commercial enterprises engaged in supporting their provision. Recreational activities occur on privately owned Nature Trust conservation lands,

Crown lands designated as a wilderness area and on waters that may be designated federally as a marine protected area. These activities take place in a largely unregulated environment with minimal management intervention.

Conservation, Recreation and Economic Initiatives

In 2017, a multi stakeholder initiative was launched called the Wild Islands Tourism Advancement Partnership (WITAP). WITAP is a community-based project with the goal to capitalize on the eastern shore archipelago as a tourism destination. As part of the WITAP project, the Nature Trust and the provincial Department of Environment, are developing a management strategy that will provide complementary management direction on both Nature Trust and Crown land. The Nature Trust has focused community engagement for several years on gathering information on ecological and social variables, and to discuss and receive feedback on plans to acquire privately owned properties for conservation. More recently, communities have engaged with the Nature Trust to discuss possible management approaches to the 100 Wild Islands.

Conservation and Management Issues

Residents who have participated in open houses and other forms of engagement are broadly supportive of efforts by the Nature Trust to conserve privately owned land. However, support is often qualified on the understanding that activities such as hunting, sea kayaking and camping will continue unhindered as this is viewed as a 'right'. There is also a lack of clarity and understanding on the respective conservation mandates of the Nature Trust, the Government of Nova Scotia and the federal Department of Fisheries and Oceans.

Local communities and their residents exhibit a high degree of 'ownership' of the islands and coastal headlands and undertake a wide range of traditional and recreational activities on both Crown land and privately-owned properties. Participants in recreational activities undertake these pastimes in a regulatory setting that is either not actively enforced, or is embryonic in both objectives and direction. Many residents are hostile towards any government entity or non-government entity that is perceived to have hidden agendas that might restrict their continued ability to partake in recreational activities on protected land. The Nature Trust recognizes the importance of securing local resident support in the development and delivery of a management strategy for the 100 Wild Islands. With an anticipated increase in visitation within the 100 Wild Islands comes potential increased threats to their ecological and cultural resources. Limited resources within the Nature Trust to complete management planning and divergent viewpoints and agendas complicate joint management efforts. Challenges arise with efforts to reconcile strongly held local views of the right to participate in recreational activities with the conservation mandate of the Nature Trust.

Efforts to reconcile divergent views between the Nature Trust and users of the resource have, to date, consisted primarily of participant engagement of a more generalist format, eg. public open houses and, secondly, targeted engagement with specific user groups, eg. commercial operators, hunters, fishers. In these forums, dialogue is structured in a conversational format intended to convey the conservation objectives of the Nature Trust and to seek and document the nature and scope of recreational and traditional uses of the islands. Information gathered from these sessions is used by the Nature Trust to compile and conduct an inventory and analysis of the type of activities occuring on the islands and the location and timing of the activities. This information is then used by the Nature Trust to assess the spatial and temporal compatibility of the activities with the conservation objectives of the islands. The Province of Nova Scotia must consider management approaches on Crown land in the context of protected areas legislation and policy. The charitable, non-governmental status of the Nature

Trust provides a high degree of flexibility to consider and incorporate management approaches unencumbered by legislative imperatives.

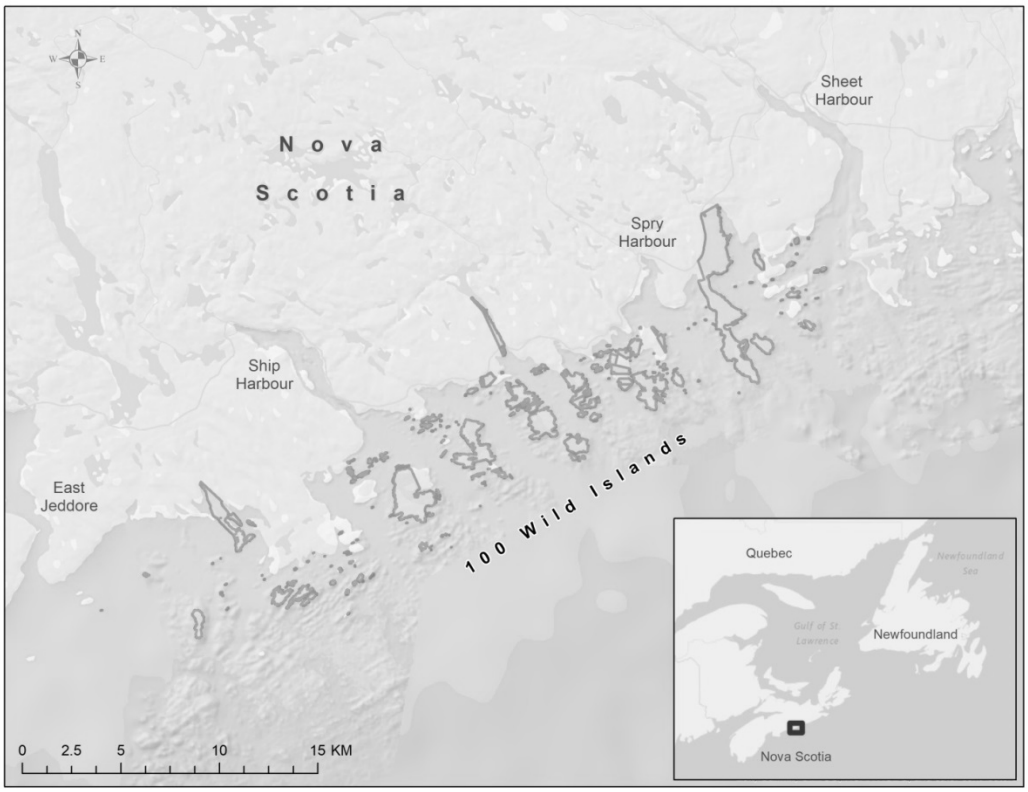

Figure 1. 100 Wild Islands

Outdoors Economics 1 - Contributions to the Economy

Regional economic impacts of tourism in German Biosphere Reserves

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Within the UNESCO Man and Biosphere program the concept of biosphere reserves aims as an innovative form of protected areas to achieve sustainable development in areas of cultural or/and natural importance. The apparent contradiction between protection and development is dealed with the help of a zoning model. Inside the development zone, surrounding the core and buffer zones of nature conservation, innovative approaches should be tested to strengthen a sustainable regional economy (KRAUS et al. 2014). Tourism can be seen as one important vehicle to achieve sustainable conservation and development outcomes, especially in UNESCO Biosphere Reserves (JOB et al. 2017).
For the evaluation of regional economic impacts of tourism, we must know: *how many tourists visit the biosphere reserve? How important is the biosphere reserve as a tourist attraction? And which economic impact does tourism generate in the biosphere reserve?*
In Germany there is so far no overall system to monitor the visitor numbers, structure or expenditures in protected areas. Therefore, in the years 2003-2005 a standardized method for the evaluation of economic impacts of tourism in German large scale protected areas was developed based on three case study regions (JOB et al. 2005). The method for the calculations is based on on-site countings to determine the accurate visitor number, short interviews to clarify the visitor structure (locals, day-tripper, overnight guests) and long interviews to gain more information on the motivation of visitors, the relevance of the protected area on their travel decision and the expenditures inside the region. Since 2006, the German Federal Environmental Ministry and the Federal Nature Conservation Agency as well as some of the local management bodies funded the application of the standardized method to all national parks and biosphere reserves by a series of research projects. While all German national parks (only exception is the 2015 designated Hochwald-Hunsrück Nationalpark) are already evaluated (JOB et al. 2016), the current research project focuses on the remaining German biosphere reserves. In evaluated national parks there are mostly no people living inside the PA and there are fewer entrance points which is why the calculation of the total visitor number is based on the on-site countings at the park entrances. In biosphere reserves it is more complex to differ between overnight guests, day-tripper or locals living inside the reserve. Therefore, we base our calculations of total visitor number on the percentage of locals, day-tripper and overnight guests which we received from short interviews and then weight the official tourism data in the biosphere reserve communities. For computing the regional economic impact of all our case studies in Germany we used value added analysis which is an easily understandable and comprehensible method and suitable for all individual segments of tourism (Job et al. 2013 & 2016).
Between 2011 and 2012 the first six biosphere reserves *Pfälzerwald, Rhön, Schaalsee, Spreewald, Südostrügen* and the *Thüringer Wald* were investigated. JOB et al. (2013) calculated around 20 Mio. visitor days per year resulting in a total gross revenue of almost one billion Euros for these six biosphere reserves. The share of visitors who visited the

biosphere reserves because of its protected area label varied between 3.5 and 21.5 percent. The affinity for the protected area label is an important indicator to underline the regional economic impacts of tourism in protected areas as it shows clearly the effects that were only generated because of the existence of the label.
Since 2016 we concluded the field work in the remaining biosphere reserves *Bliesgau, Oberlausitzer Heide- und Teichlandschaft, Schwäbische Alb* and *Karstlandschaft Südharz*, investigating at the moment the *Schorfheide-Chorin* and *Flusslandschaft Elbe*. In late 2018 we will also start the survey in the newly designated biosphere reserve *Schwarzwald*.

	Pfälzer-wald	Rhön	Schaal-see	Spree-wald	Südost-Rügen	Thüringer Wald	Bliesgau	Schwä-bische Alb
Visitor days	5 715 000	6 370 000	490 000	1 943 000	5 288 000	487 000	3 887 000	7 124 000
Overnight guests	39.4%	31.9%	17.6%	51.3%	93.3%	35.9%	16.5%	19.5%
Day guests	60.6%	68.1%	82.4%	48.7%	6.7%	64.1%	83.5%	80.5%
Visitors with high affinity for the BR	3.5%	13.7%	21.5%	8.7%	4.9%	11.1%	18.1%	14.6%
Gross revenue in Mio. €	228.98	185.56	11.61	89.97	379.27	12.73	93.49	168.70

The gathered data can be seen as an important baseline for a national integrative monitoring system for protected areas which is planned to be implemented in 2020. It will contain several indicators for the regional economic impacts of tourism (GEHRLEIN et al. 2014).

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Introducing the Outdoor Recreation Satellite Account

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Developing Economic Statistics for the U.S. Outdoor Recreation Economy

The Bureau of Economic Analysis (BEA), part of the U.S. Department of Commerce, produces official macroeconomic and industry statistics for the U.S. economy. Through a collaborative effort with outdoor recreation economists, industry experts, and multiple government agencies, the BEA recently released the Outdoor Recreation Satellite Account (ORSA), a set of new statistics quantifying the U.S. outdoor recreation economy for 2012-2016. For the first time, the ORSA provides an estimate of the outdoor recreation economy's contribution to current dollar gross domestic product (GDP), plus gross output, compensation, and employment by industry statistics.

The ORSA was built using BEA's comprehensive supply-use tables, which provide insight into the internal workings of the U.S. economy and detail the contribution of specific industries and commodities to GDP. The data detail the flows of goods and services purchased by each industry, the incomes earned from production in each industry, and the distribution of sales for each commodity. In practice, the ORSA is a rearrangement of the current data to isolate outdoor recreation spending and production.

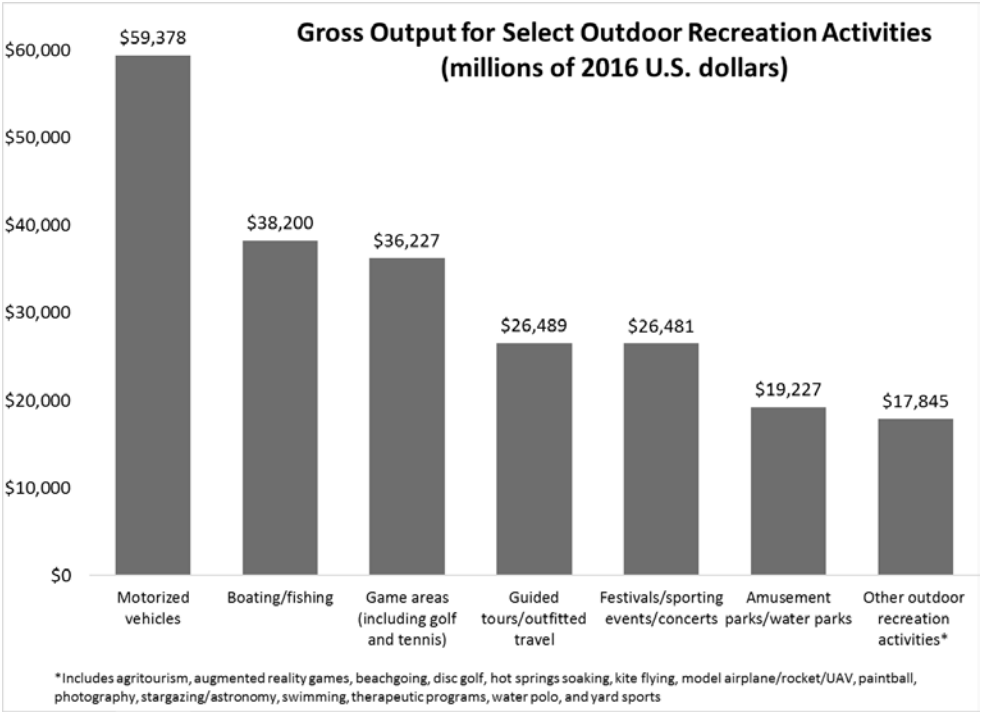
The term “outdoor recreation” can span many activities, from traditional activities like camping and hiking to more casual outdoor activities like gardening and outdoor festivals. To meet the diverse needs of data users, the ORSA was designed to capture both the conventional and comprehensive conception of outdoor recreation. The conventional viewpoint reflects more traditional outdoor recreation activities, such as hunting, hiking, camping, and fishing. More formally, conventional outdoor recreation is defined by BEA as “all recreational activities undertaken for pleasure that generally involve some level of intentional physical exertion and occur in nature-based environments outdoors.” The comprehensive definition attempts to encompass the broader viewpoint of outdoor recreation and is defined by BEA as “all recreational activities undertaken for pleasure that occur outdoors.” BEA staff worked closely with outdoor recreation experts from academia, government, and private industry to develop these definitions to serve as a foundation for the ORSA. These definitions also reflect public input received by way of a Federal Register Notice, a public email address, and multiple BEA blog posts directly soliciting feedback. The definitions allow for new activities that may emerge in the future to be included in any forthcoming iterations of the ORSA.

The goods and services ultimately included as part of the ORSA were chosen from BEA's comprehensive list of nearly 5,000 categories of goods and services. The commodities chosen as in-scope to the outdoor recreation economy reflect research and reports about the outdoor recreation economy as well as feedback from outdoor recreation economists and experts in the private sector, academia, and federal agencies that serve as stewards of public lands and waterways. The chosen commodities fell into two categories: (1) core goods and services purchased directly for outdoor recreation and (2) supporting goods and services that provide access to outdoor recreation. The core category includes gear, equipment, fuel, concessions,

maintenance, repair, and fees related to outdoor recreation activities. The supporting category includes trips and travel, construction, and government expenditures.
Gross output by industry and GDP (value added) by industry are both published as part of BEA's outdoor recreation satellite account, and both sets of statistics provide important insights into an industry's contribution to the overall economy. Gross output of an industry is the market value of the goods and services produced by an industry, including commodity taxes. The components of gross output include sales or receipts, other operating income, commodity taxes, and inventory change. Gross output differs from value added, which measures the contribution of the industry's labor and capital to its gross output. Value added is also defined as the difference between gross output and intermediate inputs. Value added summed across all industries is equal to GDP.

Prototype Outdoor Recreation Economic Statistics for the U.S., 2012-2016

In 2016, outdoor recreation accounted for 2.0 percent of current-dollar GDP, comparable in size to both the mining and utilities industries in the U.S. In addition, the average annual growth rate in 2012–2016 using current-dollars was 4.4 percent for the outdoor recreation economy versus 3.6 percent for the overall economy. The top industry contributor to GDP was retail trade, which contributed 22 percent of all activity to the total outdoor recreation economy in 2016. The next largest industries were accommodation and food services ($55.7 billion) and arts, entertainment, and recreation ($47.4 billion).
Total gross output for the outdoor recreation economy was $673.2 billion in 2016. Conventional outdoor activities represented 62 percent of core gross output. The single largest activity was motorized vehicles, with a gross output of $59.4 billion. The motorized vehicles category comprises RVs, which represent about half of the category's gross output, on-road and off-road motorcycles, snowmobiles, ATVs, and driving for pleasure. The next largest activities in 2016 were boating/fishing, game areas (including golf and tennis), and guided tours/outfitted travel. Trips and travel ($230.5 billion) and multi-use apparel and accessories ($92.6 billion) also proved to be significant contributors to outdoor recreation gross output in 2016.



In 2016, the outdoor recreation economy also generated 4.3 million jobs and $203.6 billion in compensation. The top four industries for outdoor recreation employment were retail trade (1.3 million); accommodation and food services (1.0 million); arts, entertainment, and recreation (0.9 million), and state and local government (0.2 million).

BEA developed this account under a 2-year interagency agreement with the U.S. Department of Interior and other federal agencies that serve as stewards of public land and waterways and as stipulated in the "Outdoor Recreation Jobs and Economy Act of 2016." After publishing the final national estimates in September 2018, BEA will endeavor to produce state estimates and other extensions to this satellite account subject to time, data, resource, and funding constraints.

The footprint of outdoor recreation on the Danish national economy

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Introduction

Politically, more focus has been given to the importance of nature areas for the Danish public's outdoor life in recent years – a focus culminating in the spring of 2015, when the Ministry of Environment published the first Danish national outdoor recreation policy (Miljøministeriet, 2015). In preparation of this policy, the national economic significance of outdoor recreation was called for. To meet this demand, the consumption related to the Danes' outdoor recreation activities were estimated based on data collected through a questionnaire survey. Knowing this consumption allows for 'input-output' analyses to calculate the proportion of Denmark's gross domestic product (GDP) that is attributable to the outdoor recreation activities of Danish households, and the related employment (Jacobsen et al., 2014).

Data collection

To ensure that respondents are on common ground, 17 specific outdoor recreation activities and physical areas (forest, beach, lake, city, etc.) were specified in the questionnaire. Instructions were given to ensure the accuracy of the expenses reported as incurred in connection with the activities – e.g. ensuring that the same expenses are never stated more than once and that the expenses were carried in Denmark during the last 12 months prior to the survey. The respondents were asked to indicate what expenses the *household* have had over the entire range of possible expenses – from transport, specialized clothing and overnight stays, to more durable consumer goods such as tents, bicycles, weapons, etc. adapted to the 17 specific outdoor recreation activities. The 17 activities were selected on the basis of e.g. previous national outdoor recreation surveys and what is generally considered as 'outdoor recreation' in a Danish context – in contrast to e.g. pure sport activities at designated grounds and mere transport.
The questionnaire was sent out to a representative sample of the adult Danish population through a polling company (Userneeds). In total, responses from 4,058 persons were received in the period from Mid-October to Mid-November 2013.

Input-output model

The data basis for the input-output model is derived from the overall input-output table for the Danish economy, divided into 117 professions. Across these industries, the contribution of the activity-creating consumption can be divided into *direct* and *indirect* effects. Initially, activity-creating consumption contributes to direct effects in the industries that deliver the requested goods and services. In order, for the industries which benefit from the direct effects, to deliver the desired production they need additional input from a number of other

industries, and thereby creating the indirect effects – whereby the value of the total production always will exceed the activity-creating consumption.

Results

Consumption

In 2013 (September 2012 - September 2013) Danish households spent 11,157 DKK on average on outdoor activities in Denmark, with an estimated total consumption of around 29 billion DKK at the national level (Table 1). Equipment expenditure is the largest item (just over 11 billion DKK), followed by clothes and shoes (almost 3.5 billion DKK). Analysing consumption by activities (Table 1), it is apparent that the largest consumption falls within the category 'Nature trip' with a consumption of just 6.8 billion DKK, followed by sailing at just 5.7 billion DKK. However, it should be noted that more than half of the expenses related to sailing are accounted for by the trade of used boats between private individuals. This does not create economic activity – in a national economic sense.

Table 1. Footprint of domestic outdoor recreation consumption on the Danish national economy in 2012-2013, ranked by consumption. (Million DKK and number of employees. 1 € ≈7.5 DKK; 1 US$≈6 DKK).

	Consumption	Activity creating consumption	Induced effect on Production	Induced effect on GDP-contribution	Induced effect on Employment	Induced effect on Fulltime
Nature trip	6.809	5.023	8.476	5.200	11.727	8.771
Sailing	5.729	1.989	3.205	2.264	3.432	2.716
Cycling	4.960	2.242	3.669	2.620	4.874	3.739
Horseback riding	2.087	1.511	2.452	1.591	3.059	2.515
Study/exp. nature	1.818	1.169	1.954	1.277	2.602	1.977
Hunting	1.782	1.222	2.142	1.351	3.019	2.491
Bathing	1.420	1.043	1.759	1.099	2.393	1.798
Jogging	1.397	870	1.428	989	2.216	1.649
Fishing	1.315	622	1.022	736	1.525	1.147
Mountain biking	616	263	429	315	566	435
Canoeing/kayaking	496	288	482	319	633	489
Flying	145	104	172	117	228	178
Paintball	126	78	129	93	194	144
Roller-skating/skiing	122	74	120	82	191	141
Nordic walking	108	70	115	79	175	130
Skiing/ice skating	90	57	92	62	139	104
Wind- & kitesurfing	77	37	62	48	74	58
Total	**29.096**	**16.662**	**27.708**	**18.239**	**37.047**	**28.483**

Footprint on the national economy

But what is the impact of the 29 billion DKK spent on outdoor recreation on GDP and employment? The input-output model utilizes the national account's information on which industries that deliver, produce and/or trade the individual goods and what economic and employment activity it causes. However, the production and employment effects of the total consumption of 29 billion DKK will depend on the composition of the consumption. Therefore one has to identify the *activity-creating consumption*. To do so, it is necessary to withdraw a number of contributions which are not included in the input-output model, namely: 1) direct imports related to outdoor recreation spending of approx. 4.2 billion DKK, 2) VAT of approx. 4.5 billion DKK, 3) taxes of approx. 270 million DKK, and finally 4) private (used) trade of almost 3.5 billion DKK. Leaving an activity-creating consumption of just over 16.6 billion DKK (Table 1).The industries supplying goods and services for the good 16 billion DKK creates indirect effects in terms of demand in their respective productions. Thereby, so-called multiplier effects occur throughout the Danish economy, which means that the total impact of outdoor recreation consumption can be estimated at just

over 27 billion DKK (Table 1). The GDP contribution is calculated to 18.2 billion DKK or approx. 1 % of the Danish GDP in 2012. The total production due to outdoor recreation consumption gives rise to an employment rate of just over 37,000 people, or 1.2 % of the total number of employed (equivalent to 28,500 full-time employees). Breaking down the figures to specific outdoor recreation activities, it is evident that the more general 'Nature trip'-activity is the most significant by its contribution of close to 1/3 to the overall national economic impact of outdoor recreation.

Multiplier effect

A comparison of the importance of the various recreational activities for the Danish economy – independent of the level of activity – can be achieved by considering the so-called multipliers. Considering e.g. 'Nature trip' it turns out that for every 1 million DKK consumed within this activity, a production of 1.12 million DKK is generated in the Danish economy – a contribution of 0.69 million to the GDP and the employment of 1.55 persons. Generally, the secondary effects of 'Nature trip' are among the highest, while the lowest derived effects are seen for 'Cycling' and 'Mountainbiking', due to high import rates.

Closing remarks

A comparable Swedish study of spending on outdoor recreation in 2009 reaches a consumption of just over 72 billion SKK by the Swedish households (Fredman et al., 2010). When converting to DKK and taking the difference in population-size into account, the Swedish consumption correspond to 29.5 billion DKK. In this way, the total consumption in the two analyses turns out to be astonishingly similar; however, significant differences occur when comparing the individual consumption categories and types of activities.

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Measuring Tourism in Public Natural Parks in Japan

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Introduction

Managing public lands for recreational use requires accurate measurement of visitation. Counting visitors is relatively easy if the land is entirely owned by the government authority and access can be controlled, as is often the case for national parks in the United States. National parks in Japan however are relatively recently designated public park zones that often overlap areas where people already live. In such places, it is difficult to separate usage of parks by tourists from the coming and going of residents living inside the zone.
This study introduces methods of measuring visitors in Japanese public natural parks, and discusses associated problems and areas for future efforts in park management. We also discuss the use of data to estimate economic impacts from recreational use by visitors.

Measuring visitors at Natural Parks in Japan

The Japanese natural park system differs considerably from that in the United States. Because of difficulties in finding vast areas of uninhabited land suitable for government to own for the purpose of preservation, Japan designates park zones over a mixture of public and private land. Areas of public parks by ownership are summarized in Fig. 1.

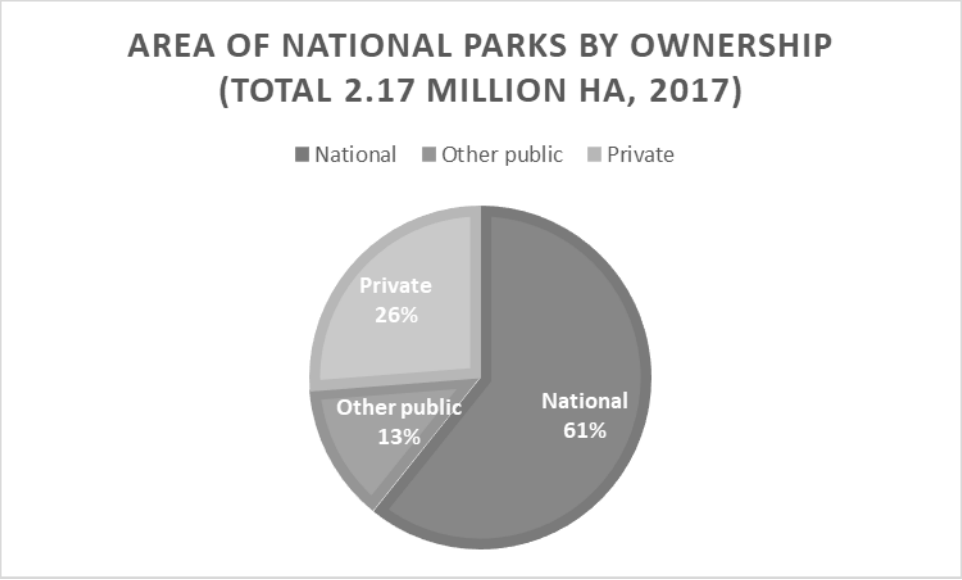

Fig. 1. Area of national parks by ownership (Source: Ministry of the Environment)

There are three kinds of natural parks in Japan: national parks, quasi-national parks, and prefectural parks. National parks are the most highly regarded among these. Since the first designation in 1934, there is now a total of 34 national parks in Japan, managed by the Ministry of the Environment (MOE). (MOE, 2018).

National park visitors are counted by local governments, and counts are gathered at MOE for the preparation of annual reports. The choice of method for counting visitors is largely left to the discretion of local governments. Among the types of park, national parks are the most well monitored. Measurement policies may differ from one national park to another, though the following measurements are commonly used:

- Counting visitors at the visitor center
- Self-reporting, such as a climber's lists at the entrance of mountain climbing trails
- Periodic monitoring by the local government

We consider these three methods, and discuss related issues and areas for future advances.

Counting visitors at the visitor center

Most national parks have a few visitor centers within each park zone. Methods for counting visitors may differ from one center to another. The most common way of counting visitors is a self-reporting visitor sheet at the visitor center. These sheets allow visitors to voluntarily provide information about their visit, such as the date, name, place of departure, number of people in the party, etc. This method can collect rich visitor information, however accuracy and consistency are potential issues: not all visitors voluntarily disclose the same information. An increasing number of visitor centers also have installed electronic counters, which can help verify counts of visitors. However, the use of counters can overstate visitation if re-entry by the same visitor is significant; , a visitor could also be counted at more than one visitor center.

Self-reporting at the entrance of trails

There are self-reporting forms set at the entrance of many mountain trails in public parks. Reporting is voluntary and it appears that a significant number of people choose not to use the system. In addition, not all trails have self-reporting installed. There is also the issue of consistency in information that is reported.

Periodic monitoring

Local governments periodically monitor visitors at natural parks. As people often reside within the park's boundaries, parks typically do not have operating hours or closed seasons. For this reason, the timing of monitoring varies greatly among parks. Some remote parks with many access roads used by both tourists and local people have no good way to distinguish between park users and residents. One example is Sanriku Fukko NP, nearly 150 mi in length along the Pacific in Northeastern Japan.

This study also investigates how visitors are monitored by authorities for quasi-national parks and prefectural parks, and finds that these authorities have not developed any better monitoring systems than are in use at national parks.

Issues on economic evaluation and discussion

The importance of developing visitor statistics and evaluating economic values or impacts of parks is widely acknowledged. Nevertheless, these activities are not widely undertaken by MOE. On the management side, understanding visitor activities, including visitor spending patterns, is important for considering how much effort should be devoted to managing parks, and expressing parks' contributions to local economies.

Traditionally, economic values of non-tradable goods such as parks are estimated from actual user activities (so-called revealed-preference studies), or by asking potential users about their preferences across a range of scenarios (stated-preference studies). Results from this type of analysis provide the public with an estimate of public benefits generated in return for tax

dollar expenditures on the park management. However, the high-cost of surveys is often an issue.

We consider that information made available on the internet (such as social networks and travel sites) is an inexpensive way to gather data, and may be useful in estimating visitor spending, and the resulting economic contributions from visitors. Internet services where people post public reviews of what they purchased or experienced provide information on actual consumption (revealed preferences) as well as people's preferences. Information contained in postings may also reflect underlying utility functions. For non-marketed goods like public goods and common resources, uncovering the factors affecting people's quality of experiences is crucial for the efficient management of resources.

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Measuring the spending of visitors to U.S. national forests over two decades

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Introduction

Understanding the economic connections between U.S. national forests and towns and cities surrounding those forests has been of interest since the establishment of the National Forest System (NFS). Historically, extractive uses, such as timber production and mining, were the primary drivers of local economic activity. With declining national forest timber harvest levels and changes in commodity markets, the economic significance of those activities, especially timber production, has lessened in recent decades. Recreation, and the associated spending of visitors to national forests, is now the primary driver of economic activity from use of national forests in many communities and across the entire NFS.

Understanding the magnitude and characteristics of spending by individuals recreating on national forests is key to describing how recreation use of the NFS affects the economy, both in communities around national forests and nationally. We have been conducting long-term research on recreation visitor spending patterns as part of the Forest Service National Visitor Use Monitoring (NVUM) Program. In this paper, we describe our approach to estimating visitor spending patterns and magnitude and report on the observed stability in spending patterns over time.

Data and Analysis

The Forest Service NVUM Program has the duel goals of quantifying the amount of recreation use on the NFS and describing the characteristics of visitors to the NFS. Visitor characteristics are measured using data from a survey administered by trained interviewers. Days and locations where visitor interviews occur within individual national forests are selected via a stratified random sampling approach as part of NVUM's goal to measure recreation use. Visitor interviews are conducted throughout the calendar year. The NVUM Program rotates through individual administrative units in the NFS over a five-year cycle.

Under NVUM, all contacted individuals who are on the national forest for recreation (as opposed to work, passing through, or some other reason) and who are ending their recreation visit that day are eligible to participate. All interviewees complete a "basic" questionnaire that gathers general information about the recreation visit, the trip away from home, and visitor demographics. Approximately 1/3 of interviewees are also randomly selected to complete a supplemental questionnaire that is used to gather information on their trip expenditures. Visitors are asked to report spending made within 80 kilometers of their recreation destination in 10 expenditure categories associated with their present trip. Visitors are also asked to report their total spending during the entire trip away from home. Spending on durable goods, such as backpacks, boots, trailers, and boats is excluded.

Basic surveys are administered to about 20,000 national forest recreation visitors each year. About 6,000 of those visitors also complete the supplemental questionnaire gathering information on visitor expenditures. Data collected in each year are aggregated across NVUM years so that the most recent data from each NFS unit are represented in the visitor spending dataset. Reported spending is price adjusted to a common year for analysis. Cases

are removed from the dataset as outliers or contaminants following several rules detailed in White (2017).

Our approach to estimating average visitor spending is based on the principles detailed in Stynes and White (2006). Key among those principles is estimating average visitor spending within a mutually exclusive set of trip types. Visitors are first classified into three groups: 1) day trips to the local area, 2) overnight trips to the local area where the visitor stays on the national forest, and 3) overnight trips to the local area where the visitor stays off the national forest. Visitors in those three groups are then divided into "local" and "non-local" groupings based on whether the travel distance from home was more or less than 80 kilometers. Finally, a seventh group is formed comprised of all those visitors who reported their primary reason for initiating the trip was something other than visiting the national forest.

Results and Discussion

Pooling data across all NFS units, visitor spending in communities around national forests ranges from an average of $36 USD for those on short-distance day trips to an average of $580 USD for those traveling longer distances and staying overnight in the local area in commercial lodging. For those on day trips, fuel constitutes the greatest expense followed by food. For those on overnight trips, lodging expenses and food account for the greatest expenditures. In general, spending on entry fees, sporting goods, and souvenirs comprises a small component of overall trip spending. Those whose primary purpose for traveling away from home was something other than recreating on the national forest spend about $422 USD in communities around national forests. Because that spending is only indirectly related to the presence of the national forest, it is typically excluded entirely or partially from estimation of the economic activity resulting from NFS recreation.

The recreation activity of the visitor explains relatively little variation in visitor spending once trip type is taken into account (White and Stynes 2008). Within trip types, the spending of visitors engaged in specific activities is typically not statistically or practically different from the average spending computed for visitors engaged in all activities combined. Alpine skiing and snowboarding is an exception to this general pattern. Spending by visitors engaged in that activity is between 25% and 65% greater than that of visitors engaged in other activities.

There has been little change in average spending patterns of visitors to the NFS over recent years. Once corrected for inflation, spending average totals within trip types have remained generally stable between 2005 and 2016. Further, the patterns in spending across expenditure categories within individual trip types has remained generally consistent through time.

For estimating the economic contribution of NFS recreation use, total visitor spending is estimated by combining the average visitor spending figures with the NVUM visit estimate, an estimate of the shares of those visits that occur in each trip type, and the average number of people per party within each trip type. That total spending estimate is then applied as a final demand shock within an economic model to calculate the economic contribution of NFS recreation visitor spending.

Table 1—U.S. national forest visitor spending averages by trip-type segment and expenditure category, dollars per party per trip[a]

Spending	Nonlocal			Local			Non-	All
categories	Day	OVN-NF	OVN	Day	OVN-NF	OVN	primary	visits[b]
				USD				
Motel	0.00	44.77	203.85	0.00	6.39	51.62	139.67	53.96
Camping	0.00	27.79	13.68	0.00	28.25	23.01	12.23	7.43
Restaurant	14.77	27.47	116.41	5.66	7.65	32.43	93.23	37.63
Groceries	10.67	55.09	72.52	6.62	71.54	59.62	49.85	29.68
Fuel	30.20	62.27	82.47	15.43	46.59	58.05	62.71	38.74
Other transportation	0.58	1.34	4.98	0.16	0.04	1.19	3.35	1.45
Entry fees	4.12	7.13	12.85	2.70	4.51	5.12	7.58	5.38
Recreation and entertainment	2.96	7.36	33.31	1.01	2.01	3.61	21.84	9.38
Sporting goods	3.15	10.77	13.75	3.83	11.78	9.48	7.91	6.62
Souvenirs and other expenses	1.93	7.73	25.87	0.60	1.10	11.48	23.74	8.62
Total	**68.39**	**251.74**	**579.70**	**36.00**	**179.86**	**255.60**	**422.12**	**198.87**
Sample size (unweighted)	2,112	3,600	2,289	9,225	1,388	295	3,955	22,864
Standard deviation of total	72	399	714	53	199	325	653	n/a

[a] Outliers are excluded and exposure weights are applied in estimating spending averages. All figures expressed in 2014 dollars. These averages exclude visitors who claimed their primary activity was downhill skiing. OVN = overnight; OVN-NF = overnight visitors staying on the national forest.

[b] The all-visit averages are computed as a weighted average of the columns using the national trip segment shares for nondownhill skiing as weights.

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U.S. Federal Recreation: Diverse Lands, Diverse Agencies – Comparing Agency Methods of Monitoring Visitation and Estimating Economic Impacts

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Introduction

U.S. Federal lands and waters provide recreational opportunities to nearly 900 million visitors a year, resulting in billions of dollars of spending and related economic impacts. These recreation areas encompass over a billion acres, managed by a diverse set of agencies for a variety of uses. This presentation describes similarities and differences across the methodologies used by U.S. agencies to estimate visitation to recreation areas under their jurisdiction; the amount and patterns of related spending by those visitors; how this spending affects local economies in terms of economic impacts; and challenges to reporting nation-wide totals.

Background

U.S. Federal recreation areas are managed by the seven agencies that make up the Federal Recreation Council (FRC): the National Park Service (NPS), the Bureau of Land Management (BLM), the U.S. Fish and Wildlife Service (USFWS), the Bureau of Reclamation (Reclamation), the U.S. Forest Service (USFS), the National Oceanic and Atmospheric Organization (NOAA), and the Army Corps of Engineers (USACE).

FRC agencies use data on recreation to consider economic values and economic impacts; to inform plans and policies for management, transportation, and infrastructure; to anticipate management issues related to visitor impacts on recreation resources; and to efficiently allocate personnel and management resources across sites. Local governments, business communities, and researchers are also interested in this information to inform a wide array of activities related to visitation.

Characterizing visitation on Federally managed lands is a challenge given the diversity in the types of sites and activities available to visitors. Many sites have multiple unmonitored access points in remote areas. As such, visitation monitoring and approaches for data collection differ across agencies and sites.

Visitation data can be collected using on-site or off-site methods. Off-site methods typically involve a survey, with respondents asked to report their number of trips to specific destinations within a given time period. These surveys often rely on memory, and like other surveys of the general population appear to suffer from declining response rates. Furthermore, it may be a relatively small portion of the general population that visits Federal recreation sites, making it difficult for even a large random sample of households to identify a statistically sufficient number of visitors.

On-site methods count visits as they occur at the recreation areas, avoiding so-called response bias or recall bias, however these approaches have other challenges, including (1) the expense and resources required for monitoring and counting visitation at sites where recreation is widely dispersed; and (2) the difficulty in training field personnel, and verifying count consistency at the different types of sites found across the country.

Data and analysis

Table 1 reports data for 2016 for the FRC agencies: visits, visitor spending, related economic impacts (value added), and the recreation acres managed by each agency. The extent of an agency's management area does not necessarily determine the number of recreation visits the agency will receive, or the economic impact of those visits. For example, NOAA and BLM together manage for 59 percent of total recreation acreage, while visitor spending to these areas accounts for 16 percent of the total. Conversely, 67 percent of recreation visits were to sites managed by NPS and ACOE, which together manage 9 percent of recreation acreage. The most visitor spending (37 percent of the total) is related to visits to NPS sites, which make up 8 percent of recreation acreage.

Table 1 also illustrates differences in the type of spending associated with a visit to each agency's lands. For example, comparing agency-wide visitor spending to visits implies an average of about $33 per visit to a Reclamation site, compared with $62 per visit to a USFS site.

Table 2. U.S. Federal Recreation, by Managing Agency (2016)

Federal Agency	Abbreviation	Managed Area (million acres)	Recreation Visits in 2016 (millions)	Visitor Spending 2016-$ (billions)	Value added 2016-$ (billions)
National Park Service	NPS	84	331	$18	$20
Bureau of Land Management	BLM	250	65	$3	$4
U.S. Fish and Wildlife Service	USFWS	150	50	$2	$3
Bureau of Reclamation	Reclamation	6	30	$1	$2
U.S. Forest Service	USFS	193	146	$9	$11
National Oceanic and Atmospheric Organization	NOAA	384	n/a	$5	n/a
Army Corps of Engineers	USACE	12	267	$11	$13
Total		**1,079**	**889**	**$49**	**$53**

Sources:

Area: Leggett et al., 2017; National Marine Sanctuaries website: sanctuaries.noaa.gov

Visits and Spending: Cline, S., and C. Crowley, 2018

Notes:

Visitation estimates are for the 2016 fiscal year (Oct-Sep), except that:

NPS uses the 2016 calendar year (Jan-Dec);

USFS uses an annual estimate for the period FY 2012 – FY; and

NOAA does not estimate annual visitation.

One acre = 0.4 hectares

Results and discussion

We find that FRC agencies tend to rely on on-site methods to estimate visitation rather than off-site surveys. Agencies tend to use automated vehicle and pedestrian counters where practical, as well as various administrative data sources such as campsite registrations and permit applications. Agencies differ in the degree to which data collection is centrally coordinated; the level of documentation of the approach used; the spatial and temporal resolution of the estimates; the method and frequency with which conversion factors for

automated counters are updated; the degree to which double counting of visits is addressed; the definitions used for various visitation metrics; and the provision of public access to the statistics.

Agencies would likely benefit from improved documentation, guidance, training, and interagency coordination of current methods for data collection and reporting. For example, there is variation in definitions of key concepts (e.g., what constitutes a *visit*, or *visitor-day*), activities considered, the degree of autonomy in developing methods (i.e., site-level versus agency-level), and the spatial and temporal resolution of data.

There is also potential for improving current methods of data collection, and exploring new methods. For example, visitors who enter and leave a site within a single day may be double-counted; this could be avoided by counting only "last-exiting" visitors. More sophisticated automated counters could provide richer data on temporal patterns, and may provide an option for reporting data wirelessly, reducing the need to access counters in person.

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Post-data collection uses of visitor monitoring data 2

Using visitor monitoring data to manage mountain-biking use in the Wienerwald Biosphere Reserve, Austria

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Introduction

Urban and suburban landscapes are heavily used by recreationists and other land users (Arnberger & Eder, 2012). Mountain biking in such landscapes provides many positive effects for the bikers, but may also negatively impact other recreational users, nature or management activities of landowners. Natural resource managers, therefore, need visitor monitoring data for decision making. Since many years, mountain biking has been a very popular activity in the Wienerwald UNESCO Biosphere Reserve (WBR) which directly borders the city of Vienna with its 1.9 m inhabitants (Arnberger & Eder, 2007; Hirnschall *et al.,* 2012). More than 800 km of mountain bike trails have been established in the biosphere reserve; however, many of these trails do not satisfy the needs of mountain bikers. During the last years, various non-designated mountain bike single trails were developed and illegal bike areas with ramps and jumps were built, even in the core zones of the WBR. These off-trail uses and new facilities evoked conflicts with other area users, land owners and nature conservation. Since 2014 forest owners, mountain bikers, local tourism, and WBR management work together to develop mountain biking facilities in a sustainable way and according to the goals of the WBR (Koeck & Brenner, 2015). A monitoring of mountain-biking use was established in one of the biking hot spots to deliver information on use intensities and to test the success of the reorganization of mountain bike trails and areas.

Study Area

The WBR extends across the two federal provinces of Vienna and Lower Austria and covers an area of about 100,000 hectares. Within the WBR 37 areas are designated as core zones, in which nature protection is the main goal. Recreation use is possible along officially marked trails, whereas mountain biking is not allowed in core zones and biking use limitations exist for specific day times depending on season. For example, bicycling is not allowed in the WBR forests between November and February. In 2016, the mountain biker association transformed the former illegal downhill bike area in Weidlingbach (near Vienna) into a legal downhill trail area in accordance with nature conservation regulations and in cooperation with landowners and WBR management.

Methods

On behalf of the WBR management, mountain bikers were counted along four trails between June 2015 and July 2017 before and after the redesign of the bike area to get information about the intensity and the temporal use patterns of different trail types and the effects of the redesign of the bike trail area. The permanent counting was done by electronic counting devices which were installed at designated and non-designated trails around Weidlingbach. Induction loops, heat detecting sensors (at downhill trails), and a tube sensor counted bicyclists. All counting devices were calibrated by human observer counts. The data was downloaded once a month, transferred into a database and checked for plausibility.

Results

Results indicate that bikers use the trails all over the year; the highest use intensities were recorded between April and September. The counters registered most use at the official mountain bike trail, but counted also high numbers of users at the illegal trails. Most mountain bikers were counted on Sundays and public holidays, followed by Saturdays and Fridays. On working days, most use occurred in the evening hours, while weekend use peaks were counted before and after noon. In summer time, mountain bike use started early in the morning and lasted till sunset, while in winter and spring, most visitors cycled between 10:00 and 16:00. Many counts were registered outside the official day times and months for bicycling. The counts also revealed that biking use outside the official day times and months slightly dropped between 2015 and 2017. The new bike area with its two downhill tracks was heavily used in the first months of its existence, while biker numbers slightly dropped at the counter of the core zone.

Conclusions

The study showed that mountain bikers use the bike area and its surroundings during the whole year and day, although biking is not allowed during specific months and day times (Reimoser *et al.* 2008). However, ongoing information efforts seem to be successful because of the drop of illegal biking use. The study also showed that the new bike area with its downhill trails attracted many bikers, thereby deflecting some use from a core zone of the WBR. Results of this monitoring built not only the basis for an effective management of mountain biking and provided basic data for evaluating the acceptability of the trail area, but also showed whether the new bike area is deflecting biking use from core zones of the WBR. Ongoing biker use monitoring should be carried out to further investigate the effects of the new trail area, redesigns of the biker trail network in the region, and e-mountain biking.

Acknowledgements

The authors thank the forest owners and the biker association Wienerwaldtrails for their cooperation.

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Status of, issues with, and manager attitudes toward visitor monitoring in Japan's national parks

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Introduction

Monitoring of visitor behavior and attitude is indispensable for management of protected areas, including national parks, and accurate information regarding such is thought to lead to prudent management (Cessford & Muhar, 2003). It is essential to know the number of visitors and their trends, motivation, and satisfaction. That information is useful for making decisions concerning the planning and management of parks and is essential for sustainable and appropriate use of these protected areas (Hornback & Eagles, 1999).

The number of visitors in Japanese national parks has been compiled and published since 1951. It just has added tourist statistics reported by municipalities. It is known that park managers and person charge of municipalities have doubted the information. In recent years, infrared traffic counters have been installed in the national parks. However, a few problems remain concerning reliability, usability, software, and durability.

This study aimed to clarify the current condition of visitor monitoring in Japanese national parks and to understand the issues and attitudes of park managers.

Method

In January 2013, we distributed survey forms regarding visitor monitoring in the national park to the regional offices and management offices of the national parks. By March of the same year, 65 managers replied by e-mail, with 64 of these responses considered valid.
We queried the method of visitor monitoring in each park, devices, data utilization, the error correction method, and problems with monitoring. Besides, we asked the recognition of the importance of visitor monitoring and the desirable research items that park managers considered.

Results

More than 70% of park management offices were surveying the number of visitors. Whereas the most popular method was using infrared counters, direct observation was still conducted in some parks. Half of the parks corrected counting errors, such as double counting or midnight counting of infrared counters. The data on the number of visitors were beneficial for analyzing trends, planning for facility improvement, and examining management measures.

Infrared counters were installed in 41 locations, and 90% of them were "LR counters," which were developed in Japan. Managers reported many problems concerning the infrared counters, including overcounting, unlikely counting, the difficulty of access to installation locations, difficulty in obtaining power supply, and a shortage of staff who maintain the counters and collect the data.

Most park managers realized the importance of visitor counting and periodical questionnaire surveying to their park. However, they were concerned with the lack of budget and personnel, low reliability of survey methods, noncooperation with other agencies, and lack of research and analysis skills (Figure 1). In addition to the number of visitors, more than

70% of park managers considered it desirable to survey the motivation, behavior, and satisfaction/dissatisfaction of visitors.

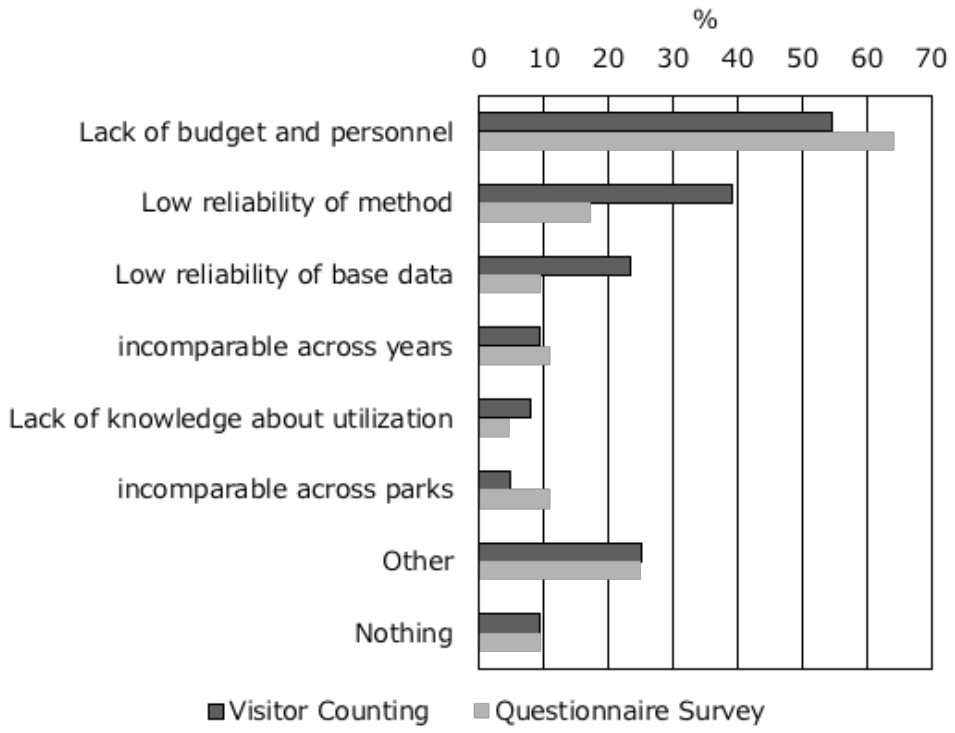

Figure 1. Concerns about monitoring by park managers

Conclusion

The number of infrared counters installed in Japanese national parks has been increasing. Thus, it is necessary to develop and supply devices that can obtain stable data and learn device mechanisms and correction methods. Furthermore, because questionnaire surveying is occasionally conducted as a data collection method, uniform questions and formatting for such should be adopted nationwide.

Requests for the implementation of visitor monitoring in each national park will likely increase, owing to an increasing number of visitors. Like in Nordic countries, it is necessary to develop manuals for monitoring (Kajala et al., 2007), promoting cooperation among experts and research institutes, hiring social scientists, and increasing training opportunities for park managers.

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Experimental Long-Term Evaluation of Measures to Reduce Biker-Hiker Conflicts – an Example of an Urban Forest in Switzerland

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Introduction

Intensity and diversity of leisure activities in outdoor areas have increased considerably in Western societies. Because of this growing use of natural resources and the variety of motives and aims of leisure activities, ecological impacts and social conflicts may arise in outdoor recreation. Since forests are often the only open spaces available for outdoor recreation – especially in densely populated areas –, this issue is particularly accentuated in urban forests. Accordingly, urban forests are often the subject of conflict studies (Schmithüsen and Wild-Eck 2000; Seeland et al. 2002; Janowsky and Becker 2003; Hegetschweiler et al. 2007).

A distinct example for the conflict potential of leisure activities is biking in forests. Studies have shown that conflicts between bikers and hikers are reported frequently (e.g. Hunziker et al. 2012; Rupf et al. 2014; Wyttenbach and Rupf 2014; Pickering and Rossi 2016), in particular in urban forests. This also happened in the forest at the Uetliberg mountain close to Zurich, where until 2005 hikers and mountain bikers were increasingly getting in each other's way.

As a measure to deal with the conflict, the City of Zürich 2005 built a bike trail to keep the bikers on a separate route. In addition, an accompanying information campaign was launched, and the transport of bikes on the train up to the Uetliberg mountain, where the trail starts, was banned.

The aim of our study was to evaluate these management measures. To reach this aim, the following research questions had to be answered:

1. How was the *acceptance* of the management measures (trail, communication, bike-transport ban) taken by the authorities?
2. What was the actual *effect* (short and long-term) of the management measures regarding resolution of conflicts between hikers and bikers?

Methods

To answer research question 1, the conduction of a survey after the implementation of the management measures would have sufficed. To answer research question 2, an experimental design had to be applied. Therefore, three surveys were conducted: a first one 2005 before the implementation of the management measures, a second one 2006, more than one year after the implementation, and a third one 2017, 11 years after implementation.

During survey 1, 1000 highly standardised questionnaires were handed out at several locations and at several representative weekdays on the Uetliberg mountain to visitors (bikers and hikers) who returned the questionnaire by post (N= 507). For the second survey, we sent

the questionnaire (consisting of the same questions regarding perceived conflicts but also including questions regarding acceptance of management measures) to the participants of survey 1 (if the address was provided). 317 participants returned the questionnaire in this round. The distribution of the questionnaires of third survey 2017 was conducted again on-site, as it was not possible to contact the same people from the first two rounds again after such a long time. 499 participants returned a completed questionnaire by post.

The data were analysed by means of the statistics package SPSS including descriptive measures, factor analyses to reduce data complexity, cluster analyses to explore specific visitor groups and multi-variate models with respective tests such as ANOVA, F-Tests, t-tests, etc. The latter procedures served to examine the significance of differences and effects allowing to evaluate the success of the measures taken.

Results

The results show that the management measures helped to defuse the conflicts between the hikers and the bikers already after a short period (2005-2006) and even more after a long period of time (2005/6-2011). Regarding research question 1, the measures taken were highly accepted 2006 and have been continued to be viewed positively 2017. Only the ban on transporting bikes on the Uetliberg by train was rated 2017 significantly worse than in 2006. Regarding research question 2, also clear positive effects on (perceived) conflicts between hikers and bikers can be observed: being disturbed by bikers was mentioned significantly less frequently 2006 than 2005, and again less frequently 2017 (Fig. 1) even though more of them were using the forest. The impressive reduction of perceived conflicts consequently resulted in an increasing satisfaction of the visitors at Uetliberg forest with their stay.

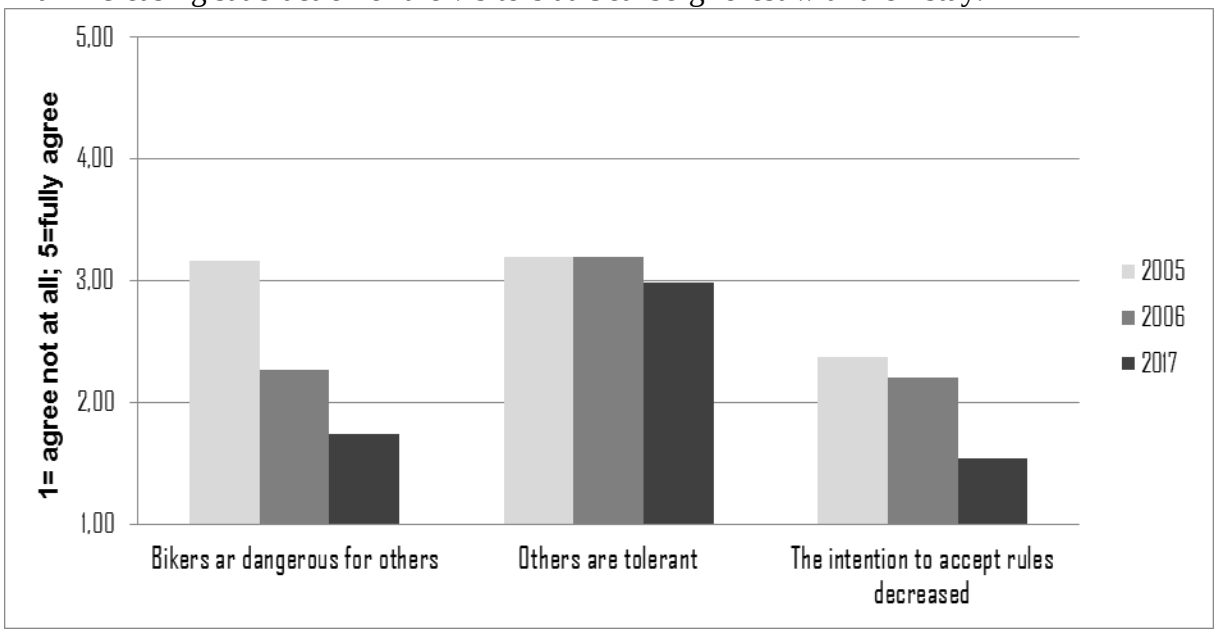

Figure 1: Level of agreement to the Likert-scale items serving to measure the degree of perceived conflicts between bikers and hikers. Differences between 2017 and 2006 were all highly significant (ANOVA post hoc test: $p \leq .001$) whereas only the perceived dangerousness was significantly reduced from 2005 to 2006.

Discussion

Despite the reduction of conflicts and resulting gain of visitations satisfaction caused by the management measures taken, the development at Uetliberg is not only a success story that increases happiness of all people involved. In particular, the (rather young) downhill bikers

could not be included into the survey because the bike-transport ban has led to them no longer visiting the Uetliberg. Thus, the high overall satisfaction of the visitors with the situation on the Uetliberg could also be biased by the lack of responses from downhill bikers. Nevertheless, the evaluation has shown that the measures taken have been successful and that such measures can be recommended to other areas where biking and hiking highly compete in using the existing infrastructure.

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Making use of visitor incident data in Karijini National Park: A Western Australian case study

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Background

Protected areas in Western Australia are considered a significant resource-base for tourism and outdoor recreation. However, in a context where one would expect enjoyment and adventure, visitor incidents and accidents are surprisingly common, ranging from minor injuries due to tripping and slipping accidents up to experiencing severe trauma or death. With increasing visitor numbers and a heightened potential for serious incidents occurring, Eagles (2014) recommends that visitor risk and safety management represent a major component of overall visitor management capacities of park agencies.
Management of visitor safety on lands and waters managed by public authorities is important as incidents involving harm to people may involve litigation and compensation requests. In order to prevent, or at least reduce, future injury and litigation, it is critical for protected area managers to learn from past events by identifying why and under which circumstances these incidents occurred. This paper illustrates, using Karijini National Park in Western Australia as an example, how the information obtained from incident recording and analysis systems has been used to inform and justify management decisions.

Incident recording in Western Australia

Visitor incidents are defined as adverse events that required first aid or resulted in serious injury, illness, or death of a visitor involving the direct use of, or interaction with, managed park facilities or resources (Golder, Tuling & Krueger 2002). In Western Australia, the Parks and Wildlife Service increasingly acknowledges the recording and analysis of incidents as an effective way of gaining a deeper understanding of the hazards in various park contexts in order to develop and refine visitor risk assessment and management processes. The recording of both severe and less severe incidents is seen as important information input providing a learning platform for future scenario considerations. From this, incident factors can be identified, and organisational structures reviewed, providing an empirical justification to change policy and procedures, with a commitment to continuously improve incident reporting practices in order to comprehensively understand their occurrence in different park contexts (Gstaettner, Kobryn, Rodger, Phillips & Lee *in press*). Most recently, in an attempt to replace the paper-based incident reporting system associated with time-intensive approaches to incident analysis, the agency upgraded to a ‘Rapid Incident Reporting system’, combining occupational safety and health, fire, and visitor risk management into one accessible electronic database.

Karijini National Park

The Karijini National Park is a remote park in north-western Australia, approximately 1,500 km from Perth (Figure 1). Karijini is one of about 100 national parks managed by the Parks and Wildlife Service, and is renowned for its spectacular gorges (e.g. Dales, Weano, Kalamina and Hamersley Gorges). A range of recreational opportunities exist in the park such as hiking, sightseeing, nature study and camping. According to internal data based on the agency's visitor information statistics collection system (VISTAT), there has been a steady increase of visitation over the last few years, from just 121,420 visitors estimated for the 2011/12 financial year to 313,850 visitors in 2016/17.

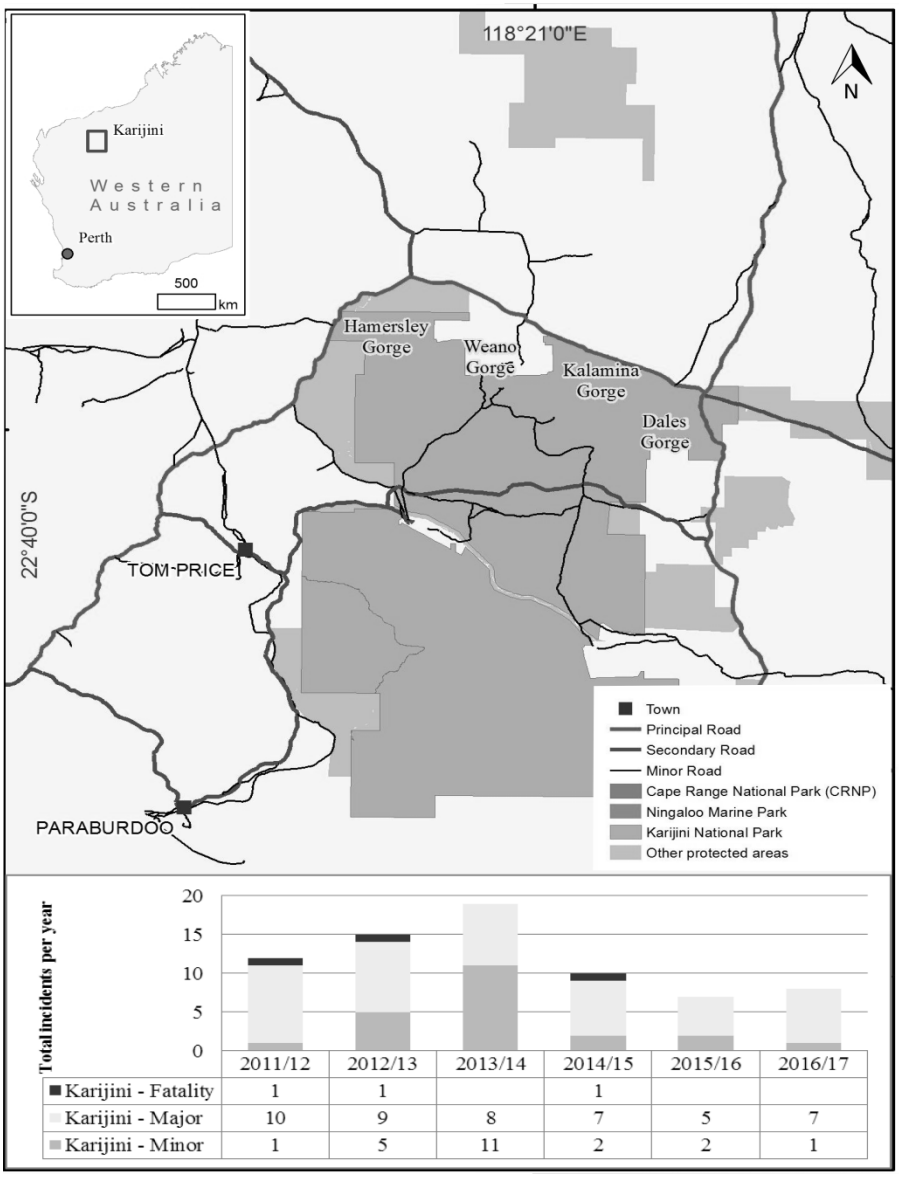

Figure 2 - Karijini National Park in Western Australia map and visitor incidents by severity over six consecutive years

Karijini National Park is a priority in visitor risk management considerations based on two criteria. Firstly, the park has a relatively high rate of incident occurrence overall compared to other parks in Western Australia. Most of these incidents are classified as major incidents due

to the great difficulty of providing emergency response services in remote park locations. Secondly, the park has a relatively high visitor risk factor considering the likelihood and the severity of injury per visiting party. The risk analysis in Western Australia requires the Parks and Wildlife Service monitoring visitation statistics to Karijini National Park, allowing the quantification of visitor risk levels in order to compare incident statistics to other park visitation contexts (considering both, the likelihood of incident occurrence and the severity of incidents). Various levels of risk represent different chances that any one visitor might experience harm calculated over a specified period of time considering the number of people exposed to the hazard. The risk analysis showed that Karijini National Park presents a higher risk of harm to any one visitor compared to other parks in Western Australia.

Making use of visitor incident data at Karijini

The number and frequency of visitor incidents in Karijini National Park has seen many changes based on the way the Parks and Wildlife Service not only responds to incidents but also in the design and implementation of visitor facilities and infrastructure. The agency has implemented a range of measures to improve responses to incidents including:

- → Installation of an emergency radio system at key locations which enables visitors to contacted rangers in the event of an incident;
- → Provision of strategically placed emergency response equipment such as Royal Flying Doctor Medical chest, OxyViva equipment and anchor points for vertical rescue; and
- → Close collaboration with local emergency services (e.g. Fire and Emergency Service (DFES), State Emergency Service (SES), St Johns Ambulance Australia, Western Australia Police).

In relation to visitor facilities and infrastructure, some of the key measures implemented as a result of visitor incident analysis include:

- → Risk signage installation at key locations;
- → Improvements in the delivery of risk and safety messages in park brochures and other promotional materials; and
- → Improvements in facility designs such as the recent completion of the metal staircase and boardwalk (geotechnical risks associated with the gorge access) to improve visitor access to the gorge.

Reducing visitor incidents

The detailed incident recording and analysis in Kariijini National Park provided the legal and financial justification for strategic management intervention. As a result, a constant visitor incident reduction, both in frequency and severity, can be observed during the last three years (see Figure 1) based on more effective and efficient resource allocation in visitor risk management decisions in the State.

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Monitoring of illegal human activities in the Tatra National Park, Poland

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Introduction

The Tatra National Park is located in the southern part of Poland and comprises the entire part of Polish Tatra Mountains with the area of about 211 km^2. Most of the park area is encompassed by the Natura 2000 Network, both as Special Area of Conservation and Special Protection Area. TNP was created in 1954 under nature protection act that imposed strict regulations of tourism inside the park. Any kind of human activities is limited to specially designed areas, such as hiking and skiing trails or climbing areas. The park authorities are obliged to monitor natural resources and their threats. Therefore any type of activities outside designates areas are strictly forbidden and can be penalized by park rangers. However trespassing is quite common and observed in areas important in terms of nature protection. This is why monitoring of illegal human activities seems to be very important issue. Those activities vary from hiking, climbing to skiing, exploring caves and gathering plants. In the Tatra National Park camera traps are used to examine these issues and estimate the scale and type of human trespassing phenomena as well as its influence on wildlife. This method is worldwide used for wildlife (Roveroa et al., 2013; Wearn, Glover-Kapfer, 2017) as well as visitor monitoring (Hossain, et al. 2016; Miller et al., 2017).

Methods

Monitoring by means of camera traps has been conducted in the Tatra National Park since winter 2006/2007 (Zwijacz-Kozica et al., 2015). They were used to determine the scale of trespassing, for monitoring wildlife and also estimating the number of tourists on trails. Different aims caused that each year the location and number of installed camera traps throughout the Tatra National Park vary and depend on the current needs. As a consequence there is no common methodology regarding the set up of the devices. Generally camera traps are programmed to record videos rather than take pictures, which enables to record any fast moving objects. They are installed in places as follows: forest roads, former walking paths (which are officially closed), paths and places forbidden for human activities but frequently visited by wildlife where conflict between animal and human might occur. Some of the monitored trails have recently been blocked by trees fallen by the wind. Thanks to this it is possible to check if those disturbances reduce the effects of anthropopressure in officially closed areas. Not only location but also time of installing and length of camera trap's operation time is different. Because of that it is difficult to compare data from the same location to data from different locations. As a result data from summer months of three locations with the longest history of observation and similar operation time of devices were selected to present the most approximate results. Information gained by means of these devices is helpful to determine the scale of that phenomena and study if the presence of humans affects animals. This also enabled to present the period of time between human and animal appearance as well as the time during the day when human and wildlife appear.

Around the world many computer software and websites were created to summarize and manage data from camera traps (Iwan et al., 2016). In Tatra National Park data from camera traps (films and photos) are processed manually and stored in Oracle database created by means of Esri ArcGis Programme.

Results

Three locations were chosen to present the scale and differences regarding illegal human activities during the summer months.

In the first location, in 2014 the amount of human appearances was 54. Two years later in 2016 it was almost 50% less. However in 2017 the number was higher, up to 41.

In the second location in 2013 the amount of human appearances was 90. Due to the trail being blocked by fallen trees in December 2013 in 2014 only 40 people were noticed and 25 in 2015. However because of creating new paths the number of people in 2016 and 2017 increased to 37 and 76 people, respectively.

In the third location the monitoring has been conducted since 2013 to 2014 and in 2017. For the whole period the amount of people was about 100. The highest number 163 was in 2014.

In each location large predators important in terms of nature protection, such as brown bear, wolf and lynx occurred. What is more data gained from them shows that only few animals occurred up to a couple hours after or before human presences, most often this period is 10-12 hours. Animals were recorded mostly early in the morning and at night whereas people appeared mostly during daytime.

Conclusions

To the present day in the Tatra National Park there is a database from camera traps observation with about 7500 records. This data is hard to process, analyze and compare due to lack of common methods of installing devices. Comparing it and concluding about the scale of illegal human activities is possible on condition that data is collected regularly from the same locations. Even though three presented locations show that camera traps are helpful to assess the number and locations of people's presence and compare them to type of animals which occurred in the same area. Thanks to this it is possible to provide more park rangers in specific and most needed areas. It was also showed that disturbances like trails blocked by the fallen trees could reduce the trespassing. In order to provide proper monitoring for the future the following issues should be taken into consideration:

1. Two devices in one location (in case one goes down)
2. Errors when object is too fast and only activates camera without recording itself
3. Constant activation of camera traps during the strong wind which causes filling the SD card and exhausting batteries – the issue demands more frequent controls
4. If locations are important in terms of nature protection monitoring has to be consequent and regular over the years.

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Estimating angling impacts on remote fisheries: An angler use and preference study in the central Appalachian Mountains, USA

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Introduction

Brook Trout (*Salvelinus fontinalis*) are native throughout northeastern North America and widely introduced in the western United States (MacCrimmon and Campbell 1969). Brook Trout are also a popular target of anglers. In the Appalachian Mountains Brook Trout typically occupy headwater streams where stream temperatures remain cold (< 20^{o} C, DeWeber and Wagner 2015). Appalachian headwater streams often are remote and this, coupled with small stream size, limits the quantity and frequency of angler efforts for Brook Trout in such systems. However, angling does take place in these small streams and the impact of angling upon native Brook Trout populations is unexplored. Therefore, the objective of this study was to understand the potential role of fishing on structuring Brook Trout populations in remote headwater streams in the central Appalachians.

Research and Objectives

The objectives of this research was two-fold:

- Evaluate angler use of remote Brook Trout streams.
- Understand the potential impact to Brook Trout populations.

Methods

Evaluation of angler use of Brook Trout in headwater streams was done using a combination of in-person surveys and motion-activated game trail cameras. Surveys provided information on the numbers and sizes of fish retained by anglers per trip. A total of 12 cameras were located (2 per) on each of six streams at likely fishing locations to estimate the number of anglers using each stream between mid-March and mid-May. Data from the surveys and cameras enabled estimation of the number of fish potentially harvested from each stream. This data was compared with data on the abundance and size of fish in each stream from concurrent electrofishing surveys to assess whether angling was affecting abundance, size structure, or reproductive potential.

Results

A total of 96 angler interviews were completed from early March until the end of May 2004. Most angler that retained fish for consumption (76%) fished on small, native Brook Trout streams. Those who focused on catching and keeping native Brook Trout kept smaller fish (182 $\pm$ 12 mm) than those fishing larger streams (268 $\pm$ 20 mm) and on average retained 4.5 fish per trip.

Motion activated cameras recorded 1-16 anglers per stream over the nearly 3 months. One camera was stolen on two of the streams. Combining the number of anglers and mean number harvested per trip from the interviews yielded an estimated harvest of 5-72 fish per stream. However, the six streams had only an estimated abundance of 5-200 catchable-sized

fish at the start of the study. Size structure in several of these streams also shows a truncated distribution of fish lengths coincident with the sizes retained by anglers.

Implications

The estimated numbers of fish harvested during the study period appears modest until placed into the perspective of numbers available and fish size structure. Even with limited angler effort, it appears harvest is shaping the size structure of trout in these streams. Fishing regulations in West Virginia permit harvest of 6 fish per day with no size limits. Given the numbers and sizes of fish found in these streams and the estimated harvest, fish over 170 mm in length could all be legally removed by anglers in 1.2 to 19.8 angler-days. Brook Trout in the Appalachians are already considered reduced (Trout Unlimited 2000) and populations are widely influenced by human impacts such as sedimentation, habitat fragmentation, and acid mine drainage (DeNicola and Stapleton 2002; Hogsden and Harding 2012; Menendez 1976; Trojnar 1976). This study documents the potential effects of fishing upon localized populations where seemingly small amounts of effort may reduce adult trout numbers and potentially reduce resilience in the face of climate change.

Acknowledgements

This work was supported by the USDA National Institute of Food and Agriculture, McIntire Stennis project WVA00048 accession number 0195351, and the West Virginia Agricultural and Forestry Experiment Station. Funding and in-kind support was also provided by the WV Division of Natural Resources, USFS Monongahela National Forest, and MeadWestvaco Corporation. Field data collection was aided by J.S. Webster, R. Utz, J. Stolarski, J. Niles, and numerous undergraduate students at WVU.

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Accuracy of estimated number of visitors gained through different monitoring methods and its implications on economic analysis

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Introduction

The use of visitor monitoring techniques for estimation of numbers of visits and for determination of the visitor profile in protected areas is becoming widespread in almost all European countries. The form, time and geographical scale of visitor monitoring, as well as the way of aggregation of the visitor data vary significantly from country to country, and frequently also among protected sites within one country. The differences are mostly driven by the diverse priorities and needs of the management of these areas and also by the budget available for visitor monitoring. However, since the portfolio of methods is large and expands dynamically, the choice of a specific method of monitoring may be affected also by the limited knowledge of managers on strengths and drawbacks of particular monitoring methods, some of which are necessarily context-specific.

Methodology

The most complex and detailed source in Europe known to the authors is the manual "Visitor monitoring in nature areas – a manual based on experiences from the Nordic and Baltic countries" by Kajala et al. (2007), which we may recommend as a useful methodological guidance for managers of protected areas. The manual describes monitoring methods in a very comprehensible way and discusses the pros and cons of available methods in detail. Based on our experience in the Czech Republic, we may confirm that their evaluation of methods is transferable also to other European countries without significant limitations. However, this guidance does not cover at all the newly emerging methods that have considerable potential to enhance the complexity of monitoring results - in particular, the use of mobile positioning data for visitor monitoring purposes.

Therefore, this contribution aims to build on the state-of-the-art of evaluation of visitor monitoring methods, bringing empirical evidence on the traditional methods and the use of mobile positioning data in particular. We focus on the precision, explanatory power and ways of aggregation of total number of visitors of particular monitoring methods.

We further discuss the implications of the error of prediction of visitor loads on the results of economic analyses. We demonstrate this issue on the problematics of setting an optimal entrance fee to protected areas, which builds on an optimization model designed by Melichar et al. (2016).

Data

The comparison and discussion is based on a rich dataset that was collected in two protected areas in the Czech Republic, namely the Šumava National Park and the Český ráj (Bohemian Paradise) Protected Landscape Area. The data account for summer season of year 2014. The

monitoring was based on collecting mobile positioning data of visitors, automatic counter data, personal visitor counting and visitors' flow data based on on-site survey.
The data entering the optimization model by Melichar et al. (2016) include parameters of individual demand models for Czech protected areas and parameters of marginal cost curves. These data have been collected and processed in the scope of the project TD020049.

Results and Discussion

Using data on visitors based on particular monitoring methods, we estimate the total number of visitors to protected areas of different sizes for the particular season and period of one year. For each method, we extrapolate from point counts to a total number of visitors in the natural area using different correction coefficients calculated from the collected data on visitors´ flow (Braun Kohlová et al., 2016). Using the estimated total number of visitors of an area and empirical monetary estimates of recreation values (Melichar et al., 2016), we subsequently optimize the recreation fee in the particular areas. The results of the optimal pricing exercise are the subject of the discussion on the practical significance of accuracy of visitor monitoring methods. The results allow us to enhance the discussion on the strengths and drawbacks of spatial and temporal aggregation of data collected using various visitor monitoring methods, including mobile positioning data.

Conclusion

The accuracy of the visitor numbers of broader natural and protected areas represents an essential input for environmental valuation of recreation benefits (Schägner et al., 2018). Based on the data from two Czech pilot studies, we demonstrate the ways of aggregation of results based on particular methods over space and time using visitor flow data and we present and discuss the impacts associated with prediction errors on economic analysis.

Acknowledgement

This contribution was supported by the project *The use of pricing mechanism for tourism directing and financing the management of specially protected areas in the Czech Republic* (No. TD020049) financed by the Czech Technological Agency. The support is gratefully acknowledged.

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Mode Effect and Response Rate Issues in North American Mixed-Mode Survey Research: Implications for Recreational Fisheries Management

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Introduction & Literature Review

The importance of recreational fisheries have been increasingly recognized in the U.S. and abroad for their social (Wilde et al. 1996; Hickley and Tompkins; 1998), economic (Hutt et al. 2012), and ecological impacts (McPhee et al. 2002; Coleman et al. 2004). However, the diffuse nature of access and heterogeneity in preferences of anglers makes managing recreational fisheries particularly challenging. Thus, effective management of recreational fisheries necessitates in-depth knowledge of angler attitude and behavior (Ward et al. 2013).

Obtaining these data on a scale applicable to fisheries management agencies with statewide jurisdictions is a challenge for human dimensions researchers in the United States. Human dimensions data have historically been collected through mail-back questionnaires delivered to a sample of residential addresses from a population of licensed anglers. However, response rates for mail-back questionnaires have declined precipitously over recent decades both within the context of natural resource management (Connelly et al. 2003) and the social sciences generally (Boser and Green 1997; National Research Council 2013). This decline has brought into question the ability of mail-based survey methods to obtain representative data for use in recreational fisheries management, particularly when knowledge of the characteristics of the broader population of anglers is limited.

The purpose of this study, therefore, is to compare differences in response rates, socio-demographic characteristics, and angler behaviors, motivations, preferences, and expenditures between and within samples obtained from three common survey designs.

Method

Data collection

In partnership with TPWD, the Statewide Survey of Licensed Anglers was administered via three modes of solicitation: a surface mail with web-push, a mixed-mode with both mail (with web push) and email invitation, and an email invitation. Freshwater and saltwater anglers (n = 9,000) were sampled from the larger population of approximately 1.2 million resident license holders in Texas (license period September 1, 2011 through August 31, 2012). For all three solicitation modes, the collection protocols were modified from the framework outlined by Dillman et al. (2014). The collection protocols for each sample were as follows:

1. Surface mail with web-push (n = 4,000): Four postal invitations were sent to participants with a web push contained within each, 1 week apart.
    a. Letter sent informing participants of the study purpose and invitation to complete the questionnaire online with a URL link provided in the body of the letter.
    b. One week following, a thank you/reminder postcard was sent to all participants. The postcard also contained the URL link to the online questionnaire.

c. One week following, a second solicitation letter was sent to non-participants inviting them to complete the questionnaire via the URL provided within the body of the letter.
d. Last, a survey packet containing a cover letter (including URL for the online questionnaire), a hard copy of the questionnaire, and a reply postage paid self-addressed return envelope for the completed questionnaire.

2. Email-only (n = 4,000): Four email invitations were sent 1 week apart. Similar to the cover letter sent to the web push group, the email invitations outlined the study purpose and invited participants to complete the questionnaire online. Both a URL to be entered into participants' browser and hyperlinked icon ("Take Survey") were provided for participants to access the questionnaire.
3. Mixed-mode (n = 1,000): Four simultaneous mail and email invitations were sent 1 week apart. These solicitations replicated the protocols outlined for the web push group with simultaneous solicitation using the protocols outlined for the email-only group. The sending of email and postal invitations were synchronized to arrive simultaneously with email invitations sent approximately 2 days following the mailing of hard copies.

Measures

We selected questionnaire items measuring avidity, motives, satisfaction, trip expenditures, days spent fishing, and socio-demographics to compare participants across modes of survey solicitation and response. Motivations, for example, have demonstrated utility for understanding angler satisfaction, management preferences, and attitudes toward fisheries management decisions. Satisfaction is also an important construct in recreational fisheries management that has been tied to individuals' continued involvement with angling.

Findings & Discussion

Response Rates

Our findings suggest that mixed-mode designs were most effective for generating the highest response rates. Our mixed-mode design relied on both surface mail and email invitations to participants and generated response rates more than twice that of email-only or surface mail (with web push) invitations. In terms of recommending a sampling design to researchers or managers, our results suggest that if a high response rate is the priority, then the mixed-mode design we describe is warranted. However, we also suggest survey designers and management agencies consider their priorities, such as the desired number of responses, costs, and available resources they have access to for conducting their surveys, given the limited variability we observed in terms of anglers' behaviors, preferences, motivations, and expenditures. In the context of our study, the lack of variability in these variables alludes to an email-only solicitation being a potential option for the agency's future collection efforts, and use customary weighting techniques on the collected data using age (Dillman et al. 2014).

Solicitation Mode

Our analysis of between-group variability revealed little variation in respondents' motives, satisfaction, and expenditures related to fishing trip expenditures. While we did observe variation in respondents' socio-demographic characteristics, this variation was not manifested in those indicators that provide more managerially actionable insight. These findings diverge from past human dimensions of fisheries work where socio-demographic

profiles often correspond with variability in factors related to preferences, motivations, and avidity.

Response Mode

Aside from soliciting participants through the mail or their email, our web push and mixed-mode designs provided participants with the option to respond via a paper or web-based questionnaire. Nearly 50 percent of web push participants and 70 percent of mixed-mode participants chose to respond online. In terms of socio-demographic differences, the results of our within-group analyses, which were consistent with past research. We observed that web-based participants were significantly younger and wealthier compared to those who responded via mail-back. Paper-based participants reported being older and having spent significantly more days fishing during the last twelve months, regardless of the mode solicitation. These results, when coupled with the proportion of respondents opting to complete the questionnaire online, even when given the option of a hard copy (46.2% for web push and 70.2% for mixed-mode), signals a trend for the conduct of future surveys.

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Outdoors, health and wellness

Understanding the demand for ecosystem services provided by parks and green spaces: Using the partial profile choice experiment

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Introduction

The aim of this study is to identify the demand for ecosystem services (ESs) provided by parks and green spaces in Sapporo (northern Japan) using a partial profile choice experiment (PPCE), which is an application of a discrete choice experiment (DCE).

Parks and green spaces in urban play a key role in that they provide various ESs which are essential to the quality of human life. However, we do not know the overall demand of ESs, therefore park managers are unaware of what kind of maintenance should be promoted. It is, therefore, important to identify what type of ESs residents expected. In this respect, DCE is a promising method for responding to various demands, however, the DCE has the number of attributes is limited. In order to understand the overall demand for various ESs provided by parks and green spaces it is necessary to evaluate them simultaneously.

Therefore, in this research we try to solve this problem by using a PPCE which can accommodate a large number of profiles at one time. In addition, we are paying particular attention to provision of facilities for the elderly and shelters to prepare for disasters. Recently, in Japan, there is a great demand for facilities for the elderly. The elderly population is 34.6 million, accounting for 27.3% of the total population and the number is expected to increase. Because of this situation, the park managers are concerned about providing facilities for the elderly which is one service of the ES provided by parks and green spaces. For example, in Japan, “park golf” which is a form of golf that can enjoyed in small corners of parks is popular among the elderly. In response to the demands of elderly, park golf courses have been developed in several parks. According to this, park managers should know if these facilities are really needed and if they need to be built in the future. Another important issue is the provision of shelters to prepare for disasters. Although the necessity of providing evacuation sites has been raised, it is necessary to examine whether maintenance should be continued as this is considered as one of the ES provided by parks and green spaces.

Based on this background, our specific research questions are as follows:

1. What is the preferred ESs provided by parks and green spaces?
2. What are the preferences for the provision of facilities for the elderly and evacuation sites?

Material and Methods

Study Area

The case study site is the Sapporo urban area. Sapporo is the largest city in Hokkaido Prefecture, an island located in northern Japan. The city is the fifth largest in Japan by population. The population of Sapporo is about 1.9 million people.

Partial profile choice experiment (PPCE)

The PPCE was introduced as a method for adapting the DCE so that it could handle large numbers of attributes (Chrzan, 2010). In conventional DCEs, the attributes being valued are limited. However, in the PPCE, researchers present only a subset of the attributes being considered in the survey. If respondents can be made to properly understand the nature and levels of attributes that do not appear in a choice, task bias can be avoided (Bradlow et al., 2004; Chrzan, 2010).

Survey design and sampling procedure

In this survey, 15 ESs were constructed as parks services based on literature reviews and interviews with experts. The valuation scenario is as follows: policies that would strengthen or weaken the 15 ESs are being considered and park area will be increased or decreased in the area accordingly. In this scenario, it is assumed that a tax burden must be accepted to implement these policies. This study used a willingness-to-pay measure to understand demands quantitatively.

We obtained our survey data—including data from the PPCE—from 1,109 respondents in December 2017. A consumer research company sent invitation emails to registered respondents living in the Sapporo urban area, who then responded to the questionnaire trough a website.

Results and discussion

In this study, we were able to simultaneously evaluate ESs that have been individually evaluate using PPCE. We examined the valuation of 15 ESs provided by parks and green spaces using PPCE and investigated what services are important to residents.

To date, monetary evaluation of ESs provided by parks and green spaces has been conducted by DCE, but there was no case in which 15 ESs were evaluated at the same time. Based on this results, the park managers can understand which services is more important than other at once.

Figure 1 shows the marginal willingness-to-pay (willingness-to-pay for 1% increase of park area) for 15 ESs and contents of 15 ESs are delineated below the Figure 1.

We now look into the specific results of this research. The service that residents think the most important was “1. Formation of landscape”. This is consistent with the results of survey on urban park utilization which was conducted by Japanese Ministry of Land, Infrastructure, Transport and Tourism (MLIT, 2015). According to the report, the pleasant and beautiful environment in city was selected as number one expected role of the park. Also, following that, “3. Providing a place to interact with the forest” and “15. Providing evacuation sites” were valued highly. On the other hand, the service that residents regarded as unimportant was “7. Providing facilities for the elderly”.

The importance of elderly facilities and evacuation sites has been pointed out, however, the average results indicated that providing elderly facilities were not as important as the evacuation sites.

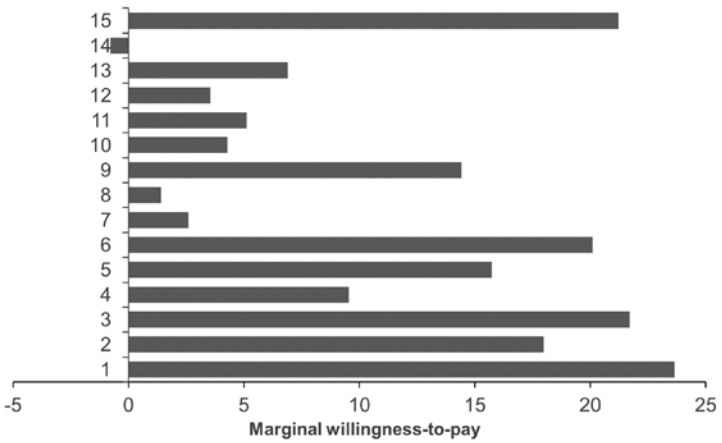

Figure 3 Marginal willingness-to-pay (willingness-to-pay for 1% increase of park areas) for 15 ecosystem services (100 JPY is nearly equal to 0.8 EUR)

1. Formation of landscape; 2. Conservation of biodiversity;
3. Providing a place to interact with the forest 4. Providing a lawn;
5. Providing a place to interact with flowers; 6. Providing facilities for the children
7. Providing facilities for the elderly; 8. Providing cultural facilities;
9. Providing a parking lot; 10. Providing a playground; 11. Proving a place for learning;
12. Providing a place for events; 13. Providing a place for community activities;
14. Providing an eating venue; 15. Providing evacuation sites

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Back to the North Japan Alps: A Comparative Investigation of Incident Causes and Risk Profiles of Different Alpine Areas

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Introduction

Against a backdrop of increasing incidents and rescues across Japan's mountains, Kobayashi and Jones (2016) investigated the profile of vulnerable segments, especially older climbers, via the case study of the North Japan Alps. This paper revisits the same site: known as the birth-place of modern mountaineering in Japan, trends in this national park have national relevance (Murakoshi, 2010). Drawing on a longitudinally expanded database extracted from police reports, this paper extends previous research by comparing incident cause factors and risk profiles of different Alpine areas.

Methodology

Case study site

Nagano, Toyama and Gifu prefectures form the mountainous central region of Japan. Located at the crossroads of the North, Central and Southern Japan Alps, and Mt. Yatsugatake range, the area includes several peaks over 3000m and some of the steepest V-shaped valleys in the country. 2016 police records reveal that the three prefectures accounted for 21% of all recorded incidents in Japan, with a fatality ratio (1.59 times) and injury ratio (1.46 times) much higher than the national average.

Research method and sources

Police incident records were compiled from Nagano (2001-2016); Toyama (2004-2017); and Gifu (1999-2014) prefectures respectively. A database was created from annual reports, pooling the following 14 variables: prefecture; year; date; hour; weather; area; gender; age; extent of injury; cause factors; group number; surface conditions; action at the incident; incident trigger. Commercial motives such as foraging for herbs were excluded, leaving 5,391 incidents. Findings were triangulated via follow-up interviews with the police, NGOs and research organizations.

Findings

Extent of injury in the North Japan Alps

13.5% of all incidents involved a fatality, with an additional 1.4% missing (presumed dead). Amongst the non-fatal accidents, 31.3% were classified as "severe" injuries with a recovery diagnosis of one month or more. 26.7% were classified as "non-severe" injuries with an expected recovery time of less than one month. The proportion of fatalities declined from 16.7% (1999-2002) to 12.2% (2015-17). Conversely the proportion of mountaineers "rescued" increased from 21.2% (1999-2002) to 32.6% (2015-17). Mountaineers aged >50 displayed more fatalities (50s 17.4%, 60s 13.9%, over 70s 15.2%) while those aged under 20s had less fatalities (10.7%). Chi squared tests showed statistically significant relations between

the extent of the injury and all 12 other variables. Above average frequencies were found for fatalities in winter (Nov.-Mar.); morning 6:00AM-12:00AM); weather (snowy); gender (male); age (50s or 70s); group size (single or 3-4 members); incident cause factors (rolling or sliding down, or falling rocks or avalanche), surface conditions (ice or snow, wet soil or plants); acting near summits or rock climbing; incident trigger (heart diseases, avalanche, stream crossing, fatigue or rock falls).

Differences of incident severity among different routes and areas

Features of incidents were geographically clustered in certain areas. For example Mt. Hodaka-Yari; Mt.Goryu-Kashimayari; Kurobe Gorge; and Mt. Tsurugi areas had a significantly higher fatality ratio, whereas Mt. Tateyama and Mt. Yakushi areas had a lower ratio. Chi squared tests showed statistically significant relations between areas with all the 12 other variables. Regarding the cause factor, the ratio of falling down was higher in Mt. Tsurugi and Kurobe Gorge areas. Sliding down had a higher ratio in Mt. Hotaka & Yari, and Mt. Goryu & Kashimayari areas. Sickness was higher in Mt. Tateyama area. For surface conditions, the ratio of ice or snow was higher in Mt. Hakuba, Mt.Goryu & Kashimayari and Mt. Hotaka & Yari areas; unstable gravel in Mt.Tsurugi, Mt. Hotaka & Yari, and Mt. Tateyama areas; rocks and stones in Mt.Tsurugi, Kurobe Gorge, and Tateyama areas; chains and ladders in Mt. Hotaka & Yari, and Mt. Tsurugi areas. Amongst incident triggers, the ratio of slipping was higher in Mt. Hakuba, Kurobe Gorge, and Mt. Yakushi areas; loss of balance in Mt.Goryu & Kashimayari, Mt. Hotaka & Yari, and Kurobe Gorge areas; stepping out in Mt.Goryu & Kashimayari areas; mountain sickness in Tateyama area. By age, 10s ratio was higher at Mt. Tateyama; 50s in Mt. Hotaka & Yari, 60s at Mt. Hakuba. A lower proportion of climbers in their 70s was observed in Mt. Hotaka & Yari, and Mt.Goryu & Kashimayari areas.

Discussion

In a follow-up to the paper presented at MMV8, this study investigated the increase in incidents in different areas of the North Japan Alps. Police records from Nagano, Toyama and Gifu prefectures provide insight into incidents showing statistically significant differences between incident trends and risk profiles in different areas. Identification of the incident profile, could help improve risk management by facilitating a targeted response to regional incident characteristics.Results could facilitate creation of a response plan targeted to the incident features of the respective areas. For example, on the Hodaka-Yari route, resources should be focused on older climbers; precautionary measures taken to prevent sliding down; and climbers' attention raised against slips and loss of balance. Counterstrategies may involve 'hard' solutions such as more maintenance of trails located on unstable slopes; set-up of rescue stations for acute mountain sickness. In addition, 'soft' tactics related to risk communication could help prevent incidents, and pre-registering route information with local authorities, could facilitate search and rescue operations. It's necessary to take targeted steps to mitigate accidents according to the incident profile of respective areas in the North Alps.

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Table 1.Percent differences by geographical area crossed with extent and cause of injury

Table 1.Percent differences by geographical area crossed with extent and cause of injury

Extent of injury	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**	**A7**	**A8**	**A9**	**Total**
fatality	10.1	**24.5**	11.8	10.0	**18.1**	**14.7**	**16.3**	4.5	4.5	13.2
missing	2.0	1.5	0.9	1.5	1.5	1.6	3.1	0.0	1.5	1.4
severe	**36.6**	31.3	**36.0**	29.4	30.9	**33.3**	**34.9**	24.1	**38.3**	31.3
non-severe	22.1	24.2	24.6	25.2	27.8	27.7	15.5	**31.4**	30.4	26.7
rescued	29.3	18.5	26.8	**33.9**	21.7	22.8	30.2	**39.9**	25.4	27.4
Total incidents	358	265	228	520	1196	430	129	576	201	3903
Cause factors	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**	**A7**	**A8**	**A9**	**Total**
slip	1.7	7.6	4.9	3.9	13.9	**20.8**	**24.0**	7.1	4.5	10.1
trip	36.3	25.8	29.5	30.3	18.8	23.1	24.0	31.3	51.5	27.2
slide	17.9	**28.8**	22.0	16.8	**32.7**	14.0	10.9	7.1	5.5	20.4
lost the way	9.5	6.4	3.1	6.4	5.0	7.9	**11.6**	5.6	9.0	6.4
fatigue	11.2	8.7	10.1	**14.1**	5.1	6.5	7.8	3.7	10.0	7.7
illness	10.6	10.2	19.4	19.3	13.7	13.8	7.0	**39.0**	11.0	17.6
rock fall	5.6	2.3	2.6	1.7	3.8	3.5	0.8	1.4	1.0	2.9
other	4.2	7.6	6.2	7.3	6.8	9.3	**14.0**	4.0	7.0	6.8
avalanche	3.1	2.7	2.2	0.4	0.2	1.2	0.0	0.9	0.5	1.0
Total incidents	358	264	227	519	1190	429	129	575	200	3891
									p<0.001	

Index of areas in the North Japan Alps	
A1	Hakuba
A2	Goryu & Kashima Yari
A3	Jiigatake-Mitsumata
A4	near Yari-Hodaka
A5	Yari-Hodaka
A6	Tsurugi
A7	Kurobe gorge
A8	Tateyama
A9	Yakushi

Nature for physical activity promotion –role of green infrastructure in Finland

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The role of physical activity (PA) in promoting health and preventing diseases is scientifically well documented and therefore, improving ways to improve and maintain participation in PA are most welcome (WHO 2009). Nature areas offer attractive and cost-effective opportunities for PA when compared to built exercise facilities and thus offer an economically sustainable approach for enhancing physical activity policies. In Finland green infrastructure, ranging from neighbourhood parks to peri-urban forests and protected areas, creates an important resource for recreational activities that contribute to people's health, well-being and quality of life (Korpela et al. 2014, Pietilä et al. 2015). Nature is the most important environment for PA, as around one third of all leisure time physical activity among adult Finns takes place in natural environment (Borodulin et al., 2011).
Today there is only limited amount of research exploring green infrastructure's role in PA promotion (de Vries et al. 2011, Mytton et al. 2012) , in particular, compared to sport sector where most funding is often currently allocated. More information is needed how the accessibility and quality of green areas is related to residents' physical activity. This presentation discusses first results from an ongoing NatureMove -study funded by Ministry of Culture and Education investigating i) to what extent accessibility of close-to-home recreation areas affects physical activity and ii) how individuals differ in their relationship with and perception of nature that might motivate residents being physically active outdoors.

Population study data in Helsinki

The study data was collected in Helsinki, a city of 620,000 inhabitants, the capital of Finland. Approximately 40% of Helsinki consists of various types of green areas. Most of the green areas are located in the suburbs, while the majority of indoor sports facilities are located in core urban areas. The data (Environmental Health Survey) was collected in 2015 using both mailed and electronic questionnaires. A random sample of 8,000 Helsinki residents aged 25 years or more was drawn from the Population Register. Of these, 3,730 (47 %) people participated in this survey.
The amount of green exercise and leisure time physical activity were self-reported. Participants reported how often they exercised outdoors during the warm season (May to September) and in the cold season (October to April).The amount of LTPA was obtained via the question: How often do you practice physical leisure time activity for a minimum of 20 minutes at a time so that you get at least slightly winded and that you sweat. The participants also reported whether they walked or cycled to work or school in warm and cold seasons. Moreover, respondents were asked information linked to their socio-demographic and personal-level variables including their health status. To measure the connection the respondent had to nature, the brief measure of nature relatedness (NR6), was used.

To calculate the supply of green areas in Helsinki, spatial data of green areas was constructed using the green area database of the City of Helsinki, aerial photographs of the city and annually published SeutuCD. The green areas were classified into small (< 25 ha), middle-sized (25 to 150 ha) and large (> 150ha) green areas to reflect their qualities and the opportunities they provide for

various types of uses. The distances to the closest small, middle-sized and large green areas from the participant's home address were calculated mainly using walkways and cycle paths with the ESRI ArcGIS software package.

In addition, distances to the nearest cluster of built outdoor and indoor sports facilities were measured. The outdoor and indoor facilities for the 20 most popular Finnish types of sports were selected from the spatial data for national sports facilities. These included various types of indoor sports and outdoor sport facilities such as gyms, sports halls, swimming pools, skating parks, golf courses, and outdoor pools. Clusters were formed by creating a 150-meter buffer zone around each sports facility. The residential areas of the participants were divided into core urban and suburban areas according to the postal code areas.

The association between GE and different sizes of green areas were analysed with a Pearson correlation. The statistical significance of the differences between the low and high LTPA group was analyzed using a chi-square and T-tests. The factors associated with GE separately for all, low, and high LTPA groups were studied using multinomial logistic regression analysis. Socio-economic and personal-level variables associated with GE were also included in the regression analysis.

Results and discussion

A short distance to at least a middle-sized green area was associated with green exercise, both in the core urban area and suburban area. This association, however, was found only in the suburban area after the participants were divided into low and high LTPA groups. More factors were found to be related to GE in the suburban area compared to the core urban area as well as for the low LTPA compared to the high LTPA group. A short distance to build outdoor sports facilities was related to higher levels of GE only among core urban residents. Nature relatedness was directly associated with GE despite the LTPA level or the living environment. In addition, a good level of perceived health and the quality of the green area as well as a high degree of active commuting were associated with GE.

The results are in line with previous studies suggesting that there is strong evidence of a positive association between the availability and proximity of green areas and GE (e.g. Pietilä et al. 2015). The quality of nature areas including the size and the type of the green area seem to be good indicators for predicting the usability of green areas for PA. The green environment may provide an inspiring opportunity to engage in physical activity especially for suburban residents and those who are not physically active.

More information, however, is needed to find out what kind of environments provided for PA are encouraging the most inactive groups to increase their physical activity levels. Therefore, site specific data regarding experiential knowledge on green area qualities will be collected in 2018 from residents by using Public Participatory tool (PPGIS). The respondents are asked to mark spaces in Helsinki (specific locations, routes and areas), which they e.g. use for physical activity.

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Future stewards? Connection to nature starts from childhood experiences in nature areas

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Introduction

These days, more than half of the world population is packed into cities and this trend is still ongoing. Urbanization, however, is an ongoing force separating humans from the natural environment. This limited access to nature results in less direct contact with nature. Some researchers even warn for the "extinction of experience", arguing that due to the loss of interaction with nature, interpreted as outdoor activities in nature, positive attitudes towards nature protection, emotions and pro-environmental behaviour will decline. As environmentalism is often traced back to memorable childhood experiences in nature, one may wonder what would happen if children would not have those experiences anymore. The disconnection between children and the natural world has left author Richard Louv, and many more with him, to wonder where the future stewards of this earth will come from. Recently, several interventions aimed at reconnecting children with nature, through real life nature experiences, have been initiated. Examples of these interventions are: the greening of children's playing environment at nurseries, school and during leisure time and the introduction of nature experience programs for primary school children. The aim of this research is to investigate the connection of nature

Connection to nature

Based upon Cheng and Monroe (2012) and Giusti et al. (2014: 21) we define nature connection as the feelings and thoughts in and about nature leading towards an empathic concern for nature, an awareness of human dependency on natural resources and consequently a moral obligation to respect and protect nature. It consists of the following dimensions (i) *feelings in nature*, referring to the affective component while experiencing nature, (ii) *empathy with creatures*, referring to the ability to understand and share feelings of another, (iii) *sense of oneness*, which is about people's place in nature and the importance of nature in people's lives, and (iv) *sense of responsibility*, which focuses on the moral obligation to behave correctly towards or in respect of nature (Postma, 2016; Schouten-Van der Laan, 2017).

Experiencing natural playgrounds and nature after school centres

Children's connection to nature has been the subject of two studies in the Netherlands, one focusing on children playing in two natural playgrounds called "De Natureluur" and "Het Woeste Westen" in Amsterdam and one focusing on nature after school centres "Struin" in Nijmegen and "Wijs" in Utrecht. The research consisted of extensive participant observation, (group)interviews with approximately 60 children (age 5-11), and –in the case of the nature after school centres- questionnaires with parents.

Results

All children enjoy playing in nature, though the level of enjoyment depends on the extent children feel comfortable in (types of) nature. Children show much empathy for creatures and perceive plants and animals to be largely equal to human beings. The majority considers humans to be part of nature and recognize human dependency on nature and natural resources. Knowledge plays a strong role in the sense of oneness children experience. Finally, sense of responsibility seems to differentiate with respect to the other connection to nature variables. In case of a positive enjoyment of nature sense of responsibility was articulated from an anthropocentric point of view, with respect the loving and understanding of other living creatures a biocentric value was attached to it and when discussing sense of oneness a ecocentric interpretation was given to sense of responsibility (see Figure 1). The results indicate that the strength of connection to nature depends on influential adults, such as parents, staff and warders, whether playing activities were spontaneous or organized in children clubs, and whether the playing environment afforded only natural elements or also man-made elements.

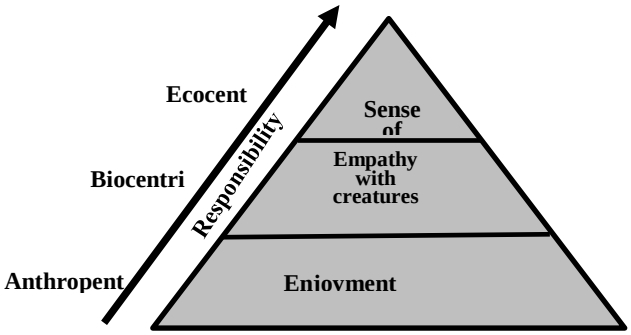

Figure 1. Connection with nature conceptualized

A “childeren experiencing nature” inclusive policy

Our research shows that connection of nature is stimulated by means of experiencing nature in both natural playground and nature after school centres. A basic requirement for it is that children need to feel comfortable in nature. Especially sense of responsibility can be increased by knowledge about human beings relationship with creatures and dependency on nature and natural processes. Finally, connection with nature can be increased by influential adults who help children focus as well as to create understanding of nature and natural processes. Our results seems to indicate to experiencing nature during childhood might contribute to the creation of future environmental stewards. Therefore, nature policy should be “nature experience” inclusive, especially, but not exclusively, for children.

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Healthy Parks, Healthy People Finland

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Introduction

Taking inspiration from the growing evidence base, and from the work of Australia's Parks Victoria in the development of a Healthy Parks Healthy People approach, Parks & Wildlife Finland (PWF) is implementing a national Healthy Parks Healthy People strategy to help address health challenges (Metsähallitus, Parks & Wildlife Finland 2017). The environmental resources on which delivery depends are based largely within park management bodies, but the strategy works with business innovators, healthcare practitioners, scientists and NGOs to foster better health of individuals and communities. The strategy is being implemented in locations all around Finland and many inspiring nature-based solutions have been developed – examples of which will be used in the presentation. The presentation will also address the issue of evaluating the impacts of the strategy and the health outcomes from specific projects and programmes.

The presentation will highlight that there is very strong business case in the relationship of biodiversity and human health. Nature-connected innovations in health care systems, wellbeing tourism and various approaches like Healthy parks - Healthy people, health walks, Green Care and green prescriptions already support this business case. Health is considered as the most basic human right and an important indicator of sustainable development. Biodiversity and health linkages are also crucial elements in several Sustainable Development Goals.

International cooperation and sharing good practice plays a crucial role in achieving health benefits from nature as the challenge is global. There is a clear message here for public health fora to include park managers, as parks and greenspace not only protect the essential systems of life and biodiversity, but they are also a fundamental setting for health promotion and the creation of wellbeing.

Content of Healthy Parks Healthy People Finland

Parks & Wildlife Finland manages all of Finland's national parks, other state-owned protected areas, wilderness areas, national hiking areas and public waters. PWF works to improve public well-being and the viability of tourism, as well as the state of biodiversity in Finland. In 2010 PWF Finland launched Finland's Healthy Parks Healthy People programme with the overall aim that *Public health will improve as people get out into natural settings, enjoy positive and genuine experiences, and improve their physical health through a wide range of outdoor activities.*

In 2016 PWF launched a new and more comprehensive programme with overall aim being ***Finland's diverse natural environment improves the health and well-being of its people*** - *The Finns are an active, outdoor people, for whom nature is an essential part of everyday life and leisure time. Their social, physical and mental well-being has improved due to the varied Finnish wilderness and their active relationship with nature*. The programme was renewed as PWF realized it's role better in improving public health:

1. Guardian of the diverse natural environment and a provider of high-quality services that meet the needs of recreation, tourism, hiking, hunting and fishing.
2. Inspiring people to go out into the natural environment and strengthen their relationship with nature
3. An active developer, partner and coordinator in collaboration.

The programme has several goals, as well as measures to attain these goals. Measures are included in three main themes: 1) from nearby nature to national parks, 2) everyone outdoors, and 3) results based on communications and cooperation. The programme is implemented all around Finland, and it also has strong national and international dimensions. One outcome is new methodology to improve our understanding of health benefits of green settings and our ability to monitor related progress. International cooperation has played crucial role, as this challenge is global in scope. In addition, research institutes are key partners, for example in the field of indicator based management. Together with research partners PWF has been able to start the monitoring of health benefits. Communicating these results is an important part of the programme (Metsähallitus 2018a, Metsähallitus 2018b).
Healthy Parks, Healthy People Finland especially stresses the importance of biodiversity and good access to nature in preventing diseases and in overall wellbeing of people and societies. Nature connection should be available to all, and in addition, a special focus needs to be geared to vulnerable groups who may have strong barriers in the use of natural settings and who may need most support to reach natural environments.

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Tranquility mapping for soundscape management: From concept to reality

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Introduction

The search for tranquil environments is often the chief reason people give for escaping urban settings for the 'natural' environments of Protected Natural Areas (PNA). Tranquility in natural environments is a combination of both 'natural' landscapes - *and* 'natural' soundscapes. Increasingly, enjoyment of PNAs by some visitors generates anthropogenic noise that 'consumes' natural soundscapes in a manner which subtracts from the total soundscape available to others. This conception of natural soundscapes as a Common Pool Resource (CPR) bound by time and space (Dumyahn and Pijanowski, 2011) frames the essential PNA soundscape management challenge thus: the preservation and conservation of tranquil natural environments for the long-term benefits of the public; *and* the sustainable and equitable allocation of finite natural soundscapes between different stakeholders.

The predominant source of anthropogenic noise in New Zealand's PNAs derives from the use of motorised transport, most notably the commercial operation of aircraft and jet-boats for tourism purposes. While the New Zealand Department of Conservation (DOC) has legislative jurisdiction over the land in PNAs, it has no jurisdiction over use of airspace or waterways. Therefore, prior to 2016, DOC's sole intervention for managing this anthropogenic noise relied upon controlling both the number of locations where aircraft and jet-boats could land visitors, and the number and frequency of movements to those locations. Monitoring the effectiveness of this intervention involved a purely subjective assessment of ground-based visitors' annoyance with the anthropogenic noise generated by these movements.

Over time, it became apparent to all stakeholders that both the management and monitoring mechanisms were increasingly ineffective and iniquitous in the preservation and allocation of natural soundscapes, and that a new approach was required. Following an extensive scoping study, the Tranquility Rating Prediction Tool (TRAPT) was proposed as the most appropriate solution for DOC's future soundscape management and monitoring requirements (Watts, Pearse and Donohue, 2016).

Applying Tranquility Mapping to PNAs

Developed by Watts and Pheasant (2013, 2015), TRAPT uniquely combines both objective and subjective dimensions. TRAPT includes factors for natural features, a noise metric, and a moderating factor, to produce an output called tranquility rating (TR) on a 0-10 scale (where TR >8 is 'Excellent'). However, as configured at the time TRAPT was unsuitable for the DOC application, requiring significant modification to be undertaken.

Adaptation of TRAPT

TRAPT was initially developed for stationary sound sources such as wind farms, and thus needed to be adapted to accommodate moving sound sources such as helicopters and jet-boats. Several noise prediction software packages were assessed as possible candidates for generation of contours of predicted noise levels, from which the TR could be derived. The USA Federal Aviation Administration's (FAA) Aviation Environmental Design Tool

(AEDT) was ultimately selected based on features deemed essential for PNA noise prediction purposes, particularly features directly relevant to the problem of helicopter flights in mountainous terrain. In theory, these features would enable the plotting of tranquility contours from moving sound sources onto digital topographic maps of PNAs with a high degree of fidelity. In practice, it emerged that this was the first application of AEDT to helicopter operations in uncontrolled airspace, significantly expanding the developmental challenge and timeframe.

Calibration of TRAPT

Originally calibrated for the United Kingdom population and later verified for the Hong Kong population, recalibration of TRAPT for the New Zealand population was nevertheless undertaken to maximise confidence in the predictions. Furthermore, there existed a requirement that any new management tool be able to represent additional dimensions of soundscapes at places of cultural and spiritual significance, especially to New Zealand's indigenous Māori people. Finally, while many studies have looked at population response to aircraft noise, these studies focused mainly on noise from fixed-wing aircraft, with the result that the response to helicopter noise is poorly understood.

Calibration of TRAPT ultimately involved samples of the general New Zealand and Māori populations being processed through a controlled laboratory setting according to strict protocols, using representative helicopter and jet-boat sound files and images recorded in New Zealand PNAs.

Collaboration on TRAPT

From the outset, the soundscape management initiative was based upon the premise that the department could not achieve desired outcomes through regulation, and that any solution therefore depended on collaboration with stakeholders; most crucially, the commercial tourism sector. Modelling tranquility to inform the allocation of soundscapes rather than landing rights was seen by stakeholders to offer significant advantages, including:

- Predicting noise and resultant tranquility is robust and transparent, and if repeated would give exactly the same answers. This is in contrast to the previous subjective monitoring tool where results were influenced by many variables and therefore more easily contested;
- Noise and TR predictions are able to be plotted as contours over an entire PNA. The TR plots combine both established areas of visitor concentration on the ground and typical aircraft and jet-boat tracks, to enable an easily-interpreted visualisation of acoustic 'hot spots', and assist with identifying opportunities for mitigation measures;
- Tranquility modelling allows "*what if*" mitigation scenarios to be developed, refined and agreed to by all stakeholders using a single, shared representation of a potential future state.

Furthermore, to model TR geospatially it was necessary to obtain representative track data to position the moving sound source in space and time. This data could only be obtained through the voluntary installation of purpose-built GNSS tracking devices in commercial aircraft and jet-boats.

Completed Tranquility Mapping Tool

The completed DOC Tranquility Mapping Tool (DOC-TMT) comprises four key components:

1. Global Navigation Satellite System (GNSS) track file – provides the spatial and temporal movement of the source noise (aircraft/jet-boat)

2. AEDT software - provides the source noise (aircraft sound file), propagation properties of that noise, and models the observed noise at ground level across the PNA in question;
3. TRAPT - provides the algorithm that calculates the TR levels;
4. GIS software - generates the graphic representation of TR contours across maps of PNAs.

Figure 1 shows the flowchart for calculating the TR from various noise inputs, and the subsequent mapping of the associated tranquility contours.

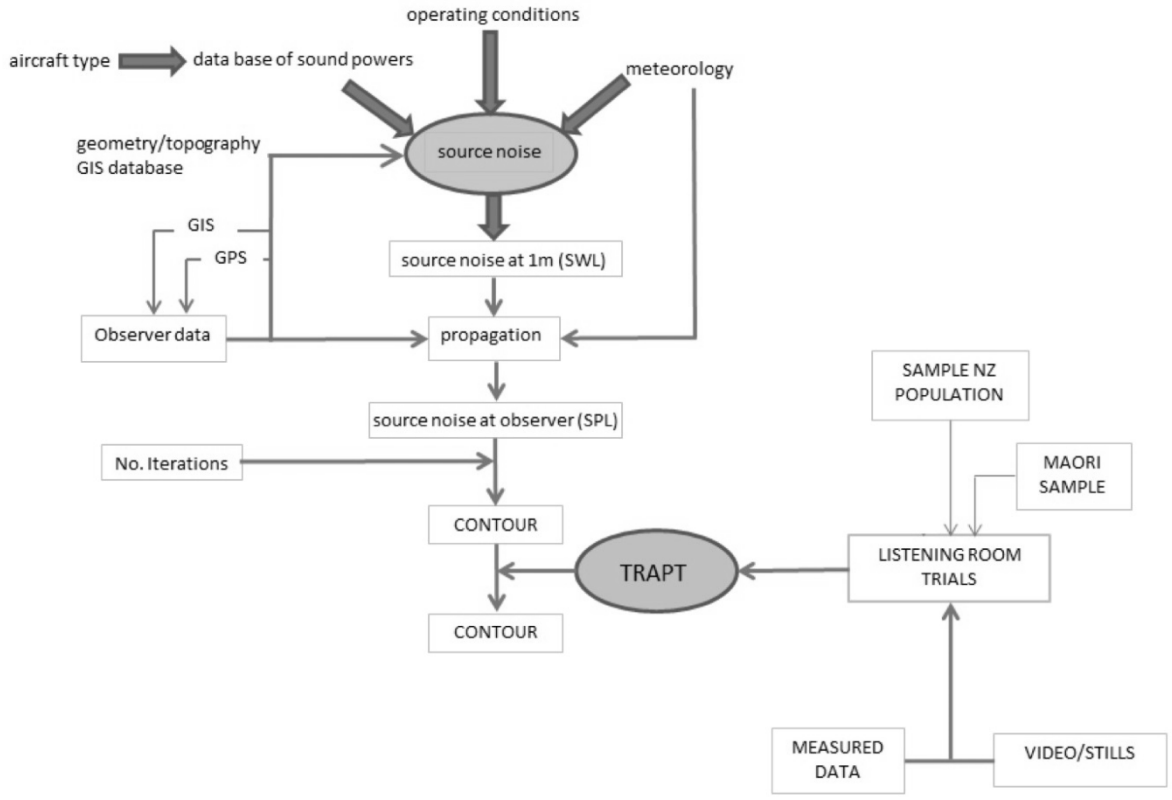

Figure1: Conceptual Schematic of DOC Tranquility Mapping Tool

DOC-TMT is now generating high-fidelity tranquility maps representing the current state of natural soundscapes in several National Parks. These maps are informing the establishment of tranquility management settings in zones across the Parks, while also providing the means by which commercial tourism operators can collaborate in the preservation and conservation of natural soundscapes through innovations in their operational practices. DOC-TMT will also enable monitoring through the periodic generation of maps based on updated track data.

AEDT 2b User Guide at: https://aedt.faa.gov/Documents/UserGuide.pdf

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Preferences and representations of nature

Wilderness in German national parks: The gap between rhetoric and reality

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Introduction

There are numerous reasons for the conservation of wilderness areas – not least because of the provision of benefits for nature and humans. Wilderness areas are considered to be the embodiment of a dynamic landscape, offering unique experiences for visitors unobtainable in our otherwise civilized environment (Garms et al., 2017). However, in most parts of Europe, extensive pristine wilderness is almost nonexistent today. Nevertheless, Germany pursues considerable efforts to preserve or "rewild" potential wilderness areas. By implementing the National Biodiversity Strategy (NBS), the German Federal Government set the target to allow nature to take its own course on at least two percent of the country's total land area by 2020 (Schumacher et al., 2018).

Wilderness definition of the National Biodiversity Strategy

However, what is meant by wilderness according to the NBS in the light of intensively reshaped and used cultural landscapes in Germany? This question is crucial as the strategy on the one hand demands strict protection and the absence of humans, while on the other hand it calls for access to nature and even for designing the "wilderness" (Lupp et al., 2011). As a result of the political NBS framework a definition has been developed for Germany: "*Wilderness areas in the sense of the NBS are sufficiently large, (predominantly) non-fragmented areas free of intrusive or extractive human activity. They serve to permanently provide for the ecological functioning of natural processes without human interference"* (Finck et al., 2013, p. 343). The key criteria are: size of the area (>500 ha), fragmentation and usage, and further "quality criteria" such as a natural and undisturbed character.

National parks and wilderness

National parks (NP), as popular tourism destinations (Mayer & Woltering, 2018) and part of the country's natural heritage, compromise 0.6 percent of the terrestrial territory and are regarded now - self-evidently - as wilderness areas (Schumacher et al., 2018). This ascription is also strengthened by recent marketing activities, tourism services and offers of NP and dependent businesses (e.g. wilderness trails).

Thus, we address the following research questions: Are German NP able to fulfill wilderness standards of the NBS given their regional development goals? Which potential wilderness areas are left when visitor as well as management disturbances (e.g. hunting) are considered? What new challenges arise with high visitor numbers and related pressure on potential wilderness areas?

Case Study Region and Methods

This study allows insights into the implementation of the NBS aims and its challenges by highlighting the Western Pomerania Lagoon Area NP, located at the German Baltic Sea coast. The planned extension of the terrestrial core zones provides a suitable framework to deal critically with the existing path network of the largest forest in the NP, the Darßwald (about 5,000 ha) and the peninsula Ostzingt (3,000 ha). Due to their outstanding natural

features and the associated high recreational value both areas are popular tourist destinations. More than 4 million visitor days per year were recorded in 2014 (Job et al., 2016). As a result, the NP is exposed to an enormous visitor pressure. Especially in the summer season, popular hiking routes are massively frequented by various user groups such as cyclists, hikers and horseback riders. To deal with the research questions an extensive GIS-analysis containing measurements, adjustments of the path network and the usage of appropriate tools (disturbance buffer) were applied. Moreover, scenarios including different levels of use intensity and possible path reductions were developed to identify potential wilderness areas.

Results

Due to the former forest management, the Darßwald has a very dense network of forestry roads and paths with a total length of about 281 km, which results in a path density of 55 meters per hectare (m/ha). More than half of the routes are intensively used by tourism. In the core zone of the Darßwald (1,500 ha), which has a total path network of 73 km, the path density is slightly lower (47 m/ha) than in the Darßwald in total. Nevertheless, these values are very high compared to other German NPs.

Under particularly strict NBS requirements with a special focus on disturbances (buffer 250 meters left and right to the base of the road) and prospective reductions of unused (mostly forest management) trails, 40 un-fragmented areas (average size about 8 ha) arise in the Darßwald and 29 un-fragmented areas (average size 18 ha) arise in the region Ostzingst. A rather “soft scenario”, where the disturbance factor is reduced to only intensively used trails, results in the extension of potential wilderness areas (from 9% to 38% of the total area). Nevertheless, under the presented conditions none of the areas fulfills all requirements, especially the minimum size of at least 500 ha cannot be realized in the forests of this NP.

Conclusions

To sum up, the NBS wilderness definition is not applicable for the terrestrial parts of the Western Pomerania Lagoon Area NP under mentioned conditions and probably, because of high path/road fragmentation and visitor frequency rates, in hardly any German NP. Even if NPs belong to the largest and most strictly protected areas, wilderness in German NP seems to be more a marketing slogan, than reality. Thus, the wilderness concept appears to be inconsistent with high visitation rates. However, the question arises if small undisturbed areas in a NP are also able to contribute to a high recreational value as well as to the conservation of nature? Wilderness has both an ecological and a subjective meaning and is not necessarily a fixed and objective concept. The visitor may perceive wilderness in the NP even on small areas. In aggregation, the forests of Western Pomerania Lagoon Area NP for instance provide more than 700 ha (ca. 9% of the total area) undisturbed terrestrial areas under strict NBS-conditions, as well as more than 3,000 ha (ca. 38% of the total area) under weaker requirements. Finally, the NP management has to decide whether their park should be a strict wilderness area or to allow visitors to access and gain unique nature experiences.

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Sounds as an element of human-coupled systems: Social-ecological evidence from Muir Woods National Monument

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Sounds have a profound impact on both social and ecological components of the environment (Francis et al., 2017). Although many studies have studied the social and ecological soundscape components independently (Francis et al., 2017), no research has examined the coupled social-ecological impacts of natural sounds. In this presentation we discuss findings from Muir Woods National Monument (MUWO) in California, USA, that shows how both social and ecological components of the soundscape influence and are influenced by each other in a dynamic and synergistic human-natural coupled system.

Background

Soundscapes are a collection of all the sounds in a designated area at a specified time (Pijanowski et al., 2011). This includes both natural sounds and human-caused sounds. Ecological, natural sounds fill acoustical niches and provide a variety of functions (Pijanowski et al., 2011). For instance, sounds help wildlife locate prey, avoid predators, and secure mates. Increases in human-caused sounds interfere with the ecological functions of natural sounds and have a variety of deleterious impacts, like interfering with animal abundance and changing key behaviors of animals (e.g. foraging, vocalizations, and movement) (Francis & Barber, 2013; Francis et al., 2017). Socially, soundscapes also influence humans. For instance, increased human-caused sounds impact mood states, recreational experiences, and cognitive restoration (Abbott et al., 2016; Francis et al., 2017; Stack et al., 2011). Conversely, natural sounds are more preferred by people and contribute to human health and well-being (Francis et al., 2017) Collectively, this body of research illustrates the profound roles that sounds play in our social-ecological systems.

As we begin to recognize the value of intact soundscapes free from human-caused sounds, we are also recognizing that areas without human-caused sounds are becoming scarce (Buxton et al., 2017). For instance, cross the entire National Park Service (NPS) of the USA, human-caused sound is a wide-spread problem (Buxton et al., 2017). This includes some of the most wild and uninhabited protected areas of the USA, in which 12.1% have noise pollution levels above naturally ambient levels (Buxton et al., 2017). Considering many park and protected areas try to protect valuable resources while also providing visitor experiences, these findings illustrate a critical need to study and manage soundscapes to provide both social and ecological benefits.

Methods

The findings from this research were collected at MUWO during the summer of 2016. Mutli-disciplinary approaches were used to collect data for this project using a quasi-experimental approach. Previous research showed that signage can reduce visitor cause noise at MUWO (Stack et al., 2011). Thus, our treatment in the approach was to introduce signage about reducing visitor-caused sound at MUWO, and the control was to remove signage (existing conditions). To collect ecological data, trained researchers conducted point counts to record bird diversity information. Social science data were collected using intercept surveys of MUWO visitors. Social science data were analyzed using stated-choice modeling to develop utility scores for visitor preferences of management strategies related to reducing visitor-caused sounds. Ecological data were analyzed using a variety of statistical models that account for both the treatment and control periods.

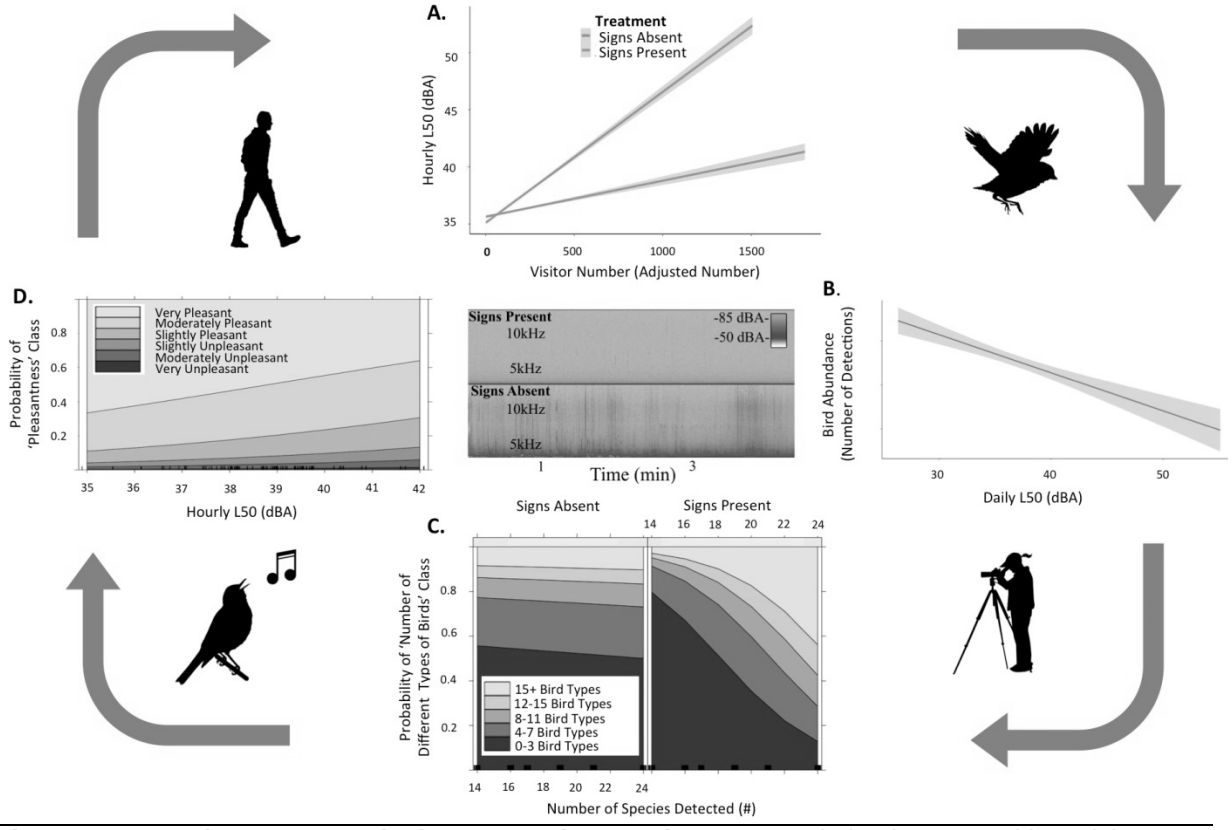

Figure 1. Soundscapes couple human and natural systems. (A.) Signage asking visitors to 'Maintain Natural Quiet' in Muir Woods National Monument USA led to lower sound levels across a range of visitor numbers ($p<0.001$). The center of the figure displays spectrograms (frequency x time) of audio recordings taken during 'signs present' and 'signs absent' weeks. (B.) Bird abundance increased 5.92% with every 5 decibel decrease in sound level (dBA, L50; <0.001). (C.) Human visitors reported experiencing more 'Different Types of Birds' with signs present (Treatment: $p=0.039$; Number of Species: $p=0.59$; Treatment*Number of Species: $p=0.035$) and (D.) ranked the soundscape as more pleasant with decreasing sound levels ($p=0.012$).

Results

Figure 1 displays the coupled human-natural relationships from natural sounds. We found that similar to previous research (Stack et al., 2011), signs about reducing visitor-caused sound were effective in reducing the decibel levels in MUWO (Figure 1, A). Ecological monitoring of bird diversity found showed that bird abundance increased nearly 6% for every

five decibel decrease in sound level (Figure 1, B). Visitors to MUWO also perceived significantly higher levels of bird biodiversity when signs were present (Figure 1, C). Additionally, visitors reported the soundscape as more pleasant with decreased visitor-caused sound levels (Figure 1, D).

Discussion

When viewed collectively, we believe the positive feedback cycle displayed in Figure 1 has potential to markedly increase the effectiveness of parks protected areas for both wildlife and human experience. Natural sounds provide a way to link both social and ecological components of parks and protected areas. Socially, visitors achieve more satisfaction from their experiences as visitor-caused sound decreases. Part of the reason for this is that visitors may be able to see more wildlife, which is a key motivating factor for visiting park and protected areas. Additionally, visitors indicated that they supported management actions that reduced visitor-caused sound. Visitors who experienced the quieter treatment days expressed even higher preferences (through utility scores) for management that reduced visitor-caused sounds. This is additional evidence that visitor experiences are improved through reducing visitor-caused sounds. Ecologically, as visitor-caused sound was reduced, bird diversity increased. This shows that reducing visitor-caused sound also has ecological value. The findings from this research provide evidence that sounds provide a measurable link that couple human-natural systems.

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Assessment of the scenic beauty and attitudes towards deadwood experiment plots in the Bavarian Forest National Park, Germany

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Introduction

Forests cover almost one third of Germany. After centuries of cultivation, only a few forests are now developing naturally, e.g. the core zones of national parks, like in many other European countries. An essential element of natural forest development is deadwood, which occurs in most managed forests in Germany only to a small extent. However, deadwood is considered as an important factor in preserving forest biodiversity, which has been proved by many studies (Seibold et al., 2015; Kirchenbaur et al., 2017). Thus, it plays an important role in implementing measures according to the German national strategy on biodiversity from 2007. Nevertheless, there is little knowledge about the impact of artificially enriched deadwood on the scenic beauty perception of forest visitors.

Within the framework of the research project BioHolz (www.bioholz-projekt.de/node/153), the influence of deadwood on forest biodiversity is investigated from an ecological perspective by creating experimental plots characterized by different arrangements of deadwood structures. From a social-science perspective, it is of great interest to assess the perception and valuation of the deadwood experimental plots by forest visitors who were 1) intentionally led to them or 2) were confronted with pictures of the plots at the visitor center of a national park. Finally, we draw conclusions about the preferences of forest visitors, which are relevant when implementing measures for (artificial) deadwood enrichment in managed forests. Similar methods using scenic beauty valuation approaches are often implemented in landscape or forest preferences studies (e.g. Daniel, 2001; Kohsaka & Flintner, 2004; Ribe, 2009; Edwards et al., 2012).

Survey Area and Methods

The present study was carried out over several weeks in the summer and autumn of 2017 at deadwood experiment plots in the Bavarian Forest National Park, Germany, as well as in the main visitor center of the Park, where the participants were randomly approached and selected. Visitors, who were willing to participate in the onsite study, were then taken by bus to the deadwood experiment plots.

The nine deadwood experiment plots (plus one control plot) were artificially created and differ systematically in structure and distribution of the deadwood. The standard plot size is 50x50 meters within a block design in stock. The deadwood is either concentrated in one place or dispersed, there are standing or lying pieces, as well as stumps and combinations of all. The experimental areas are intended to depict various possibilities of artificial deadwood enrichment in order to foster forest biodiversity, and are intensively monitored regarding species diversity.

The respondents were guided past the experiment plots along a newly established path, where they were asked to make a scenic beauty valuation on a scale from -5 (extremely negative) to +5 (extremely positive) based on their visual impressions of each of the plots. Finally, they were asked about their attitudes towards nature, their forest activities and their socio-

demographics in a standardized interview. To control for the influence of the level of information about deadwood and the experiment, we systematically informed every second group of respondents about the purpose of the experiment before the visit, while other groups only afterwards. In addition, the direction of the route along the path was randomized.
The remainder of the respondents was interviewed at the visitor center, using the same questionnaire, except that standardized photos of the experiment plots were used. A total of 292 forest visitors participated in the study, with 76 interviewed onsite and 216 interviewed offsite.

Preliminary results

First results using general mixed models show that the scenic beauty assessments of the onsite and offsite respondents differ significantly between the experimental plots. Overall, with one exception, all plots were valuated positively by the respondents, whereby the offsite participants rated the experimental plots significantly more positive (+1.4 on average). Both groups share a higher preference for experimental plots with a disperse deadwood distribution. Onsite participants rated the reference plot, where the forest was not manipulated at all, the most positive (+2.4), while the offsite participants rated the plot with dispersed standing deadwood elements best (+2.9). Both groups rated the plot with concentrated standing logs worst (onsite -1.6, offsite -0.4). It seems that the respondents preferred dispersed deadwood and they disliked the striking appearance of concentrated standing dead trees. In both groups knowledge as well as walking direction had no significant influence on the overall valuation of the plots.
The questions concerning the attitudes towards transferring these deadwood enrichment concepts to managed forests showed that most respondents would continue to visit the forests (over 70%) and not displace (15.9%). More than 70% also think that these plots make sense and nearly two thirds (63%) support the idea of deadwood enrichment in general.

Conclusions

In this study, forest visitors' scenic beauty assessments of experimental plots evaluating different forms of deadwood enrichment were conducted for the first time. Preliminary results show that several variations of deadwood enrichment are evaluated quite positively by forest visitors, especially dispersed, shaded and rather unobtrusive measures. In general, a majority of the respondents also supports the idea of enriching deadwood in managed forests in the way illustrated by the experimental plots. Most respondents would also not change their forest recreation patterns due to the existence of deadwood enrichment plots.
The results lead to some recommendations for forestry: It is possible to artificially enrich deadwood without impairing the recreational experience and the aesthetic feeling of forest visitors. However, care should be taken to avoid overly conspicuous deadwood clusters close to forest paths and transparent information should be provided.
Future research should control for the following aspects: The national park setting of the study might lead to a sampling bias towards respondents who are more interested in forests compared to the general public and who have the tendency to favor pro-biodiversity measures. Therefore, we need to expand the study with a representative offsite sample. Finally, it is worth repeating the study on a regular basis as the deadwood on the plots only begins to decompose which will most likely change their visual characteristics.

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Landscape preferences of tourists hiking in the trails of S. Miguel Island (Azores, Portugal): importance for conservation

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In the last decade, the Azores archipelago turned from an almost unknown region to a highly awarded tourist destination. Furthermore, in April 2015 the local air space was opened to low cost flights, leading to an increase in the number of national and international arrivals. Since nature-based activities have been the main reason for tourists to visit the Azores (Queiroz et al. 2014), most of them developed within the Azorean protected areas, the fragile balance between recreation and conservation may be compromised. One must not forget that these are small oceanic islands that need particular attention when it comes to plan and manage their protected areas (Calado et al. 2014). On the other hand, these tourists' interest on the Azorean nature, may be used to call local authorities' attention upon the importance of ecosystems' conservation, required to fulfill the cultural services they provide.

The Azores are part of the Macaronesian biogeographic region, which has in the primordial forest remains its main asset. The Azorean trails were designed to maximize the tourists' contact with nature and the Azorean landscape, including agricultural areas (mainly pastureland) and different forest types dispersed along the trails. We selected São Miguel Island (SM) as a first case-study, because it is the larger and more populated island and is also the one receiving more tourists (SREA 2017). In order to understand (i) the tourists' motivations for hiking, and (ii) their landscape preferences along the visited trails, we applied a structured questionnaire to a sample of 185 trail users in four trails in SM, with different land cover patterns, during the summer of 2017: "Mata do Canário" (MC); "Vista do Rei" (VR); "Salto do Cabrito" (SC); "Lagoa do Fogo" (LF) (Figure 1). The questionnaire was divided into several sections; one of them allowed us to characterize the tourists' profile, another was designed to evaluate their main motivations to visit the Azores and hike on trails, and yet another meant to rate their experience on the trails and ask them about their perceptions concerning the trails' use by hikers like them. All of these are important issues for future recommendations to be included on management plans for the areas visited.

The gender distribution was almost equal and the mean age ranged 40 years. The most represented nationalities were German, Dutch, French, Spanish and Portuguese, corresponding to employed workers with college or postgraduate degrees, with relatively high income, which visit nature destinations relatively often; they used the internet to organize their walks, rented a car, were accompanied by their partner, and stayed at a hotel.

By large, the main motivations to visit hiking trails in the Azores were “nature” and “landscape”. Trail conditions were evaluated between average and good, with higher scores for accessibility, safety, natural beauty, amount of waste, behavior of visitors, and maintenance.

To evaluate landscape preferences along the trails, tourists were asked to pin-point their preferred trail sections in an orthophotomap covered with a geo-referenced grid, whose cells were then used to calculate the percent cover preferences for each type of vegetation cover. We then compared the trail vegetation cover that we have on our SIG’s database with the tourists’ preferences, in order to understand the importance they gave to the presence of forest or other types of soil uses, along the trails. The main results are summed in figure 1.

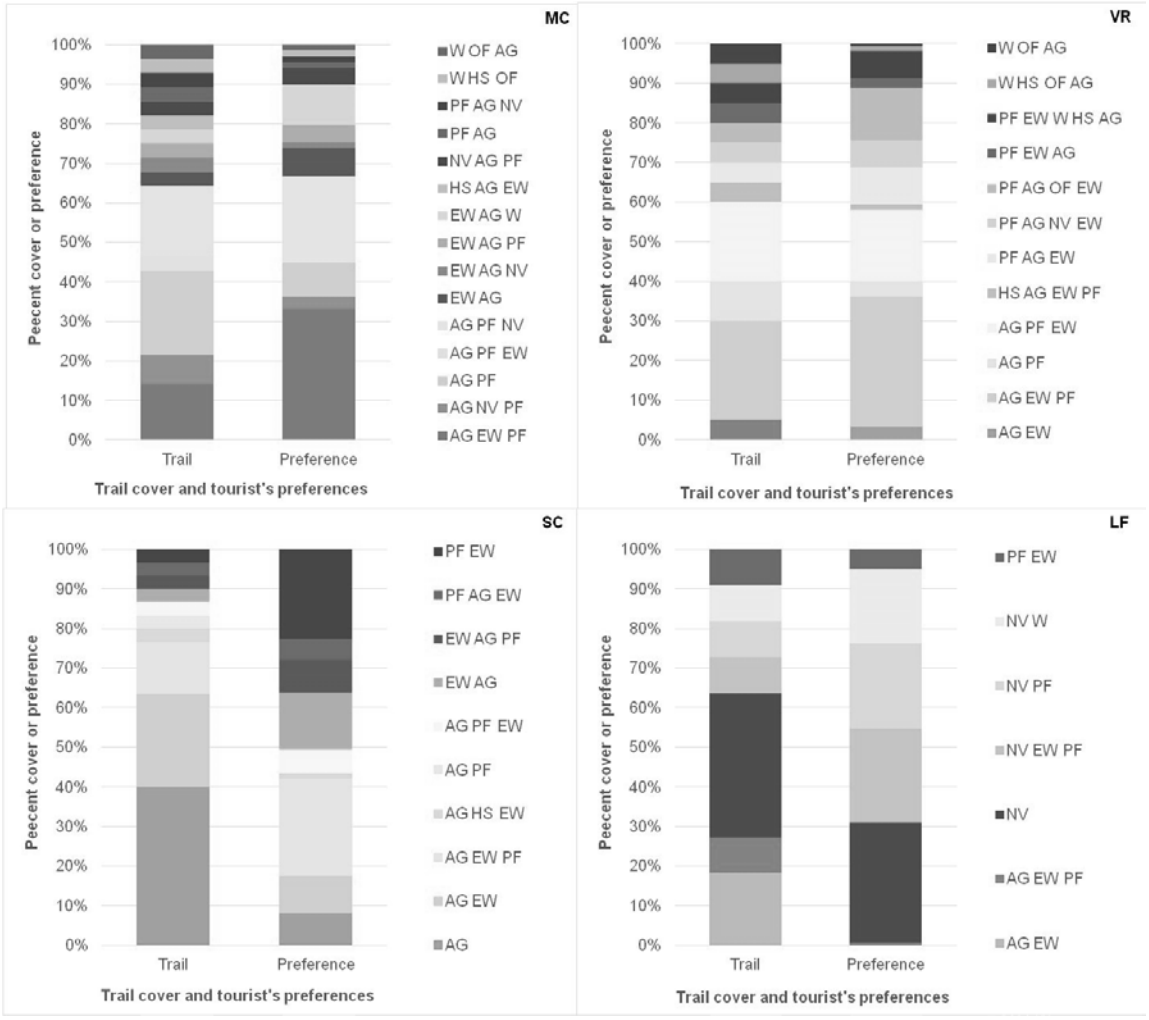

Fig. 1 – Match between vegetation percent cover along each of the 4 trails (MC – Mata do Canário; VR – Vista do Rei; SC – Salto do Cabrito; LF – Lagoa do Fogo), and tourists’ preferences for certain sections of the trail; Vegetation codes: AG - Agriculture (mainly pastureland); EW - Exotic woodland (mainly *Pittosporum undulatum* and *Acacia melanoxylon*); HS - Human settlement; NV - Natural vegetation (mainly scrubland and forest); PF - Production forest (mainly *Cryptomeria japonica* and *Eucalyptus globulus*); W - Water bodies; OF - Other forest types.

When we look at trails MC and VR, where pastures (AG) are dominant along the trail, these seem to match the visitors’ preferences however, when we turn into SC trail that has also a large dominance of agricultural areas, tourists demonstrated a greater preference for the

sections with forest (PF and EW), maybe because these lay close to a big waterfall. As for LF trail, and since it lays mostly within a protected area (SAC of Natura 2000), we find a larger percent cover of native vegetation (NV) but the tourists' preferences for the sections of the trails passing through these type of vegetation, greatly surpass the other sections of the trail, showing that in fact preserving the natural ecosystems is a great way also to increase their touristic potential. The global results and the tourists' preferences are discussed within a sustainability framework, allowing the valorization of the different landscape components.

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Mapping of landscape attractiveness for the development of a monitoring indicator for Mediterranean wetlands: "Landscape perception indicator". Ichkeul protected area case study, Tunisia

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Introduction

Mediterranean wetlands are important components of the landscape, characterized by their specific biodiversity, water and atmosphere varying along seasonal factors. They also play vital functions for their habitats and surrounded ecosystems providing a highly diversified goods and services to humans. However, trends show that they are still threatened and destroyed because of human overexploitation and pollution, exacerbated by more recent global changes. Often considered as useless or unhealthy for a long time, a large part of these zones disappeared with the expansion of drainage, embankments, hydraulic installations and urbanization. For example, Tunisia has lost 28 % of its wetlands in the last 100 years (Mediterranean Wetlands Observatory (MWO), 2012).

To reverse this trend, we conducted an innovative study in 2013 and 2017 in an emblematic Tunisian protected wetland (Ichkeul), aiming at developing a new "social" argument, beside the "ecological" one, in favor of wetlands protection. Results from this new Social-landscape research angle aims at informing decision-makers about the various human and social benefits provided by wetlands to visitors (Chazee et al., 2017). Located in the sub-humid plain of Mateur, this wetland represents a very varied ecosystem in Tunisia. It occupies 12,600 ha, successively covering the Jebel (Mountain) of 1,363 ha, Ichkeul Lake of 8,500 ha, and swamps of 2,737 ha (El Ghezal, 1984).

Research Objectives

The aim of the study was to define visitor's perceptions of landscape attractiveness and to understand the cluster of factors that increase visitor's attraction to Ichkeul Lake. The methodology of the research was based on the ecosystem services framework of the Ramsar Convention, with focus to cultural (recreational and educational) services.

Methods

Data were collected through semi-structured interviews at Ichkeul National Park. These interviews were conducted in 2013 (100 interviews) and 2017 (70 interviews) among Ichkeul visitors at different places (trails, eco-museum, parking, Lake shore, mountain top), with a sample taking into account the diversity of visitor profiles, age and socio-professional categories. These interviews were conducted during weekends, school holidays, public holidays and working days to capture the highest diversity of visitor profiles. Interviews focused on perceptions of Ichkeul's landscape and the place occupied by the landscape in the attractiveness of the site. The interviews consisted of four main domains through the use of an index: (i) the most popular landscape element, (ii) the location where the landscape seems the most attractive, (iii) the most attractive colors and (iv) the period of the year when the wetland is the most attractive. The percentage of different indexes is calculated in relation to

the total of the visitors' responses, then GIS tools have been used to map the spatial localization of landscape perceptions related to Ichkeuls' wetland.

Results

Ichkeul wetland is characterized by its great diversity of landscapes (Figure 1). They are ranked in increasing order of land coverage: lake, marsh, cultivated, forest and urban landscapes. However, the comparison between the general survey results (2013) and the landscape perception mapping (2013 and 2017) shows that the combination of the Jebel (17% of total responses of visitors in 2013 and 19% in 2017) and the lake (20 % of total responses in 2013 and 2017) are the key landscape elements fostering visitors' satisfaction. The factors that influence the perceptions of this distinctive Ichkeul landscape are the geomorphological diversity and the mountain top view (66% of total response in 2013 and 70% in 2017) with a remarkable panoramic view of the lake. This Jebel-Lake relationship in landscape appreciation is also enhanced by the high altitude of the Jebel crest line providing impressive and wide angle of view. Green is the most appreciated color (56% in 2013 and 60% in 2017) followed by blue color (21% in 2013 and 23% in 2017). Spring (73% in 2013 and 69% in 2017) is by far the most attractive season to visit the site, especially early morning and at sunset (Figure2). We emphasize that social and individual perceptions did not realy change within the 5 years period, indicating the persisting value of both Lake and Jebel in Landscape appreciation among recreational visitors.

Landscapes make it possible, directly or indirectly, to appreciate nature and to enhance emotions created by a mix of esthetic, ecological, social and cultural dimensions. Detailed responses in qualitative surveys show that landscape and quietness play an important role in feelings of well-being, discovery, contemplation, spirituality and emotion. In Ichkeul, these levels of sensation originate from this Landscape integrity mainly structured by four elements: Lake, Jebel, flora and birds.

Implications

Clearly, aesthetical landscape and quietness are keys for a successful visit and social satisfaction of general public. Based on this study, Landscape approach could be further developed to measure and monitor social and human benefits provided by ecosystems to visitors. To sustain the attractiveness and value addition of Ichkeul for the well-being of visitors, decision-makers and site managers need to protect landscape integrity and in particular the four key elements indicated above. A landscape perception index and its mapping can help managers of protected areas, local authorities and sector planners to decide their land-use planning and client-oriented services where recreational visitors are targeted. In addition, the use of GIS tools helps to create a wetland database and the results of thematic maps produced (such as the landscape perception map) plays an important role to assess and monitor these areas for a better sustainability. As a perspective, it would be appropriate to set up a wetland platform where all informations are listed and where visitors can indicate their perceptions following their site visit. Their responses can become a monitoring indicator to better convince local and national decision-makers of the social benefit that nature provide when taking into account visitor's criteria of well being..

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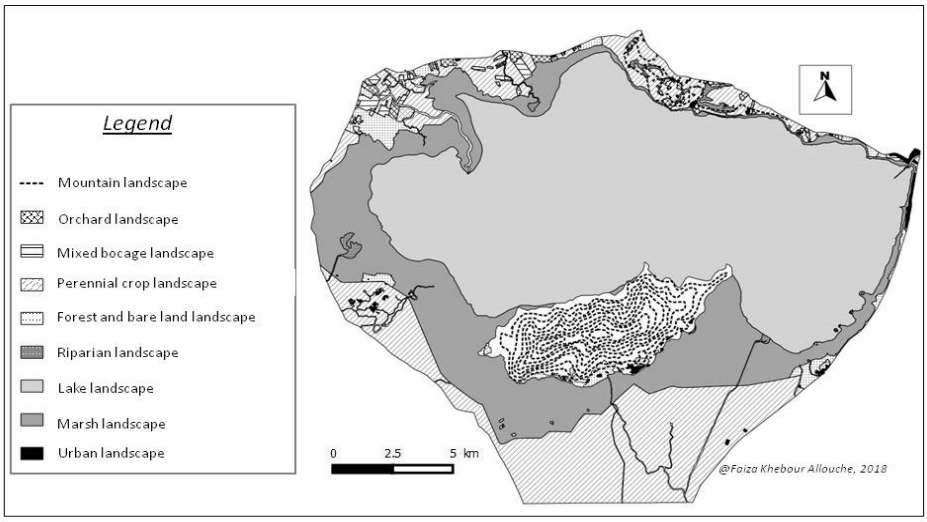

Figure 1. Landscape typology map of Ichkeul wetland, Tunisia

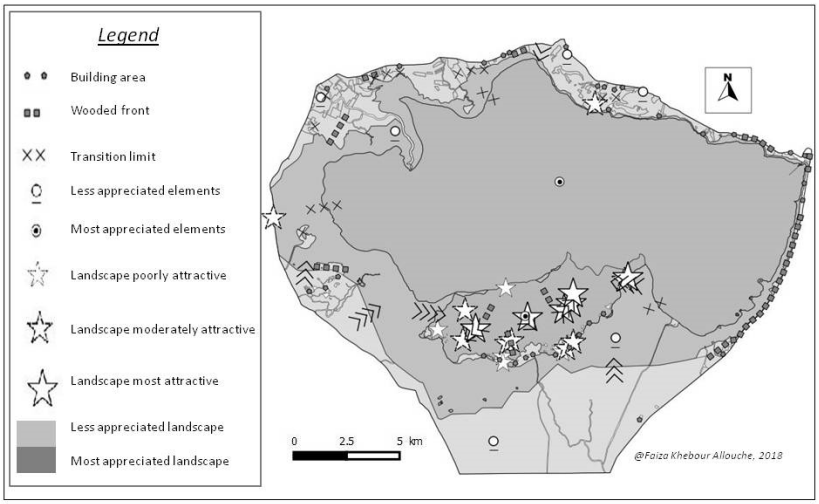

Figure 2. Landscape perception map of Ichkeul wetland, Tunisia

Biodiversity of Paklenica National Park as a prerequisite for the development of special types of tourism

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Biodiversity as a particularity of the Park

Paklenica National Park was established in 1949 as the second national park in Croatia, after the National Park of Plitvice Lakes. The richness of flora and fauna is the distinctive feature or fundamental heritage of Paklenica NP with numerous endemics, which originate from the last glacial period. The flora of the Park is made up of about 1110 species and subspecies, which form a peculiar and varied vegetation with a large number of endemic species (67). Its fauna is rich and varied, with particular emphasis on the endemism of speleofauna. The largest biological attraction of the park is a rich ornitofauna with the recorded 225 species of birds. Large beasts have also been found in the park, such as bear, wolf , wild cat and lynx. Pristine nature and great biodiversity are the primary motives of visitors. Since 2016, wildlife tourguiding has been practiced, with a special focus on birdwatching. Further activites are observation of plants, butterflies, speleophagens, mammals (observation of the chamois). In order to improve the quality of wildlife tourism in NP Paklenica, an internal wildlife guidebook has been written. Educational workshops on flora and fauna of the park are also organized, as 65.81% of all the visitors are hikers.

The aim of the research and the methodology

The aim of this research is to explore the extent to which biodiversity influences the Park's attendance and the development of the specific types of tourism in the Park's area. In order to test the influence of biodiversity as the paradigm/prerequisite of the tourism development, it is necessary to analyse all the Paklenica NP biodiversity factors and explore the visitors' views and the way in which the biodiversity of the Park influences the development of different forms of tourism. In doing so, a survey was used as a primary form of the empirical research of this paper. A survey research has been conducted by using a structured survey questionnaire on a sample of 359 respondents (N=359). On the basis of a structured questionnaire which included a set of closed and open ended questions, a face-to-face interview was used as the method of data collection. The survey consists of a total of 31 questions. The first 11 questions are close-ended and relate to a socio-demographic characteristics of the respondents. The second part of the survey questionnaire concerns the Park's biodiversity. It consists of 20 claims followed by a 7-item Likert scale according to which the respondents express their level of agreement or disagreement with a certain claim.

Survey on the biodiversity of the Park

The survey contains 20 claims regarding the Park's landscape diversity, and the answers range from 1 (Strongly agree) to 7 (Strongly disagree). The answers are expressed in percentages (Table 1). The variations of the responses are different and are expressed in percentages. Most respondents (44%) answered that they fully agree on the outstanding biodiversity of the park, and agree or generally agree. Considering the presentation and accessibility of the fauna diversity, most respondents (28%) fully agree, 24% agree and 25%

mostly agree. The following are the statements in which the respondents fully agree with about 20%, or one fifth: "The flora diversity is well presented and accessible"; "Considerable investments are needed to develop bird watching tourism"; "Wildlife tourism is a long term perspective of tourism in the Park"; "Watching the vegetation is particularly interesting"; "The co-operation of all subjects (local community, travel agencies ...) affecting tourist attractions is good"; "It is necessary to develop a tourism product park that will bring a more diversified offer and thus attract new visitors"; "Tourism growth needs to be controlled to stop unwanted nature devastation"; "We feel that we can have a positive impact on the decisions of the Park authorities about the activities in the Park. Worth remarking is the claim where only 16% of respondents fully agree that endemic species are priceless treasure of the Park, or that bird world is exceptionally interesting for observation. The largest number of variations in the responses were the following: "Wildlife Tourism is a long-term perspective of tourism in the park"; "Mammals are extremely interesting for observation." "Ecotourism is a long-term perspective of tourism in the park". Obviously, in the promotion of wildlife tourism, bird watching tourism and ecotourism, more or better effort should be invested, either through various types of education or in some other ways. The responses confirm the hypothesis "The biodiversity of Paklenica National Park is not adequately valued as a tourism development paradigm", and they also suggest that this issue should be systematically addressed. Thus, wildlife tourism as the primary motivation for the visit is claimed by18% of respondents, 24% of respondents are interested in this form of tourism, while 40% of respondents would like to attend the education program on flora and fauna.

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Table 1. Survey on the biodiversity of the Park

1	2	3	4	5	6	7
Strongly disagree	**Disagree**	**Somewhat disagree**	**Neither agree, nor disagree**	**Somewhat agree**	**Agree**	**Strongly agree**

Expressed in %	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1. The park is in small space exceptional biodiversity.	0	2	8	10	12	23	44
2. The flora diversity is well presented and accessible	0	0	5	27	25	24	19
3. Faunal richness is well displayed and available	0	0	7	19	21	25	28
4. The bird world is very interesting to observe	0	8	10	10	25	31	16
5. Considerable investments are needed to develop bird watching tourism	0	4	10	19	24	21	22
6. Wildlife tourism is a long term perspective of tourism in the Park	2	2	7	28	25	18	18
7. Ecotourism is a long-term perspective of tourism in the park	0	5	5	31	26	16	17
8. Mammals (bear, wolf, and lynx) are extremely interesting for observation	10	3	9	16	19	26	17
9. Watching the vegetation is particularly interesting	0	3	12	22	21	21	21
10. Endemic species are priceless treasures of the park.	2	4	5	24	18	31	16
11. I was very impressed with forest communities.	0	5	9	18	27	23	18
12. The co-operation of all subjects (local community, travel agencies ...) affecting tourist attractions is good.	0	0	4	26	25	26	19
13. We feel that we can have a positive impact on the decisions of the Park authorities about the activities in the Park.	0	0	9	19	28	22	22
14. It is necessary to develop a tourism product park that will bring a more diversified offer and thus attract new visitors.	0	5	7	14	39	14	21
15. It is necessary to carry out additional assessments of impact on thresholds and reception capacities in relation to existing infrastructure.	2	0	10	20	33	14	21
16. Tourism growth needs to be controlled to stop unwanted nature devastation.	2	4	12	14	26	23	19

Outdoors Economics 2 - Markets, values and organizations

Revealed and stated preferences and their determinants for cross-border visits of protected areas in the Polish-German border region

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Objectives

Since the full opening of the border between Poland and Germany in 2007 in the wake of Poland's accession to the Schengen Treaty, it was to be expected that the shadow effect of the border on tourist activities would abate and that the dividing effect of the border would be restricted to cultural distances (Wachowiak, 1997; Knowles & Matthiessen, 2009). Several million people live close to the nearly 500 km long border between both countries. Large parts of this region are sparsely populated, structurally weak and provide huge potentials for nature-based recreation and tourism in many protected areas of all categories. However, the attractiveness of those parks is not fully recognized by tourism yet.

According to earlier studies, cross-border tourism in the protected areas has only been discovered rarely (e.g. only a share of 1.5% Polish visitors in the German National Park "Unteres Odertal"). Obviously, this national border still constitutes an (especially mental and cultural) barrier for tourism (Dębski & Niemczak, 2014; Kurth et al., 2018). Therefore, the present study examines the barriers to cross-border tourism for the case of protected areas along the Polish-German border between inhabitants of both countries. These protected areas are a suitable object of investigation insofar as the natural prerequisites are comparatively similar on both sides of the border and thus can be neglected as a moderating factor for the travel decision. In our study we compare the revealed and stated preferences for visits of protected areas in the neighboring country.

Methodology

A representative online survey was conducted in the Polish Voivodships (regions) Zachodniopomorskie and Lubuskie, as well as in eleven bordering German counties (including Berlin) from Vorpommern-Greifswald in the North to Spree-Neiße in the South. 1,312 respondents participated in the survey, 656 in Poland and Germany each. In addition to sociodemographic characteristics, questions were asked in relation to the knowledge about and interest in protected areas in both countries, the travel behavior, the perception of the border and the emotional, cognitive and intentional image attributes of the neighboring country. The prejudice measurement took place in the context of a cognitive context framing inspired by Liebe et al. 2016 to reduce the bias of social desirability. The revealed preferences for visits of protected areas in the neighboring country were operationalized by the self-reported visits of the respondents to a list of 41 protected area destinations in the border region.

In order to measure the stated preferences for visits of protected areas in the neighboring country, the respondents had a simple choice task to answer, in which they should select the preferred protected areas for a hypothetical day- and a weekend-trip in the border region out of the same 41 protected area destinations which were visualized on a map. The purpose is to first investigate the share of protected areas chosen in the neighboring country and second, to analyze the influences on the decision to visit a protected area in the neighboring country.

That is, we tested among other the distance from the place of residence, the protected area category, the familiarity of the protected area, the affinity of respondents to protected areas, the location in Poland or Germany, possibly existing prejudices and other attitudinal and image variables (see Mayer et al., 2018 for details).

Main Results and Contributions

Results show that significantly more Poles visited protected areas in Germany (18.3% of Polish respondents) than the other way around (10.9%). All in all, the respondents' stated preferences for day- and weekend-trips are very similar. Also the stated preferences for visits in protected areas are very similar to the revealed preferences which validates the results of the choice task. The share of chosen protected area destinations in the neighboring country is 16.8% for the day-trips and 20.9% for the weekend-trips.

Similar to the actual park visits, the number of both revealed and stated visits of Polish and German respondents to a protected area are negatively related. Polish respondents have a statistically significantly stronger tendency to choose protected area destinations in Germany both for day- and weekend-trips than the other way around. While 81.3% of day-trip choices of German respondents are directed to domestic protected areas, this is only the case for 69.8% of Polish day-trip choices. In contrast, only 6.4% of day-trip choices of German respondents refer to Polish parks while the Polish respondents indicate 24.5% preferences for a park in the neighboring country (the missing percentages derive from respondents preferring other destinations or abstaining from the hypothetical trip).

The following main drivers of cross-border visitation of Polish and German parks can be identified: Visitors of parks on the other side of the border are younger, have better active and passive language skills of the respective neighboring language, have a higher education level, are relatively more affluent, live closer to the border and are not only more interested in and inclined to travelling abroad but also have indicated a higher number of cross-border trips for leisure reasons. Respondents travelling or willing to travel to the neighboring country for visiting protected areas know more about parks in general, have a better top-of-mind knowledge and aided awareness of both domestic and neighboring parks, visit parks more often and show more travel motives related to parks.

Revealed and stated visitors of protected areas abroad show a lower border perception as well as a significantly lower aggregated barrier effect of the border. In general, they have a more positive affective, cognitive and intentional image leading to a more positive overall image of the neighboring country. Regression models show that combinations of these variables are the best predictors of a destination choice for the neighboring country's parks.

One major difference between revealed and stated preferences for parks is the fact that reported previous visits to protected areas abroad positively influence the probability of choosing such a destination in the future. It also seems that for revealed preferences overall country image and negative prejudices play a smaller role compared to the stated choices (Mayer et al., 2018).

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Place-based approach to outdoor recreation economics: empirical analysis of recreational demand in forests

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Introduction

Since Tuan's seminal work on sense of place (Tuan 1990 [first ed. 1974]), there has been an increased focus on place-based approaches and place-related values. While understanding the complex origins of such value in places remains a challenging issue, there is now widespread acceptance of the idea that recreational sites are not just about functional (either natural or man-made) attributes, but are also made up of unique socio-spatial recreational qualities. In the broad field of social sciences, significant work has been done in disciplines such as environmental psychology, environmental philosophy, sociology and geography (Farnum, Hall *et al.* 2005). In contrast, economics seems to have taken less interest.

Place based values as the results of several proximity relationships

In this paper, we take a first step towards the introduction of more place-based perspectives into the field of outdoor recreation economics. We examine the possibility of coupling two conceptual traditions, as synthesized by a dual definition of "proximity".

In the standard (neoclassical) paradigm, the spatial dimensions of outdoor recreation are frequently confined to the effects of physical distance between sites and individuals. Spatial distance appears as a proxy for "prices", as is the case in the travel costs and hedonic pricing methods (Hanley, Shaw et al. 2003). From this perspective, distance and space are considered as exogenous factors, with greater emphasis placed on market based mechanisms (fees, taxes, travel costs). The main focus is on individual behavior, with little attention paid to social (spatial) interactions

By comparison, economic geography has placed great emphasis on analyzing coordination patterns and socio-spatial relationships. A good example of this is the longstanding tradition of research into industrial clusters, which aims to identify the economic benefits for firms of being close to each other. From this viewpoint, the "places" where human activities develop are not predefined (by physical nor administrative limits) but rather appear as endogenous social constructs, *i.e.* the results of social interactions. To characterize the diverse nature of such interactions, another form of "proximity" between actors may be suggested; bearing in mind that "proximity" is not confined to the geographical sense of the word, but also incorporates similarity or adherence between actors or organizations (Torre et Zuindeau 2009). By focusing on social interaction, it is regrettable that the former approaches somehow neglect proximity with natural environments.

Methods and results

We apply this combined analytical framework to analysis of recreational demand in forests in southwest France. Most of our empirical material comes from second-hand data collected in

prior research projects. The material comes from a telephone survey (n=500) carried on a representative sample of the regional population (Aquitaine) in 2012.
Our preliminary results confirm the importance and intertwined nature of various types of proximities toward the definition of "recreational places" from an economic perspective.
First, we identify several types of proximity between individuals: henceforth referred to as *organizational* proximity (as it refers common practices), *institutional* proximity (shared values and common knowledge), and *geographical* proximity (relating to living areas). Such a typology is comforted by prior results on recreational demand as exemplified by the high popularity of walking, the time spent with the family, expectations for calm and quietness. Similarities (i.e. proximities) between individuals were also found when they expressed opposition (to waste or motorized activities) or lack of information (on property rights and forest names). In this context, the first two categories of proximity may be perceived as "non-geographical" proximities in the sense that individuals do not need to live close to one another in order to share common ground. Nevertheless some characters seem to be spatially distributed. This is particularly the case for many characters (practices, equipment, types of forests appreciated) falling under the scope of organizational proximity. By comparisons, the variables used to evaluate institutional proximities do not show statistical dependence with geographical origins.
Introducing the notion of proximity to site (measured in terms of physical distance) adds another valuable aspect of place-based characterization. Once again, characters involved in the definition of organizational proximities seem to be more statistically dependent on site proximity than those involved in institutional proximities. Some results may appear counterintuitive. For instance, we did not find any strong opposition between people who declared that they "live in a forest" (i.e. distance from site = 0) and of the rest of the sample when they were presented with the principle of increased wood exploitation. Similar results occurred with the payment of access (although they do visit forests more often). Surprizingly, fewer of the "locals" were able to name their most visited place although they live closer.
Additional results, more complex empirical techniques (multivariate analysis) and the challenges offered by more refined data (PPGIS) will be discussed in the paper.

Discussions

Though our work must be conceived as explanatory in nature, we believe that introducing place based approaches in outdoor economics can be highly relevant.
Regarding organizational issues, we expect that common ground and shared values, potentially built upon recreational places, may be powerful instruments to improve economic coordination between stakeholders. To fully exploit this issue, we now need to extend our analysis to other stakeholders (forests owners, public organization, local elected people, etc.). Defining place as social constructs may also partly account for the failure of planning processes. From a theoretical perspective, place based approaches offer a refreshing view of several traditional economic assumptions.
Further innovations in development strategies may also be expected. Using a similar analytical framework, some authors supported the idea that many of the above-mentioned socio-spatial relationships (i.e. "social proximity") favor the appearance of a specific local social resource that ultimately turns into profitable economic product differentiation. This has traditionally been tested in the case of agricultural products. We believe that it may also be useful for many nature based tourism services. In France, the National Forestry Office has launched a label (*Forêt d'Exception*) which puts great emphasis on the quality of the governance and coordination processes. Our research may help in identifying possible outcomes in terms of the economic added value stemming from such labelling process.

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Governance and economic impact of whale-watching. The case of El Vizcaíno Biosphere Reserve, Baja California, Mexico

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Whale-watching (WW) has gained considerable importance for coastal communities as a potentially sustainable form of tourism-driven resource use (Brenner et al., 2016). However, as common-pool resources marine wildlife bears the risk of being overly exploited to the detriment of animal populations and economic sustainability. Therefore, careful management and use regulation based on capable institutions are required (Hill et al., 2015). Governance arrangements fulfilling these requirements need to be accepted by (local) stakeholders and resource users. To assure compliance with regulations stakeholders must be involved in decision-making about management issues and should participate in the economic benefits of whale-watching. Both factors are major drivers of positive conservation governance attitudes. Therefore, this presentation analyses the nexus between governance and economic impact of WW for the case of the coastal lagoons in El Vizcaíno Biosphere Reserve, Baja California, Mexico, a globally-renowned WW destination, declared World Natural Heritage Site by the UNESCO in 1993 (see Figure 1).

Our study is based on one quantitative and two qualitative studies. The quantitative methods applied to assess the economic impact of whale-watching consisted of a demand- and supply-side survey. A random sample of 382 whale-watchers was asked about their trip motivation, expenditure patterns, and sociodemographics during, or after, their WW tour, using standardized intercept interviews. The additional quantitative study focussed on tourism enterprises related to whale-watching (40 tour operators/owners/managers of hotels and camp sites), who were interviewed qualitatively. This survey assessed the gross turnover of tourism businesses, the employment situation, seasonality, and supply and intermediate input situation in the EVBR. The economic impact of WW were estimated using an input-output (IO) model. A national IO table for Mexico was obtained from the OECD (2011), and a regional table was derived from the FLQ location quotient approach described by Flegg et al. (1995).

To identify, characterize and classify the actors directly or indirectly involved in WW at different locations in the reserve, 27 semi-structured, in-depth interviews were conducted, using the snowball procedure. Most respondents were representatives of governmental institutions (8), tourism cooperatives (6), or non-governmental institutions (NGO) (4). Also, six private tourism entrepreneurs and two academics were interviewed. Follow-up interviews were conducted five years later. All interviews were recorded *verbatim* after approval and then analyzed using Atlas ti 5 software. When reviewing the transcriptions, we defined and assigned codes that were subsequently grouped in code families by applying an iterative procedure. Special emphasis was placed on perceptions and attitudes towards governance arrangements, restrictions imposed on operators by the BR administration, power relations, competition and conflicts among service providers and other actors involved in WW, and the economic benefits derived from WW.

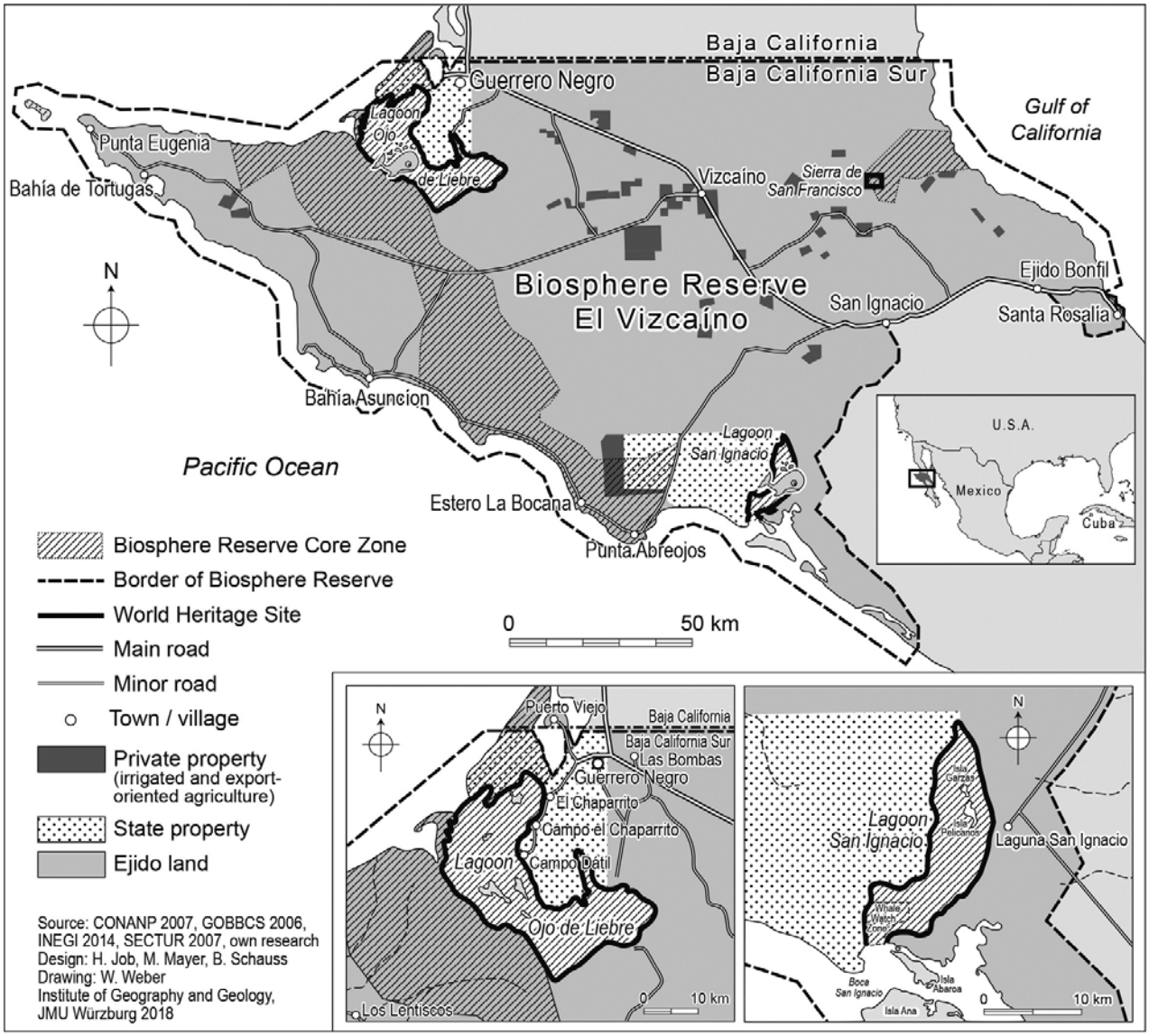

Figure 1: Study area “El Vizcaíno Biosphere Reserve”, Mexico
Source: Mayer et al., 2018

Results show that over time a government-led whale-watching governance arrangement evolved in El Vizcaíno Biosphere Reserve which prevents overexploitation, restricts resource use for non-local operators ensuring that most of the income from whale-watching benefits local service providers, offers participation possibilities for local stakeholders and mitigates conflicts between actors of imbalanced powers with the help of the reserve’s advisory board being a relatively effective negotiating platform. Therefore, these institutional arrangements are widely accepted and supported by the local actors who often rely on economic rationalism as arguments (Mayer et al., 2018).

The economic impact of WW can be summed up as follows: ~18,000 whale-watchers lead to an annual regional economic impact of US-$0.7 million, generating 334 seasonal and 180 year-round jobs. The opportunity costs related to restrictions on resource use are compensated. Thus, the case of WW in El Vizcaíno Biosphere Reserve supports the general

feasibility of the people-oriented protected area approach and the suitability of biosphere reserves as governing institutions for marine wildlife tourism (Mayer et al., 2018).

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How to sustainably manage recreational fishing: a meta-analysis of technical regulation instruments?

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Introduction

Fishing is one of most popular outdoor recreational activities in industrialized countries. It is estimated that there are at least 25 million recreational anglers in Europe, including 20 million freshwater recreational anglers. This figure is around 48 million in the United-States. The favorable of angling conditions in terms of biological quality, has a profound effect on the attractiveness and local development of these regions (Curtis and al., 2017). However, attracting a higher level of recreational and tourist activities in natural areas may increase pressure on some already vulnerable species (Cowx and al., 2010). Some recent studies, conducted in Canada and Australia, demonstrate that the pressure of non-market uses on certain fish can also lead to the collapse of certain populations (Cook and Cowx, 2006).
The preservation of aquatic biodiversity is essential to ensure the sustainability of recreational fishing. To achieve preservation objectives, several instruments have been implemented. Bag limits and size limits are the most popular instruments of regulation. These tools aim to reduce the effects "open access" on fish stocks available at a site. However, these tools are generally only effective where anglers have homogeneous preferences for fishing sites and species. There is some doubt as to whether these results still hold where the preferences of anglers are heterogeneous. This paper aims to demonstrate the ability of these regulation tools to meet preservation objectives when faced with recreational pressure and heterogeneous angler preferences. Essentially, we aim to verify the effectiveness of these tools regulating recreational fishing, with the aim of better protecting the biodiversity, particularly for endangered species.

Methods

In this paper, we conducted a systematic review of empirical studies into the effectiveness of regulatory instruments covering recreational fishing. We used meta-analysis. This approach allows synthesizing in a complete and rigorous way the results from different empirical works on the same subject. By including many different studies, the meta-analysis also increases the statistical power of the results and explains the variability of results between these different studies. The database that will be used in this meta-analysis is made up of 21 primary articles covering the period 2000-2016, with 354 observations, which we selected according to two criteria. In one hand, the use of Choice Experiment approach (CE) (Adamowicz and al., 1998) for the regulation of recreational fishing. In the second hand, these works provide the anglers' willingness-to-pay for different fishing conditions, including regulatory instruments. Our analysis develops a meta-regression approach where the objective is to explain the welfare variation of anglers as obtained through studies by based on a set of variables and an econometric model.

Results

The results from the meta-regression model suggest that there is a positive marginal willingness-to-pay for fishing sites that are subject to regulatory instruments. In other words, the anglers continue to visit the managed fishing sites with such measures, and are willing to pay up to 59€ per trip. Furthermore, the values of willingness-to-pay for a freshwater fishing trip are higher than saltwater fishing trips. There is no difference in anglers' willingness-to-pay between studies conducted in Europe and for the rest of the sample. Also, the anglers' willingness-to-pay is higher for a size limit instrument than for a bag limit instrument. This result is consistent with the theoretical results of Woodward and Griffin (2003).

The welfare variation expected from an improvement in fishing conditions, through the regulation of catches, is positive, but remains low, (6.68 € /angler /trip). This welfare variation would appear to be lower for migratory fish (Salmon, Trout and European eel). This suggests that anglers who target these types of fish fish (compared to anglers who target other types of fish) expect less benefit from improved fishing conditions through technical measures. Implementing bag limit management reduces the welfare variation of anglers by 50%.

Conclusion

This paper confirms that non-market economic valuation, in this case the choice experiments method (CE), can provide a useful indication for helping public decision making both in terms recreational management and protection of natural resources. In general, anglers will always look to improve their fishing conditions. Their willingness-to-pay is higher for the implementation of measures imposing a size limit than for a bag limit. This demand is higher for sites dedicated to migratory fish. However, these technical instruments of regulation are less effective for improving the well-being of anglers who target migratory fish.

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Sustainable financing of national and nature parks in Croatia and possibilities for introducing the new finance mechanisms for biodiversity

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Summary
This paper provides an overview of the current finance mechanism of the national parks and nature parks in the Republic of Croatia and outlines different schemes of innovative funding mechanism that can be applied to ensure stable and sufficient long-term financial resource (e.g. payment for ecosystem services, trust funds and green taxes mechanism resources, finding new donors such as large corporations, special fund-raising campaigns, volunteers actions for some specific jobs…).

Keywords
Financing, national park, nature park, financial sustainability

Introduction
IUCN defines PA financial sustainability as the "capacity to secure stable and sufficient long-term financial resources, and to allocate them in a timely manner and appropriate form, to cover the full costs of Pas (both direct and indirect) and to ensure that Pas is managed effectively and efficiently with respect to conservation objectives" (IUCN, 2006). Quite similar definition is also used by UNEP.
Key messages to scale up biodiversity outcomes from the workshop on Finance Mechanism for Biodiversity: Examining Opportunities and Challenges, held on 12 May 2012, in Montreal were: by raising additional revenue that is then used to achieve biodiversity outcome; by mainstreaming biodiversity in the production and consumption landscape (e.g. green markets; offsets) and by reducing the cost of achieving biodiversity conservation and sustainable use (i.e. environmental fiscal instruments).
There are various categories of protected areas in Croatia, but in this paper we will consider two categories: national parks and nature parks. In the Republic of Croatia, there are eight National parks and eleven Nature parks. All parks are run by Public Institutions established by the Croatian Government and managed under the supervision of the Ministry of Environment and Energy.

Finance mechanism

The Total budget for protected areas in 2017 was 81.451.000 EUR (610.886.023 HRK). Sources of income for national and nature parks are:

- *National Government budget (through Ministry of Environment and Energy).* Five national parks and eleven nature park are financed by the government with a different scope of financing. In 2017 MEE has financed protected areas with 4.013.000 EUR (30.096.540 HRK). Three national parks (Plitvička jezera, Krka, and Brijuni) are 100% self-financed and they do not receive funds from the national government for many years.
- *Self-generated income.* It mainly comes from visitors fee, hotels (in two national parks: Plitvička jezera and Brijuni), restaurants, souvenir shops, concessions, guided tours, etc. In 2017. self-generated income for all national parks an nature parks was 71.760.000 EUR (538.200.189 HRK). The biggest source of self-generated income is visitor entrance fee. Three nature parks (Učka, Medvednica, and Velebit) do not charge visitor entrance fee. In other parks in 2017. total revenue from visitor entrance fee was 44.506.000 EUR (333.797.703 HRK). Self-generated revenueo from other sources in 2017. was 27.254.000 EUR (204.402.486 HRK). *Other national and international aid (e.g. EU, other national government institutions, and other international aid).* In 2017, a total of 5.679.000 EUR (42.589.294 HRK) was raised by other sources.

All revenues, raised from budget or other sources and sel-generated, are used for biodiversity monitoring and protection, building infrastructure for visitation and outdoor activities, education and promotion of nature and cultural heritage protected by national/nature parks. Structure of costs is different from park to park and varies over time.
Until 2017, 100% of entrance fee stayed within the park finances. As from last year, 3% of the entrance fee national and nature parks have to pay to the national government. This money will be managed by the "Shared service center" within the Ministry of Environment and energy and will be used to finance projects in Parks with lack of funds. SSC was established in order to provide technical and professional support services to the national and nature parks. In 2017, total expenditures of all national and nature parks were 73.224.000 EUR (549.181.763 HRK). The enormous diversity of income is present among national and nature park e.g. revenue of the National park Plitvička jezera is 1.3627% higher than revenue of Nature park Lonsko polje, revenue from entrance fee of NP Plitvička jezera and NP Krka is 569,02% higher than total revenue from all seventeen national and nature parks.
The main conclusion is that three national parks are fully self-financed while five national parks and all nature parks need additional funds from the national budget. In some parks, improvement of financial administration, effectiveness, and efficiency can minimize the financial gap while the other parks have to find a way to introduce a new finance mechanism that has been developed by IUCN. This is an innovative PA financing mechanism based on the fundraising from a public to private sources and self-generated revenues i.e. private voluntary donations, payment for ecosystem services (this is applicable for those nature parks that are not charging an entrance fee)… As most of those parks are small there is lack of skills, experience regarding managerial competence. In last three years, Ministry of Environment and Energy through PARCS project made some efforts in: improving the accounting and finance system, improvement of the management skills of the PA management, enhancing park co-ordination, business planning, established unique methodology for pricing system, capacity building, established 'shared service centre' (SSC), etc.

Conclusion

To further improve current finance mechanism of the national and nature parks Croatian government together with PA management staff has to further develop and improve an integrated approach on sustainable financing of the protected areas in terms of accounting system, improvement of the capacity skills, business planning, legislation, framework that will support new funding mechanism, to ensure better understanding of PA financing, implement an overall strategy for monitoring and managing finances of the protected areas. Due to fact that the main source of funding for national and nature parks is visitor entrance fee, it is important to enhance visitor fee revenues by introducing an integrated approach, spreading visitors across protected areas and extending visitor season.

Economic contributions from tourism in a Brazilian National Park at the frontier of the *Cerrado biodiversity hotspot*

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***Mozart Fazito**, Centre for Excellence in Tourism, University of Brasília, Brazilian*

Introduction

Nature tourism economic impacts is one of the most important arguments in nature conservation dialogue with different sectors of society. In developing countries, such as Brazil, biodiversity is threatened, habitat loss and degradation are hampering, based on development and economic models based on commodities such as agribusiness and mining. This is particularly severe in tropical savannas, as the Brazilian Cerrado. Last remnants of the Cerrado *biodiversity hotspot* are shrinking pressured by croplands, urbanization and miming. In this context, we estimate the economic and financial impacts of tourism at Chapada dos Veadeiros National Park - PNCV, and discus the implications of different models of development, for the sustainable use of the Brazilian Cerrado. Number of visitors in Brazilian National Parks and at Chapada dos Veadeiros region have been increasing in the last decades. This contributes to local economies, through the expenses of the visitors and also to the recognition of the values of the nature.

Methods

PNCV is recognized as a World Heritage Site by UNESCO, is formed by unique ecosystems, being also important for the supply of water in the region and in Brazil, as well as the maintenance of endangered species, endemic ones and others not known by science.

We collect data from 591 independent visitors using two complementary methods: (1) travel cost, and (2) willingness to pay, from December 2015 to July, at the National Park Visitor Center. Beyond sociodemographic profile, visitors were asked about their environmental concern; actual travel expenses, willingness to pay for direct use, through an entrance fee to the Park, willingness to pay for the legacy and existence values. Complementary questions about other activities or services demanded by visitors; suggestion to improve PNCV services, and the reason to visit the PNCV, were asked.

Results and discussion

Visitors' profile is in accordance with other studies in natural areas; they have medium, higher or postgraduate education, middle to high income and have a high environmental concerned. 46% of visitors come from the nearby cities of the Federal District (DF) and the state of Goiás, 52% are from other Brazilian states and 2% are foreigners. The total travel expenditures are explained by age, income, trip length. Brazilian visitors from other states, except for DF and Goiás, and foreigners spent more. The financial impact

generated by tourism in Chapada dos Veadeiros region is estimated at R$92 million per year (DP ± R$38 million).

91% of visitors are willing to pay for an access fee, in average R$ 20. This willingness to pay was explained by an inverse relation with the age and number of visits in the park and by a direct relation with income, as well as their origin, visitors from the other Brazilian states and foreigners are willing to pay a higher fee. Finally, 42% of visitors are willing to pay a monthly value for the conservation of the natural and cultural attributes of PNCV (legacy and existence values). The only significant variable to explain this value is the visitors' literacy.

Travel expenditures generate a significant impact in the economy and can contribute even more to local development. In this context, it is relevant to consider visitor's interests in activities and services, as well as products that benefits local people and nature. The economic impact generated by the visitation in the PNCV shows that the sustainable use of the natural area for tourism is the best option in terms of economic development for the region, being more profitable than the conventional use for agribusiness industry and livestock.

The income potentially generated by the access fee is higher than the budget from the federal government and, therefore, start to collect it is important to complement the financial needs of this protected area.

The willingness to pay for the legacy and existence values suggests that it is important to take advantage of the interest and potential engagement of people in activities and green products, conservation and sustainable use of natural resources. The high level of environmental concern of visitors to the PNCV is important information for planning actions that minimize negative socio-environmental impacts and maximize potential positive impacts.

Posters session

Trends and awareness of foreign visitors in national parks – a case study of national parks in Japan

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Introduction

National parks attract many tourists to visit (Reinius & Fredman, 2007). Even for visitors coming from overseas, national parks are attractive places to visit (Weiler & Seidl, 2004). In Japan, as the number of tourists from abroad increases, the number of foreign visitors to national parks is increasing annually. The Japanese government is implementing policies aimed at improving the number of foreign tourists visiting Japan to 40 million and their consumption to 3.5 trillion Japanese yen by the Tokyo Olympics to be held in 2020. For the national parks, the goal is to increase the number of foreign users to 10 million.

The annual number of visitors to national parks in Japan is estimated to be about 350 million, of which the number of foreign visitors is approximately 5 million. It has been pointed out that a lack of publicity regarding Japanese national parks, insufficient signs, and inconvenient facilities are the reasons why the number of foreign visitors is small. Therefore, by 2020, the Japanese Ministry of the Environment intends to focus on providing information to foreigners, improving facilities, and providing various activity programs in national parks.

Location, natural resources, and recreational activities attract visitors to national parks (Neuvonen et al., 2010). What factors attract foreign visitors? Although facility improvement and diversification of services have the advantage of improving the convenience of Japanese users, there is also concern about their impact on natural resources and mismatch with the needs of foreign visitors. Thus, it is indispensable to examine the trends and needs of foreign visitors. In this study, the aim is to clarify the pattern of visits to national parks and the characteristics of foreigners visiting national parks and their needs.

Method

Every quarter, the Japanese Tourism Agency conducts an interview survey “Consumption Trend Survey for Foreigners Visiting Japan” of foreigners leaving Japan via airports and ports. We analyzed 39,956 survey responses in 2016. Questionnaire items included individual attributes, itinerary, the purpose of the visit, expectations, satisfaction, and amount of money spent.

Besides, during the winter and summer of 2017, we asked foreign visitors in Shiretoko National Park to fill out the questionnaire. Of those foreign visitors, 389 responded on site or mailed back information regarding individual attributes, motivation, satisfaction, facility expectations, service improvement for foreigners, and demands for multilingualization.

Results

First, we analyzed the relationship between the number of visitors and the number of foreign visitors in each national park, as released by the Ministry of the Environment. The Ministry of the Environment announces the number of visitors to national parks based on the tourist statistics of each municipality. The number of foreign visitors in each national park is estimated based on the consumption trend survey for foreigners conducted by the Japanese Tourism Agency. According to that estimation, about 6 million foreigners visit national parks annually. They are 1.7% of the total number of park visitors and 20% of the 28.69 million foreign tourists that visit Japan. Although the number of foreign visitors increases yearly, the ratio is still small. The correlation coefficient between the number of national park visitors and the number of foreign visitors is 0.92. Many foreigners visit parks that also are visited by many Japanese (Figure 1). In the national parks with famous sightseeing spots, such as hot springs, and that is close to metropolitan areas, the proportion of foreigners is relatively high. The percentage of foreigners is low in parks where access is inconvenient, such as in remote areas and on remote islands.

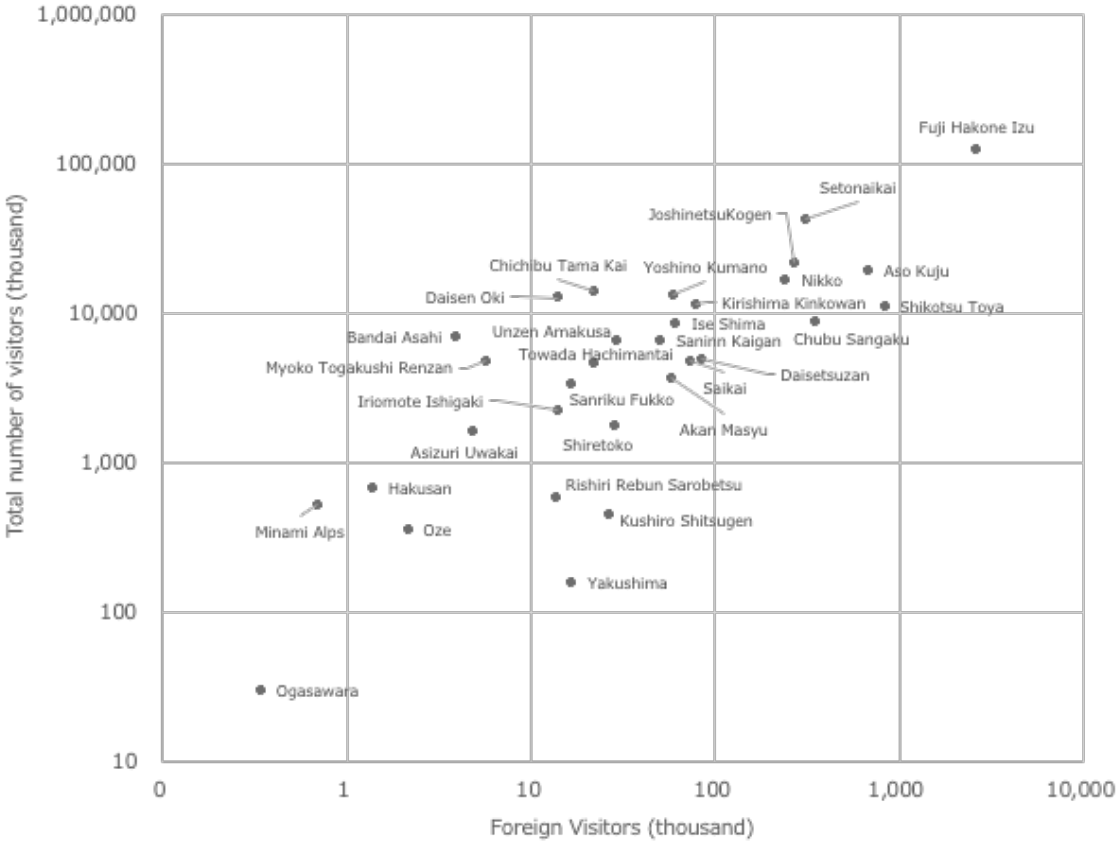

Figure 1. Total number of visitors and foreign visitors in national parks in Japan

We compared the attributes of foreigners who visited and those who did not visit national parks. Of 39,956 respondents, 32,052 (80.2%) did not visit any of the national parks, and 7,904 (19.8%) visited at least one national park. Most visited only one site, but 578 people visited two or more national parks. The national parks were relatively well visited by tourists

from Taiwan, China, Thailand, the United Kingdom, France. Besides, national parks were well visited by females, first-timers, and group tour participants. There were no significant differences between national park visitor and others in overall satisfaction and willingness to revisit to Japan. Visitors to the national parks showed the higher expectation of, the participation rate in, and satisfaction with nature experiences, hot spring bathing, and outdoor activities such as skiing.

As compared with Japanese visitors in Shiretoko National Park, foreigners were visiting regardless of weekends or holidays. They expected natural scenery and experience particular to Shiretoko National Park. Their satisfaction and loyalty were also high. Satisfaction with printed materials, signs, and access was less than it was for other parameters. They expected improvements in the provision of information. There was little expectation for the development of new facilities. Multilingualization of caution signs, printed materials and interpretation boards was desired, especially by visitors from Asian regions.

Conclusion

The number of foreign visitors to Japan's national parks is increasing. Although nature experiences and hot springs are expected, many parks are infrequently visited, owing to the difficulty of traveling in Japan and the small amount of information provided in foreign languages. Because the satisfaction of current foreign visitors is high, we can expect more visits by improving information provision and domestic travel. Development of resort facilities is not preferred, as preserving the natural environment and providing experiences unique to the national parks is vital.

Acknowledgment

The authors thank the Japanese Tourism Agency for providing data from their "Consumption Trend Survey for Foreigners Visiting Japan."

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Stakeholders' perceptions towards factors of influence on the choice of places for adventure races

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Adventure Races are part of an increasing trend of outdoor sports. They are multisport competitions varying in lenght and duration that take place in idilic natural places. Thus there is potential for a range of environmental impacts as shown by previous research (KAY; LABERGE, 2002; NEWSOME et al., 2011). One of the particulars of Adventure Races is the navigation through maps and compasses that eventually, if not constantly, makes racers pass by primitive areas outside established formal trails. This causes vegetation trampling, weed and seed spread, and informal trail formation. On the other hand there are significant positive impacts derived from the opportunity of being in nature practicing sports, such as the development of an emotional bond with the space able to stimulate environmental conservation, health improvements among the participants and environmental education possibilities (FIGUEIREDO; SCHWARTZ, 2013). This study reports the results of online questionnaires directed to adventure racers and race organisers, as well as to national park managers. Whereas in previous works more attention was given to organisers' perceptions and attitudes, this focuses on racers (BARTOLETTI; MAGRO, 2016). A few questions intended to investigate what adventure racers and organisers perceived to be the most and least important factors when choosing a place to race or organise an event: environmental and sustainability related factors or factors related to logistics such as safety and proximity to hotels.

Methods

Regarding its nature this was an exploratory and descriptive socio-environmental research that aimed to scrutinize how Adventure Races have been organized in Brazil and how potential social and environmental impacts have been perceived and managed.

Regarding the means the research was a combination of literature review and online surveys. The literature review began with an online search by the key-words "Outdoor Recreation" and "Adventure Races". Documents referenced that bore relation to the research theme were investigated whether they were books, scientific articles, adventure races' rules or interviews.

The primary data collection through online surveys was conducted during a two month period based on three questionnaires, one for each stakeholder the research aimed to interview: adventure race organisers, racers and national park managers.

Although questionnaires were designed to be similar in order to asses suchlike themes and situations each had particular features and questions depending on the target group. A similar feature in both questionnaires, for racers and organisers, was the use of Likert Scale to evaluate factors that influenced their choices of venues where to participate in or organise an adventure race (LIKERT, 1932).

The following items are an example of the conceptual Likert Scale used:

1. Not important
2. Of little importance

3. Indifferent/Neutral
4. Important
5. Indispensable

Data was analysed with Friedman Test which is a nonparametric statistical method equivalent to ANOVA yet more suitable for qualitative information analysis (SEWARD; DOANE, 2014).

Results

The online surveys yielded 62 interviews - 19 racers, 8 race organisers and 35 national park managers. Despite planning efforts in order to publicize the research among athletes on a social media - as their personal contacts were unknown because property of adventure races' organisers which made it difficult to obtain - the 19 athletes who answered surely represented a much lower number of subjects than expected.

This small sample has been accredited to the fact that social medias are often not checked by subscribers frequently even though the invitation has been on for over a month. Also we believe many athletes might still perceive research of this nature in Brazil as a threat to their recreational activity.

When asked to evaluate with Likert Scale a range of factors that could influence their choice of a place to race, the amateur athletes interviewed ranked first – as the most important factor - *terrain and the challenge it imposes* and ranked last – as the least important - *soil and possibility of erosion*.

For this sample of athletes the challenges provided by the land and its different types of terrain was the most important factor when choosing the venue for an adventure race. However, factors related to security – *ease of rescue* and *risk potential* – also received many evaluations either as "important" or even "indispensable" factors.

Factors supposedly inherent to a natural environment such as *landscape beauty* and *wild and remote quality* featured among the five more important factors of influence to this sample of racers reinforcing how nature and its characteristics provide recreational ecosystem services of importance.

The fact that *soil and possibility of erosion* was evaluated as the least important factor of influence whereas *terrain and the challenge it imposes* was evaluated as the most important is an interesting data. It raises concern that for many athletes erosion is not perceived as an ecological problem rather than as *challenge* provided by a rough terrain for their adventure sport.

Interestingly the same answer was given by the sample of organisers. They too ranked *soil and possibility of erosion* last in their list of factors that influence the choice of a place to organise an adventure race.

So this poses an important question. How to better communicate with visitors who think this way? Who perceive erosion as challenge and not an ecological issue that needs to be addressed?

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Development of a Systematic Visitor Monitoring Program for Brazil Parks and Protected Areas

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Introduction

The purpose of this study was to define the visitor profile of the Brazilian Amazon Basin using data from two different locations: The Tapajós National Forest and Anavilhanas National Park. This study also investigated satisfaction, perceptions of the number of other visitors, and methods of arriving at the protected areas.

Methods

The methodology consisted of on-site interviews with survey days spread across weekdays and weekends. A total of 2534 usable surveys were collected from October 2015 to May 2016. Frequencies, valid percentages, and means were used to describe the sample. For comparative analyzes between the two areas independent samples tests and Pearson's Chi-square tests were conducted. For the crowding analysis simple and multiple linear regressions were applied in order to understand the relationship between crowding and other variables.

Results

Most of the respondents were from Brazil (83.5%) while less than one-fifth were from a foreign country (16.5%). Of the Brazilian respondents, visitors were from three main states: Amazonas (27.6%), Pará (22.3%) and São Paulo (22.1%). The results show that one-fourth (25.4%) of the respondents came from the city of Manaus while the other third (33.3%) were distributed within the cities of São Paulo (17.9%) and Santarém (15.4%). Of the international respondents, the majority were from United States (29.8%) followed by Germany (20.2%), France (16.7%), and the United Kingdom (15.1%). Other popular countries included Argentina and Switzerland with a total 17.9% of the respondents.

The majority (84.6%) of respondents were first-time visitors while only 15.4% were repeat visitors. Over half of the visits (53.7%) were day visits with a length of stay of approximately 6 hours (mean= 5.55). Overnight visits represented 46.3% of the sample and the average length of stay of those were four days.

The survey also assessed the level of recreationist satisfaction. Over half of the respondents (66.7%) rated their visit as either *excellent* or *perfect*. A group of nearly one-third (30.1%) evaluated their satisfaction level as either *good* or *very good*. Only a few respondents (3.2%) rated their visit as *poor* or *fair*. On a 6-point scale (poor= 1 and perfect= 6), the mean rate for overall satisfaction was 4.80.

A 9-point negative and positive scale was created to better understand the extent of negative and positive impacts of other people on the recreationist's experience. Few visitors (6.5%) reported to be negatively impacted by the presence of others; of those, 3.9% reported that seeing others reduced their enjoyment. Less than one-fourth (22.6%) indicated that seeing others had no effect on their visit. Nearly three-fourths of respondents (70.0%) reported a positive impact caused by the presence of others. Of those, over one-third (34.3%) said that seeing others enhanced their enjoyment.

Visitors most commonly used private cars to get to the forest/park (42.4%). Other modes of transportation via water such as speed boat (14.3%) and boat (12.4%) were also found to be a commonly used. Transportation plays an important role on the development of tourism (Palhares, 2003). The evolution of modes of transportation have changed the face of tourism and directly influences a visitor's decision on whether or not visit an area (Mammadov, 2012). Westlake and Robins (2005), enumerated a series of factors in choosing the transportation mode (e.g. time limit, distance, status, comfort, security, benefit, price, geographical position, competition). Understanding this transportation system enables the federal agency and stakeholders to keep the traffic of visitors organized while guaranteeing easy access and good services for either boat or car users.

Implications

One of the aims of this study was to gather data to understand the current flow of visitors in the Amazon by zooming into their specific characteristics. As mentioned in other studies and reinforced in this one, incorporating visitor monitoring programs into the management of the Tapajós National Forest and Anavilhanas National Park is crucial. This is a useful tool for assessment and evaluation of impacts. The use of technologies such as game cameras, trail and traffic counters have been proved to be useful to understand visitor behavior and habits (Gordon & Muhar, 2003; Arnberger et al, 2005). Currently tourism concentrates in only one area and the activity is viewing wildlife, specifically the pink dolphins. Families and couples are the most prevalent type of group visiting the park, activities and tourism packages targeting these groups would enhance the quality of their visit. The Tapajós site has an advantage of already having some infrastructure due to the communities that live in the area. However, this infrastructure may need be supplemented to better attend to the needs of the visitors. Results of this study also shows that the sociocultural aspects of the traditional communities could be explored as a component of tourism. The National Forest has a potential for ecotourism and this should be taken into account by the managers (Tanner et al, 1997). The community's perceptions about tourism is as important as visitor's perceptions about its experience. Collective involvement is crucial for short and long term results in tourism. The Tapajós National Forest should seek more benefits of the flow of tourists already visiting Alter do Chão while developing its own name as a destination.

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Informed visitor management in protected areas – lessons learned from Croatian experiences

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Croatia has seen rapid growth of tourist arrivals with record braking 13% in 2017. Main attractions are scenic nature and UNESCO World Heritage Sites (WHS) out of which most prominent ones are Dubrovnik and Plitvice Lakes that came under attention of UNESCO and ICOMOS "reactive missions". They have been demanded to develop and implement effective management plans that include improvements in monitoring and managing visitors and their impacts. Nevertheless, other nature protected areas in tourism regions are also facing growing pressures that raise concerns with stakeholders. The managing institutions are swiftly becoming aware of the challenges and the need to assess and adapt to the circumstances.

The authors here present an approach that combined efforts of various disciplines with the goal to gather information, produce analysis and derive correlations that can inform visitor management. The goal was to consider the conservation requirements and needs of users, to produce a Study that would inform planning and management processes. Location of this endeavor is Kamenjak protected area (IUCN Category: V) located on the very tip of Istria peninsula, the region known for sun and sea seasonal tourism. Tools used in this process considered carrying capacity discourse within the tourism context and fragile Mediterranean ecology.

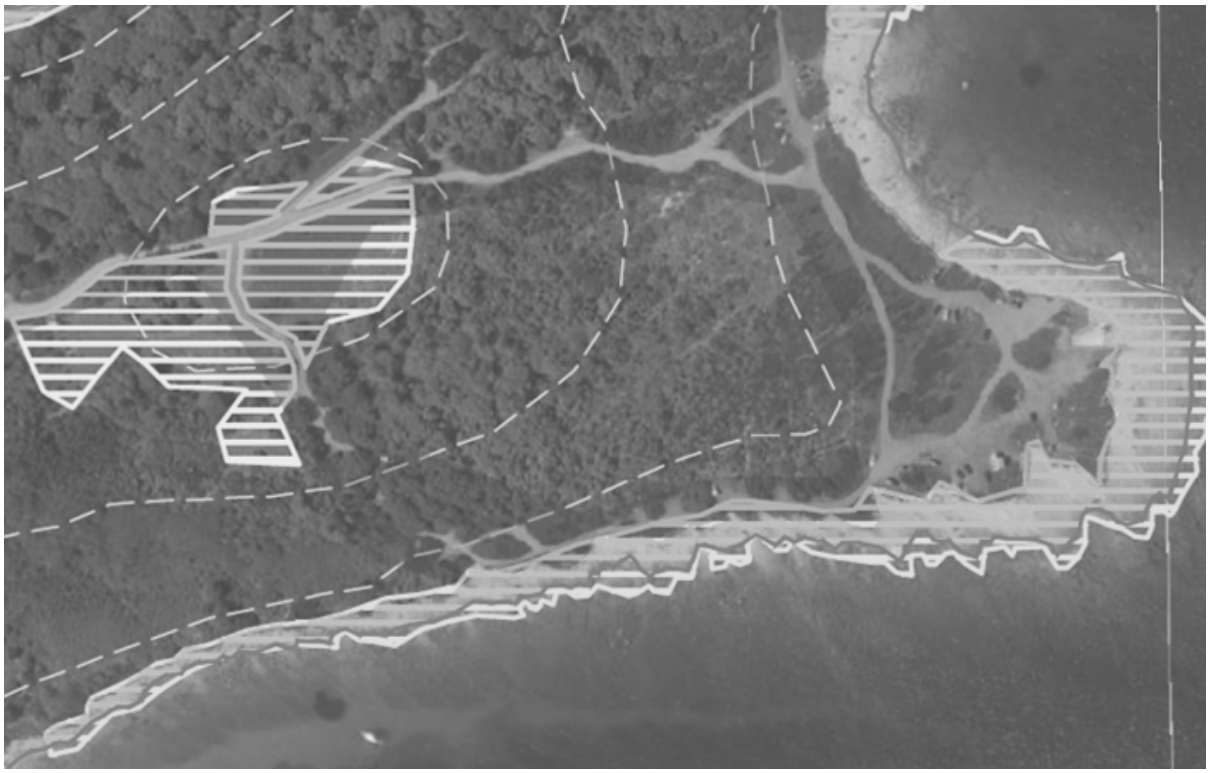
Field research employed in this process were:

• visitor survey (satisfaction and crowding perception)
• traffic infrastructure and use surveying with geo-referenced video recording
• on-foot visual and photo surveying of geomorphology and use of the coastline.
• drone areal surveying on altitudes 40-50 m and 400 m (visitor/vehicle spatial distribution and counting)
• manual traffic counting - crosschecking to verify automatic counting system

The study considered carrying capacity parameters in four sections:

1. Bio-indicator that correlates to one of the most serious pressures was *Scarabaeidae*. They flee dust from traffic, hence disrupting their important role in ecosystems. Unpaved roads network of 22 km is the source of dust emissions that are estimated to effect around 22,7 acres. Due to the type of use and climatological parameters there is also high probability of fires.
2. Visitor surveying was conducted with credible statistical sample in the pre season and high season on predesigned key locations, and enabled analysis for different types and intensities of use. Findings indicate that dust is perceived as significant or serious problem (36%), moderate to high crowding was noted by 69% and number of cars are prime irritation factors. Analysis of the survey data disclosed a level at which crowding irritation starts to increase. Also, findings informed management that more information on NATURA 2000 network is needed and that main road needs urgent improvement.
3. Traffic analysis of motor vehicles, pedestrians and bicycles disclosed key issues that lead to the design of eight models based on the five parameters: type of main road, parking, public transport, pedestrians and cyclists – providing variety of options and simulations for decision

makers and planners based on the best practices of traffic infrastructure design in protected areas.
4. Spatial parameters were determined by analyzing state of the landscape and the practice in contrast to the prescribed use in the formal planning documentation. Detailed cartographic representations for 345 hectares were produced that determined collisions between planed and actual spatial use.



Cartographic representations were employed to transparently represent the conflicts between planned protection and use: protected coastal and meadow ecosystems (light horizontal lines) versus intensive use via cars, bikes, and pedestrians (solid fill areas). Source: Grgurevic and partners ltd. archive, 2016.

Intensive use zones, key pressures and resulting conflicts were defined in high precision due to detailed field investigations, enabling determination of limits in accordance to existing spatial planning documentation and other regulations and standards. Subsequently high season monitoring of intensities show that:
- visitors per acre use is higher than protected area standards hence more in range of recreation areas.
- bathing area use (5 to 15 m2 per person) is higher than the regional government prescribed (20 m2 per person).
Conclusions made from this process were that visitor management studies should be adaptable to the site-specific factors of the protected area. They should also be interdisciplinary as much as possible in order to allow for useful correlations to be made. The following was derived as the checklist of key approaches/methods, topics, and focuses:
- review of existing research and monitoring of species and habitats and seeking out correlations with anthropogenic pressures that, as clear as possible, identify the visitation impact

- an analysis of the attractions and resources with special focus on potential interpretation for visitor education/informing
- traffic system analysis (stationary traffic, pedestrians, cyclists, boats, traffic counters, etc.)
- analysis of spatial planning documentation, spatial indicators and standards
- visitor surveying (structure, satisfaction, consumption, etc.)
- understanding trends in tourism and analyzing the tourism environment / context
- accurate insight into the spatial-time distribution of visitors (daily, weekly, seasonal, especially densities for key sites)
- impacts on nature resources and heritage, i.e. conservation goals and standards
- existing and potential conflicts of use (visiting/tourism vs. protection concepts)
- correlation of visitor satisfaction indicators and resource degradation
- determining site-specific (micro-location) standards for environmentally sustainable use
- insight into the visitor management (frameworks) and the possibility of their application on the specific site
- importance of overviews, simulations, options-scenarios and suggestions of visitor management techniques
- determining how to monitor critical indicators
- introducing the principles of green accounting and analyzing the ecosystem services
- assessing the possibility of introducing green infrastructure
- seeking out “natural allies” (small scale traditional farming, bird-watching, all-level education, etc.)

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Preliminary results on evaluating and modelling impacts of recreational trails in the Azorean native forests

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Nature trails are currently the infrastructures that allow local populations and tourists to visit the most valuable and representative natural heritage in the Azores archipelago. In this archipelago, the trail network covers the endemic-rich mountain native forests, bogs and lava fields, all of which are not only rare (covering 2% of the original area) but extremely sensitive to physical and biotic disturbance. All these habitats and their species are currently under threat due to the impact of agriculture activities, invasive species and climatic changes, but the impact of recreational activities, given their recent importance, is still debatable.
Presently, Azorean park managers and other regional decision makers lack the necessary tools to understand and evaluate the impact of touristic recreational activities on current and long-term ecosystem integrity. Therefore, it is impossible to know how to obtain the optimum equilibrium between two potentially contrasting policies: i) safeguarding the Azorean native ecosystems and their species, and ii) maintaining trails open to the highest possible number of visitors in some cases inside pristine native areas. This is a wicked problem and a conservation management challenge that needs to be addressed urgently, given that the liberalization of the low-cost aerial transports to this archipelago has caused a steep increase in use of these infrastructures, with a trend to continue.
We present the first results of a project that aims to understand the main drivers of change on ecological processes putatively caused by trail disturbance. To reach this goal, we will: 1) test the efficiency of different methodologies to monitor changes in both trail infrastructures and biota. A study system will be implemented in 5 trails, A continuous infrastructure study will be carried out for each, and each trail will have 6 sampling areas to monitor arthropod and plant communities. We will use the COBRA protocol for assessing the spider community, since in the Azores this group is proven to serve as surrogate for a relevant part of the forest arthropod community. It will contribute then with knowledge about a crucial group for this ecosystem's integrity. Plant assessments will be done by using a T-shaped sampling area, providing a high precision monitoring about invasive species spread and trampling effects; 2) perform a manipulative experiment where two different trail building techniques will be tested for their resistance to wear and their efficiency in avoiding ecological impacts from trampling; 3) perform a manipulative trampling experiment where different intensities of trampling will be induced, observe the shifts in taxonomical and functional characteristics deriving from it; 4) model the *recreational use– ecological impact* relation using an Agent Based Modelling framework. This model be built based on the use-effect interactions obtained from the previous methodologies, together with spatial and environmental variables. It will allow us to variate parameters such as visitor number, building and maintenance investment, and simulate different management scenarios.
This research program aims to allow Protected Area managers to make knowledge-based decisions for recreational impacts, and provide them with specific tools for designing a sustainable policy for recreational activities in Azores.

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Impacts of visitation on a trail evaluated through a combined methodology

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Introduction

Visitation is philosophical and conceptual linked to parks (Pimentel, Magro, Silva Filho, 2011). Public use in parks is related to the indirect use of environmental resources as recommended by the Brazilian legislation that instituted the National System of Conservation Units (Law 9,985/00). The practice of recreational, touristic and educational activities fits in this perspective and represents the possibilities of public use carried out by the visitors of the Protected Areas. However, an excessive number of visitors and some behaviors impact negatively on the park and on the visitor's experience.

The Serra da Tiririca State Park (PESET) is located in the Rio de Janeiro State (Brazil), between Niterói and Maricá. The PESET trails are surrounded by a rich biodiversity related to the Atlantic Rainforest. Most visitors access the Park through the Itacoatiara headquarters, where there is a trail that forks in two, one leading to the Itacoatiara Rock belvedere and the other to the Bananal Cove (INEA 2015).

The objective of this article is to present and evaluate the impacts on Bananal Cove Trail (BCT) through different methods that consider its physical characteristics, as well as the visitors' perceptions, seeking to identify the physical and social impacts in order to subsidize the management efforts.

Methods

The sampling point methodology was based on Bayfield and McGowan (1986). Eleven sample units, separated by 50 meters, were established at BCT to measure the physical attributes through parameters such as trail width, slopes, cross-sectional area, soil compaction, and depreciating factors in the trail bed (exposed rocks and roots).

Another method used was adapted from Leung and Marion (1999), which consists of using possible problematic points or areas as an indicator itself. These were selected according to the observation of excessive trail width, high slopes and numerous exposed roots and rocks. Water drainage problems, informal paths and occasional events that indicate visitors' actions (littering, graffiti, marks and notches on trees) were also considered. Geographic coordinates were generated for each problem point or area in order to map the locations that should be focused by the managers.

To evaluate the Social Carrying Capacity, the People at One Time (PAOT) methodology was used. The Bananal Cove area was photographed and measured with *GPS garmin*. People were added with the help of *PhotoScape 3.7*, to simulate different amounts of visitors in five images, elaborated from the recorded picture. BCT visitors were asked to analyze how affected the quality of the visit would be considering the number of people distributed on these photographs, rating from +4 to –4. The grade averages of each photo generated a standard social curve. The neutral point means the minimum acceptable condition from the visitor's perspective, which is the PAOT of the area (Needham et al. 2008).

Results and Discussion

Considering the sampling point and the problem-assessment methodologies, it was observed that the first stretch of BCT is more impacted, probably due to the fact that this section receives all the Itacoatiara Complex visitors (Figure 1).

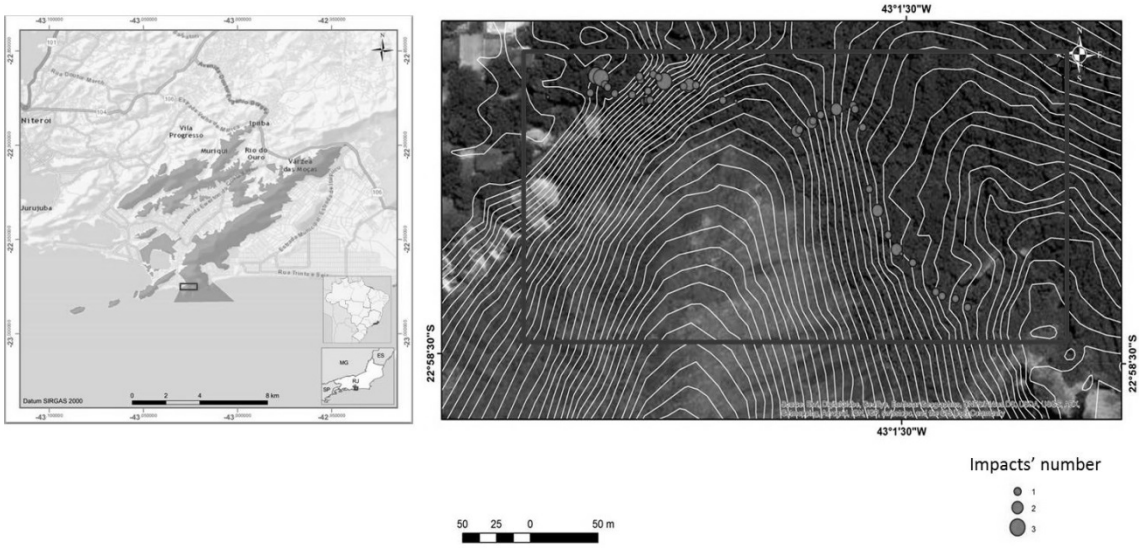

Figure 1 – BCT location and impacts. Those are demonstrated by the amount of impacts observed, considering excessive trail width, high slopes and numerous exposed roots and rocks (source: Luciana Assis, 2017 and https://www.pinterest.pt/pin/381469030913302392/).

The soil is extremely eroded with many exposed rocks and roots. The BCT widths average measured through the problem-assessment methodology was about 2.0 m. This proved to be the most effective because it best represents the trail conditions as the regular sampling points do not always capture the extreme situations. But the first depends on the field experience.

The PAOT of the area was about 19 people in 667sqm. This data, extrapolated to the total area of Bananal Cove (1101 m²) would be about 31 visitors, thus characterizing the minimum acceptable condition. This amount established by the Social Carrying Capacity accessed by the PAOT evaluation would cause a less negative impact on the visitor's perception. Zacharias et al. (2011) consider this methodology useful and easily applicable, which was also observed in this work.

Conclusions

It was verified that the trail is passing through an intense degradation process presenting stretches in deep erosion due to the large number of visitors. As the problem-assessment methodology is more focused on the areas prone to the management actions, it is recommended for the BCT as this method proved to be more effective in demonstrating its emergency situations. Through the PAOT methodology it was found that 31 people in 1101sqm is the number of visitors that causes less interference in the perception of the visit quality. The Park management is expected to take mitigating measures and to try to limit the amount of visitors, in order to reduce impacts on the trail. In fact, given to the verified emergency situation, the PAOT methodology has been used to minimize the impacts caused by the excessive number of visitors in the PESET.

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A survey of visiting rate to National Parks of Greece

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Protected Areas of Greece amount to 127 sites (http://www.ypeka.gr) according to Law 3937/2011 and the National Parks (NP) of our country amount to twenty (Efthimiou 2015). The management of NP was done by the Forestry Service, as most of them were predominantly forestry. 16 years ago, in 2003, Management Bodies (M.B.) were established, which main responsibility was the management of Protected Areas (P.A.) in our Country. Until the end of 2017 there were 28 M.B., while by a recent law in 2018, 8 new M.B. are establishing. Ecotourism and alternative forms of tourism are the main human activities in National Parks.
Purpose of this research is to become an initial approach of trafficking in National Parks of Greece which are managed by a Management Body. Our research was conducted from May to December 2017, by sending questionnaires to the M.B., to gather information for registered visitors to them for the period 2010-2016.

Visiting rate in National Parks with Management Body

From the collected data, it appears that the Management Bodies (M.B.), do not systematically record visitors to their protected area of responsibility. Of the 28 active M.Bs only 27 used data. Visitor records are usually made by groups of students participating in Environmental Experiential Environmental Education programs of M.B., as well as the visitors (individuals, families, small groups, clubs), who passed through the information centers of the Municipalities. Only in NP of Samaria, located in Crete, has an outpost at the entrance and exit of the homonymous Gorge, so that all visitors are systematically registered, who are given a certificate to the visitors crossing the Samaria Gorge.
Visitors to the vast majority of PAs come from the same county or region where PA is administratively owned. The total number of visitors to the PA for the period from 2010 to 2016 it was about 4 million (3,952,689). From them, one quarter (23.66%) visited the NP of Samaria and 21.66% visited the NP of Olympus. However, Marathon Ropes, visited about 41% of the total number of visitors, a price that is indicative and high, it is reasonable because this park is near Athens, the capital of Greece with a population of over 5 million. Figure 1 gives the total traffic to NPs with MB of Greece, showing a steadily increasing number of visitors since 2010. Interestingly, shows the NPs which are located in tourist areas and islands, where the majority of visitors are from abroad, for example in the NP of Karpathos and Saria (81.50%), Karpathos, NP of Samaria (74%) in Crete, NP of Pindos (60%) in Epirus, NP of Zakynthos (59.46%) in the island of Zakynthos, NP of Strofylia (39.14%) in the Peloponnese and the NP of Evros Delta (35%) in Thrace, of visitors come from abroad.From 2014 onwards, there is a decrease in visiting rate in Greece's national parks, which is probably due to the financial crisis.

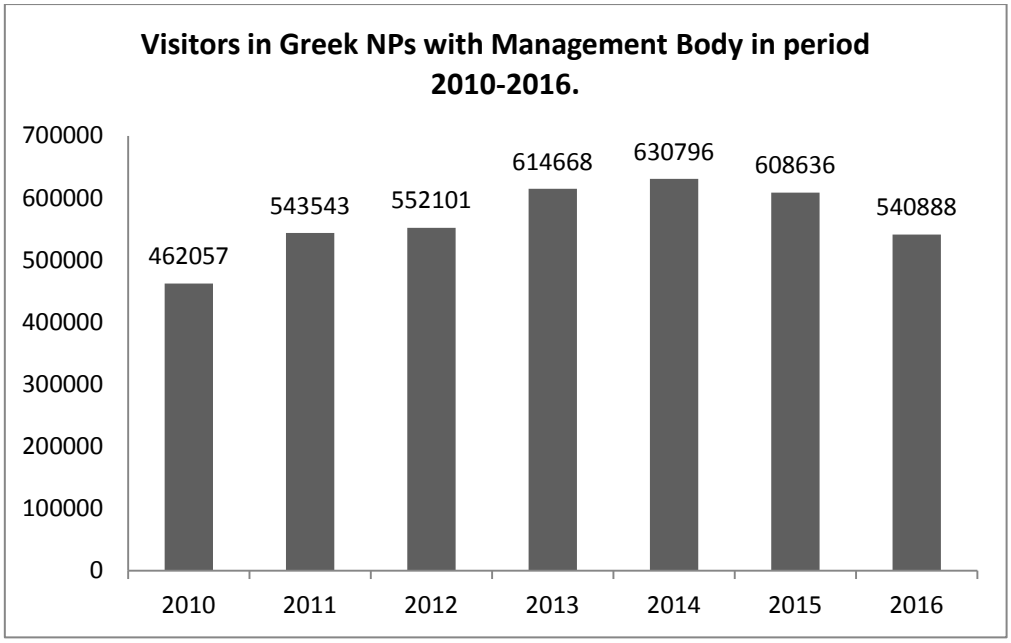

Figure 1. Visitors in Greeks National Parks with Management Body for the period 2010-2016, per year.

Problems of visiting logging

Although there are many methods of recording visiting in PAs regions globally (Gossen, 2014), in our country, there is no systematic recording of visitors to national parks (NPs). The recording of pupils and students visiting the NPs takes place at the premises of the MBs (information centers, museums, etc.). Easily accessed by visitors without controlled access to infrastructure creates a real problem in systematically recording of all visitors. The real value of the visitor is certainly much higher than the one already recorded by the M.B. (Figure 1), taking into account that one MB did not have data and 5 MBs began registering any visitors from 2013 onwards. Despite of any problems with the recording of visitors and the incomplete data from some operators, an initial approach to trafficking in PA was attempted of Greece to show the importance of recording such data for the rational management of NPs, resulting in the development of visitors management, as well as the creation of new strategic plans for managing tourism at the gateways of the National Parks (Fredman et al., 2016).

Proposals

Some essential prerequisites for correct and systematic registration of NPs visitors, controlled safe stay and exit from them are the following:

• The existence of a specific entry and exit in the NPs.

• Operation of a penitentiary at each entrance for the purpose of cutting an entrance ticket with symbolic fee or without

• Knowing the exact number of visitors who entered the National Park on a daily basis, it is possible to control the safe exit of all visitors from them

• Knowledge of the size of visiting in NPs over time, there may be better and safer management of visitors

• Controlled and directed visiting to NPs contributes to the protection of ecosystems and biodiversity of the park, as well as to the safety of visitors

• The implementation by MBs of a common record of visiting to NPs can provide reliable and credible data for a rational management of visitors to the protected areas of Greece

Acknowledgments

The authors wish to thank all Management Bodies of Protected areas of Greece, for their participation in our survey.

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Has cruise tourism pushed marine ecosystems to the 'tipping-point' of their physical-ecological carrying capacity? – Perceptions of stakeholders.

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Introduction

The Caribbean is four times more dependent on tourism than any other region in the world. The region is considered an 'ecological hot-spot'. Consequently, most of the world's cruises (35.4%) come to the Caribbean and over time the number and size of vessels has increased bringing more passengers with each call. SDG 14 addresses the need to conserve and sustainably use marine resources. Marine protected areas (MPAs) were developed for this reason however, to date only 1% of the ocean is protected. Human well being is dependent on the 'ecosystem services' provided by the marine environment. In the context of tourism these include: provisioning, regulating and recreational services. Demands being made on marine ecosystems from increased tourism activity, places added pressure on these ecosystems, weakening their ability to provide services. This threatens the ecological foundation on which the Caribbean islands are dependent. Appropriate measures are therefore needed to minimize the impacts whilst maximising tourism's potential for generating positive benefits.

Literature review

Many authors have noted that cruise tourism will continue to grow in the Caribbean but cautioned that this growth rate cannot be sustained because there are limits to growth and have stressed the need for islands to determine the carrying capacity for this activity. Conversely others have noted that the tourism policies of many Caribbean islands make mention of the need to determine carrying capacity but it is seldom ever conducted.

Researchers have proposed several measures to address problems of this nature however, these studies have focused on developed countries and the approaches used have been specific to the terrestrial environment. Furthermore, environmental and cultural differences limit the applicability of these approaches to other jurisdictions and hence a modified approach adaptable to other environments is warranted. The ultimate goal of this research is to develop a "carrying capacity framework" for managing cruise visitors in marine spaces in Small Island developing States (SIDS), where incomparable challenges are faced. This paper specifically presents the findings of the first phase of the research, in which a baseline study was conduct on one of the islands in the Caribbean.

Methodology

This study was conducted in the month of January, within the peak cruise ship season. A concurrent triangulation mixed method design was employed. Purposive sampling was used to collect qualitative data from two strata of the cruise industry: (i) elite stakeholders - eight semi-structured interviews (40 minute each) comprising 15 open-ended questions and (ii) experienced fishermen – two focus groups (60 minute each). Concurrently, random sampling was used to collect qualitative data via structured interviews from: (i) 250 repeat cruise visitors who disembarked from 14 cruise ships and (ii) 40 tour-boat operators. Qualitative and quantitative results were analysed using thematic analysis and SPSS respectively. A series of

themes emerged from the qualitative data and a matrix was developed in order to identify the themes occurring most frequently. These themes were then integrated and triangulated with the findings of the quantitative data from the structured interviews.

Results

The quantitative and qualitative findings of this research suggest that the demands of the growing cruise industry and its activities may be contributing to the changes observed in the marine environment and hence may affect the environment's ability to provide ecosystem services. Physical-ecological carrying capacity indicators relevant to the marine environment were chosen based on those proposed by Coccossis and Mexa. These indicators included: depletion in fish populations, coral damage, pollution of the harbor, oil slicks on water surfaces near reefs and an increase in solid waste at beaches and reefs.

Results showed that 16.7% of cruise visitors, 45% of the tour operators/guides, 62.5% of interviewees and 100% focus groups noted changes in the marine environment over time that were linked to these indicators. Firstly, the number and size of cruise ships visiting the island has increased over the years resulting in extensive expansion of port infrastructure including dredging of the channel and extending the berths. Consequently, there has been loss of marine flora and fauna and an increase in sediment content in the harbor and its environs diminishing its aesthetic and provisional value. Secondly, fishermen noticed a decrease in the overall population and types of fish. This was noted to have occurred simultaneously with the increase of cruise arrivals on the island. One factor proposed as having contributed to this decrease was the unauthorized use of fishing priority areas by dive boats operators and their guest which resulted in the disturbance and destruction of fish traps and equipment set by fishermen and fueled conflict. Furthermore, cruise ships sometimes cross the path of fish traps and equipment adding to these disturbances.

Thirdly, the large numbers of dive boats and catamarans anchored around the reefs simultaneously, contributed to anchor damage to the reefs. Additionally, the consequent overcrowding at reefs by the guests from these vessels added to the damage given that >200 guests frequently snorkeled and dived at the same time, touching and breaking the corals. Fourthly, oil slicks from vessel engines were observed on the surface of the water by the fishermen and tour-boat operators which they noted, negatively affect water quality and marine life especially fish. Finally, increased visitor activity due to fast growth of cruise tourism contributed to overcrowding at popular beaches, leading to contamination of land and marine resources with solid waste particularly on weekends and public holidays.

When the data were triangulated, the results of the qualitative data were confirmed by the findings of the quantitative data thereby adding validity and reliability to these results. Moreover, the frequency with which all interviewees raised the issue of unregulated use of the marine space by the informal industry (unregistered boats) suggests that there is cause for concern and this may be one of the drivers behind the aforementioned changes.

Level of threat to the physical-ecological carrying capacity

Capacity levels for the physical-ecological parameter of TCC (EC 2000)	Research Questions	Indicator (Coccossis & Mexa 2004)	Evidence from the research findings.	Threat to 'tipping point'
Acceptable levels of congestion or density of key areas e.g. coral	Is the level of congestion of coral reefs under threat of exceeding the	Damage to coral reefs	Anchor damage due to increased numbers of vessels; reef touching due to overcrowding (>200	High

reefs	acceptable level?		snorkelers per site; >29,000 reef touches per year).	
Maximum acceptable loss of natural resources without significant degradation of ecosystem functions and biodiversity loss.	Are natural resources under threat of exceeding the maximum acceptable loss?	Loss of marine flora and fauna (e.g. fishes)	Dredging of channel and port expansion in Castries; Increased noise pollution and turbulence from boat engines; oil slicks on the water; reduction in fish population.	High
Acceptable levels of water and noise pollution on the basis of tolerance or the assimilative capacity of local ecosystems	Is the level of noise and water pollution under threat of exceeding acceptable levels?	Water quality	Increased number of small vessels; increased noise pollution and turbulence from boat engines; oil slicks on the water; Release of human waste from small vessels.	High
Intensity of use of transport in the marine environment, infrastructure and facilities.	Is the intensity of use of transport in the marine environment exceeding acceptable levels?	No. of accidents/incidents in the marine environment.	Increase in the number of licensed and unlicensed small vessels; increase in conflict among users; harassment of guests on the beach; increase in crime against visitors.	High
Use and congestion of utility facilities and services	Are facilities and services under threat of congestion and overcrowding	Management and disposal of solid waste	Increased littering at popular beaches; increase in solid waste (plastic) found at coral reef sites	High

Conclusion

These results suggest that it is perceived by stakeholders in the tourism industry that the intensified level of cruise tourism and its attendant activities in the marine environment may be pushing the physical-ecological carrying capacity level to its tipping point.

Further work

Further work needs to be done to establish a framework for managing the increasing numbers of cruise visitors and their activities in the marine environment in Caribbean. This framework should be applicable to all Caribbean islands giving due consideration their varied physical and socio-cultural environments.

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Optimizing the use of the Eco-counters tool. A case of study

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Introduction

Identifying the number, distribution, and behaviour of visitors to protected natural areas is an essential component of effective and efficient visitor management (Newsome, More & Dowling, 2002; Leung et al., 2015). Reliable data on visitor numbers, and particularly how they are distributed in time and space across these areas are key aspects to balancing conservational and recreational use (sporting and tourist use) of protected areas (Cessford & Muhar, 2003). In this sense, the increasingly popular eco-counters are a good management tool. However, the evidence has shown that the correct analysis of the output data is more difficult than is commonly expected. The purpose of this presentation is to address the problems arising from the use of these eco-counters and to discuss a possible methodology to optimize the use of this tool.

Methodology

The methodology proposed in this presentation is based on the experience of more than ten related applied research projects and, especially, on the last project carried out by the authors regarding the review of the monitoring system of the number, distribution, and characteristics of the visitors to the Alt Pirineu Natural Park 2011-2017, Spain (Farías & Morera, 2017a,b).

The methodology developed includes the consideration of five main steps:

Step 1. Identify the main access points. Classify them by priority instead of the number of visits expected.
Step 2. List their main characteristics in terms of access: by car, walking, others mixed.
Step 3. Contrasting information. Fieldwork assessing the situation of the current eco-counters (if applicable) and/or thinking about best possible location of the new eco-counters.
Step 4. Accurate date are processed to determine the distribution and type of use in the area.
Step 5. Put the results into practice and track the design of the system.

Details of the basic equation apply to calculate visits using eco-counter data in the case of vehicle entrances, where VC is: vehicles detected by eco-counters; VT: vehicles that have crossed through the eco-counter; VNC: vehicles that have not crossed through the eco-counter; VUL: local population, and; VPB: visitors who have access to the Park on foot or mountain bike who, in the case of the vehicle eco-counter, are not registered by the eco-counters.

$$\left(\frac{(VC - \%\frac{VT}{VC}xVC)}{2} + \%\frac{VT}{VC}xVC\right) x \frac{average\ of\ people}{vehicle} + \%\frac{VNC}{VC}xVCx\frac{average\ of\ people}{vehicle} - \%\frac{VUL}{VC}xVC + \%\frac{VPB}{VC}xVC$$

Different vehicles that have crossed the eco-counter

Total visitors that have crossed the eco-counter with vehicle

Visitors with vehicle that have not crossed the eco-counter

People that have accessed to the Park, but to do other activities as could be to work or to collect firewood, they have not accessed to visit the Park

Visitors that accessed to the Park, but they could not be detected by the eco-counter

Eq. 1: Equation used to calculate the number of visitors to the park from the information collected by the eco-counters.

In total six entrances were considered in this study, all of which had a vehicle eco-counter. More details about each entrance can be seen in Figure 1 and Table 1.

Table 1. Main characteristics of the entrances controlled

	Name of the entrance	**Location**	**Eco-counters**
1	Fornet	Valls d'Àneu (TM Alt Àneu)	Magnetic Eco-Twin*
2	Tavascan	Vall de Cardós (TM Lladorre)	Magnetic Eco-Twin
3	La Farga	Vall Ferrera (TM Alins)	Magnetic Eco-Twin
4	Tor	Vall de Tor (TM Alins)	Magnetic Eco-Twin
5	Sant Joan	Vall Sta Magdalena (TM Montferrer)	Magnetic Eco-Twin
6	Os de Civís	Alt Urgell (TM Valls de Valira)	Magnetic Eco-Combo**

* These counters collect data in infrared format and then couple them to a Bluetooth infrared data transformer.

** these counters work in the same way as the ones above but collect data directly in Bluetooth format

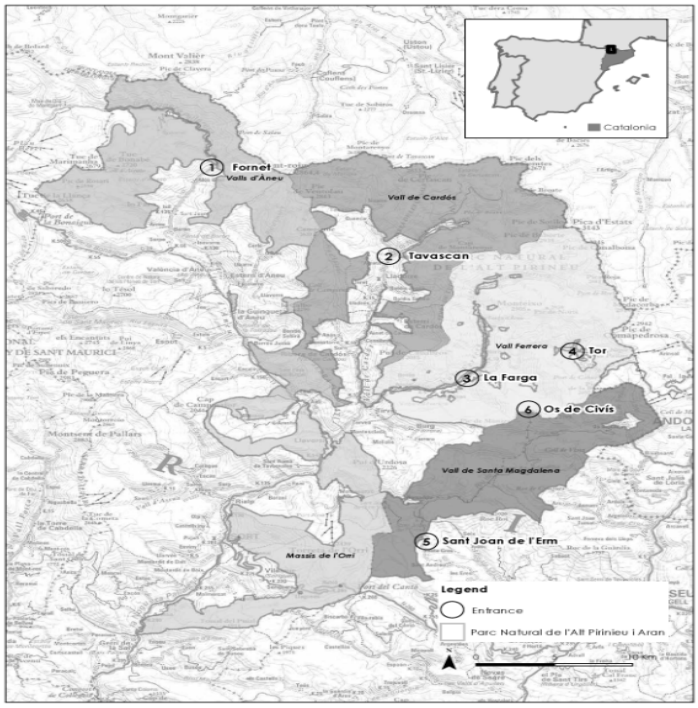

Figure 1. Alt Pirineu Natural Park - Spain

Results

The results obtained in the application of this methodology (year 2011) and the revised results in the year 2017 showed important changes in terms of the use and distribution of visits at two of the six entrances controlled, indicating a significant variation in the equation originally applied, not only in terms of number, but also in distribution (Figure 2). The range of variation between a simple or a complex equation can range from 8% to 25% depending on the entrances.

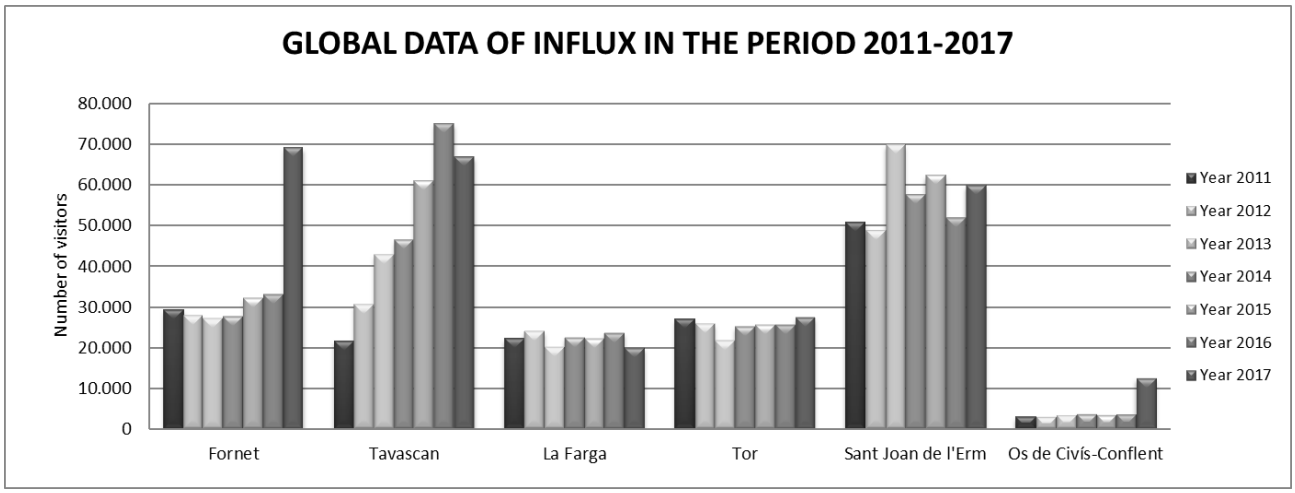

Figure 2. Evolution in the number of visits

Discussion

Although eco-counters are becoming a more common system for monitoring the number of visits to protected natural areas by applying simple filters, the results obtained in this study demonstrate that it is necessary to create a specific equation for each entrance where the eco-counters are located, and that it has to be checked periodically in order to identify the main changes and re-adjust the corresponding equations. Recommendations about how better to use the eco-counters will be discussed further in the presentation of the results.

Acknowledgements

This project has been possible thanks to the Alt Pirineu Natural Park, the Ministry of Territory and Sustainability. Government of Catalunya and the National Institute of Physical Education of Catalonia (INEFC)

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Preserve and manage Mercantour National Park using pedestrian data collection

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Introduction

Counting pedestrians in natural areas is essential for effective space management. Permanent counting stations have allowed natural area managers to understand attendance by period, compare hiking trail use with other activities and perform weather impact analyses using meteorological data.

About Mercantour National Park

Mercantour National Park is one of the ten national parks in France. It has a long history of fauna and flora protection and has been a protected area since King Victor-Emmanuel II made the territory a « Réserve royale de chasse » in 1859.
The area became an official national park in 1979 and is twinned with the neighboring regional park Parco natural Alpi Marittime in Italy. In 2018, Mercantour National Park and Parco delle Alpi Marittime submitted a procedure to be listed as UNESCO World Heritage sites.
The protected area covers 1066 km², including a central uninhabited zone comprising seven valleys - Roya, Bévéra, Vésubie, Tinée, Haut Var/Cians (in the Alpes-Maritimes) plus Verdon and Ubaye (in the Alpes-de-Haute-Provence) - and a peripheral zone, comprising 23 villages.
Since its creation in 1979, Mercantour Park has proven increasingly popular - many visitors each year enjoy 550 km of marked footpaths and visit its villages. Visitors mostly use the area for outdoor recreation activities, including hiking, rock-climbing and cross-country skiing.
Among the most visited sites:
- the « Merveilles » valley with its 40,000 prehistoric engravings;
- the Allos lake, the widest natural high-altitude lake in Europe;
- the Boréon - la Gordolasque et la Madone de Fenestre for their unique subalpine and alpine atmosphere.

Count methodology

Mercantour National Park established a count data collection program more than ten years ago. Working with estimates was a first step towards a data-oriented management approach, but the need was bigger and lead to the development of a new count program a year ago. The goal was to be able to compare accurate, objective figures collected from automated counters with subjective user estimates on key trails in the area.
For this purpose, Mercantour National Park managers uses both macro and micro-level monitoring to count on-site visits. A macro monitoring solution measures attendance between valleys and inside specific valleys, using data collected from GSM emissions. Automatic pedestrian counters have been installed to measure attendance permanently on specific, iconic

trails. Permanent vehicle counters are also used on several mountain passes to measure the impact of noise pollution on wildlife.

Results

Counters have been installed very recently, so global yearly attendance is not known yet, as it is one of the goals of the program. However, an attendance study was published in 2001 and estimated a total number of 427,000 visits between June, 15 and September, 15. These figures will be used as a reference for the upcoming data to understand the attendance of the area.

Trail operations

Park managers are already able to anticipate trail erosion by correlating pedestrian attendance with the level of erosion observed on trails, notably on the popular Allos lake trail. These correlations allowed managers to forecast erosion and react with appropriate trail operations for maintenance purposes. The data is also used to assess the number of cross-country skiers using the trails and analyze the ratio of summer to winter attendance, giving an accurate overview of year-round activities.

Finally, automatic counter data was used for one of the most popular trails in the park which has a parking lot located very close to the trail. The use of automated counting systems will enable Mercantour National Park authorities to size and schedule electric shuttle buses accordingly. Count data will also be used in this project to prevent summer site saturation by closing the parking lot if needed.

Fig.1 Pedestrian counter installed on a natural trail.

Sky conservancy actions

The project manager of the Mercantour National Park has recently been developing an “astro-tourism” activity to attract amateur astronomers to the park. Balancing the need of nature preservation with the desire to open the park to the public, the National Park is working towards becoming an “International Dark Sky Reserve”, a certification created by the International Dark Sky Association to acknowledge efforts made in reducing light pollution. Actions were undertaken by the managers of the park to extinguish lampposts near-by, reduce the overall lighting of the area and therefore increase natural night.

Through these actions, the Park aims to attract amateur astronomers and will use pedestrian data to measure the success of this initiative.

Conclusions

The Mercantour National Park uses pedestrian and vehicle counters to analyze visitor flows and take action towards preserving nature on site. Reliable and objective figures are important tools to limit trail erosion, develop appropriate services and activities and manage attendance on site while preserving wildlife.

Exploring responsibility-sharing between visitors and managers: Results of a Delphi study

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Introduction

Given the high expectations for quality nature-based experiences by the public and the tourism industry combined with an increasingly diverse array of activities by visitors from a wide range of cultural backgrounds, visitor risk and safety management is of increasing concern to recreational and protected area management agencies around the world (e.g. Rickard 2012; Shibasaki et al. 2010). In addition to a genuine commitment and a moral onus to facilitate public access as safely as possible, risks to visitors are managed for legal and financial reasons (McDonald 2003). However, the management of visitor safety is multifaceted and complex, and ambiguity often exists in terms of whether and how much individual visitors share responsibility for their safety with park management authorities (Rickard 2012).

In an effort to explore the perspectives of protected area managers, a qualitative study has been conducted *to explore the concept of responsibility-sharing* in recreational and protected areas in Australia. The study sought to answer questions such as: who shares responsibility for visitor safety in protected areas; why are responsibilities shared; and how may responsibility-sharing vary across different visitation contexts at different sites? Given that the formation of appropriate visitor risk management strategies is highly context dependent, gaining answers to such questions is timely and may assist park managers in future strategic planning and management implementation processes.

Methods

An email-based Delphi study has been undertaken, which is a research method characterized by a repeated feedback-loop until consensus is achieved (e.g. Donohoe 2011). Research participants were recruited based on their involvement in visitor risk management as part of their professional role within protected area management agencies in Australia. A total of 22 experts agreed to participate in the study representing visitor risk management expertise from a state (i.e. seven agencies) and national (i.e. one agency) level. Using the simple heuristic of a 'responsibility continuum for risk management' (McLennan & Handmer 2012) as a conceptual guide, the results presented emerged from the systematic, qualitative analysis of the written responses provided by panellists in three consecutive Delphi rounds conducted over ten months in 2017 (see Gstaettner, Weiler, Rodger & Lee 2018).

Results and Discussion

Sharing responsibility for visitor safety in protected areas:

All participants agreed that maintaining a high visitor safety standard in recreational and protected areas can only be achieved if a variety of relevant stakeholders accept responsibility to maintain the safety of visitors. Five stakeholder groups were identified to share responsibility for visitor safety based on the acknowledgement that all of these may influence safety outcomes in protected areas. The stakeholder groups identified include:

1) *Environmental Land Management Agencies* (responsibilities arising from legal requirements and liability laws, the promotion of access including the associated provision of services and infrastructure, as well as from their superior knowledge of specific environmental hazards of an area, including previous incident occurrences);
2) *Other Government Agencies on a Local, State or Federal Level* (responsibilities may arise for example for police or fire and emergency services based on their specialist ability to respond to emergency situations, or specific knowledge of governmental departments such as the Department of Water in relation to water quality issues of recreational water bodies);
3) *Commercial Tour Operators and Other Park License Holders* (responsibilities arising from legal obligations stemming from codes, standards, or licensing requirements, as well as a from the direct facilitation and/or promotion of activities and the associated superior knowledge base in relation to specific activity risks);
4) *Tourism Agencies or Private Businesses involved in the marketing of park activity* (predominantly moral obligations stemming from the dissemination of - potentially conflicting - promotional information);
5) *Visitors* (responsibilities arising from legal and moral obligations in relevance to personal responsibility for one's own safety and the safety of other visitors, as well as their direct behavioural influence on safety outcomes due to their choices made in relation to the location visited, their choice of information source, their choice of activity undertaken, as well as whether they accept management safety advice provided).

Delphi participants focused in particular on the responsibility-sharing between 'those at risk' and 'those in authority' (McLennan & Handmer 2012), i.e. the visitor or park user and the relevant land and visitor management agency. Consequently, subsequent Delphi rounds further investigated how contextual factors reflecting the characteristics of recreation opportunities could shape responsibility-sharing domain between these two main stakeholder groups.

Defining the responsibility context in protected areas:

All participants agreed that each nature-based setting is defined by its unique combination of environmental, social and managerial characteristics, and it was affirmed that responsibility-sharing conditions and associated societal expectations vary in relation to these differences. Through the lens of responsibility-sharing, the visitation context impacting on visitor risk management decisions as defined by the Delphi research participants varies relative to three situational dimensions:

(1) by a setting's *remoteness* considering its spatial as well as functional accessibility;
(2) by a setting's *level of visitor service* provision such as its physical infrastructure and its level of on-site risk information provision; and
(3) by the way a setting is *promoted*, considering the extent of promotional efforts and the type of visitors targeted.

A summary of the contextual factors influencing responsibility-sharing in recreational and protected areas is provided in Figure 1.

Domain of responsibility-sharing

Responsibility context varies along the continuum as defined by the impacting properties on visitation characteristics

Remoteness		*Level of Service*		*Promotion*	
Remoteness affects the magnitude of visitation and type of visitors, and has an indirect impact on the expected visitor experience. The easier the access, the greater the diversity of visitors to accommodate for in visitor risk management decisions.		The level of service affects the magnitude and manner how a setting is used and has indirect influence on expectations of visitors. The more developed a setting appears the higher the expectations of visitors in terms of safety management.		Promotion affects the magnitude and manner how a setting is used and has direct influence on the expectations of visitors. The more visitors are attracted to a setting, the greater the diversity of visitors to accommodate for in visitor risk management decisions.	
Remoteness refers to the real or perceived isolation of a natural setting being defined by the amount of effort required by the visitor (or emergency response) to access or depart the setting.		Level of service is defined by the extent, apparentness and complexity of setting modification and infrastructure as well as the direct or indirect facilitation of guidance through face to face means or strategically placed infrastructure and messaging such as signage.		Promotion is defined by the efforts undertaken to invite visitors to a setting and the way a setting is promoted to particular visitor groups. Promotional efforts external to the agency should also be considered, as they, too, influence visitor expectations and behaviour.	
Spatial accessibility	*Functional accessibility*	*Physical infrastructure*	*On-site risk information*	*Extent of promotion*	*Type of visitor targeted*
Spatial accessibility is evaluated by a setting's geographical proximity to (urban) infrastructure and associated services, including emergency services. Aspects to consider include the physical distance from urban areas in combination with the travel time distance based on travel mode.	Functional accessibility is evaluated in terms of the physical and functional access conditions of a setting. Aspects to consider include the type of access (e.g. road, walking track, helicopter), track and road grades/ classifications Accessibility is evaluated in relation to the individual capabilities of visitors, including the visitor skills and equipment necessary to access the setting (e.g. vehicle type, navigation equipment, etc.).	The extent of physical infrastructure is evaluated based on presence/ absence and type/ style of facilities and their extent they are blended into the natural environment. Facilities to consider include toilets, showers, barbeques and other social infrastructure, trails and lookouts, drinking water or electric lighting availability. Also considered should be the presence/ absence and type/ style of visitor centres or other commercial operations.	On-site risk information is evaluated based on the level of on-site risk and safety information and guidance provided. On-site information provision consists of a mix of interpretative/ educational or rules enforcement content provision; mostly referring to signage, but may also include presence of staff and staff advice. A clear distinction should be made between generic and site/risk specific warnings.	The extent of promotion is evaluated in terms of both, its depth and breadth. The depth of promotion can vary according to a local, state, interstate, or international reach of promotional material and the associated potential visitor catchment. The breadth of promotion can vary in terms of whether a setting is promoted for its landscape type via a large-scale tourism marketing strategy or promoted as specific visitor sites and activities.	The type of visitor targeted is evaluated based on the type of experience and activities promoted, which, in turn, influence visitor expectations. Invitation of particular visitor groups may require different safety considerations. Aspects to consider include whether and to which extent a site is visited by people not experienced with local hazard conditions such as international tourists, or vulnerable visitor groups such families with children.

Figure 3 Summary of contextual factors influencing responsibility-sharing

Conclusion

This study showed that Australian land managers involved in visitor risk management issues perceive protected areas as *shared risk spaces* where visitors and managers interact. Interaction does not necessarily relate to any physical or social contact between the two parties, but rather refers to the setting context as a means of defining conceptual representations of responsibility-sharing conditions. Within these conditions, the contextual manifestation of a setting is capable of defining societal expectations in relation to how much responsibility should be accepted by each party. The results of this study support recreation and protected area management agencies to establish relevant responsibility parameters and appropriate resourcing of a setting to identify an acceptable level of visitor risk management response. The three dimensions offer conceptual guidance to systematically consider the wider circumstances relevant to visitor risk management decisions across different setting conditions.

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A Study on Comfort Evaluation using Brain Waves and Questionnaire Survey in Green Spaces CG

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Introduction

Modern society can be stressful, and there is growing interest in the creation of comfortable living space. Many studies of urban space have focused on ways of creating relaxing space and comforting environments. For example, green space at highway rest facilities has been found to ease driver stress (Iwasaki et al., 2007). In recent years, devices for measuring biological information that were originally used in the field of medicine have become generally available and are being used in a variety of research fields. Research into the evaluation of urban space is no exception, and many researchers are now using biological information to quantify the effects of spatial recognition on the human body. Examples are the measurement of salivary amylase levels (Nakagawa et al., 2014) and brain waves in moving subjects (Miura et al., 2005).

Here we quantified the difference between the healing effect and the stress reduction effect due to the difference in green amount in the CG space using an inexpensive electroencephalogram (electroencephalogram or electroencephalogram) device. Our aim was to quantitatively verify the healing and stress-reduction effects of these spaces by using EEG measurement and a psychological analysis performed with a questionnaire survey.

Study Methods

In this research, we create images of green spaces and create CG images of 8 patterns with different green amount and width of the park. The characteristics of the eight patterns are shown in Table 1. In addition, Fig. 1 shows CG images of eight patterns.

For our measurements we used a relatively inexpensive and portable simple EEG machine. We used the following method to measure brain waves. Subjects donned the EEG machine, which then recorded their brain waves while they performed mental arithmetic (30 s) → landscape appreciation (60 s) → video viewing (30 s). After we had observed the subjects' brain waves, we performed a questionnaire survey at the same time as the subjects appreciated the landscape at each site. The survey items in the questionnaire covered each subject's living environment, the degree of stress in the environment in which they had grown up (5-stage evaluation), and the subjects at each observation point. There were 30 subjects, all of whom were students aged from 16 to 22 years.

Table.1 The characteristics of CG images

Sample image number	Width of the park	Tree height	Distance of trees
1	2m	low tree (1m)	None
2	2m	Medium tree (2.5m)	1.5m
3	2m	Medium tree (2.5m)	3m
4	2m	High tree (4.5m)	1.5m
5	2m	High tree (4.5m)	3m
6	2m	High tree (4.5m)	6m
7	1m	High tree (4.5m)	1.5m
8	1m	Medium tree (2.5m)	1.5m

image number 1	image number 2	image number 3	image number 4
image number 5	image number 6	image number 7	image number 8

Figure.1 The characteristics of CG images

Results

The conclusion in this study is as follows.

1) From the comparison of brain waves and questionnaire results using CG images, behavior of brain waves and relaxation degrees of questionnaire results due to changes in street width

are consistent. And It was confirmed that the narrower the garden road width, the lower the relaxation degree with the rest index. However, the influence on the degree of relaxation due to the change in the planting interval was not confirmed from the brain waves and questionnaire results.

2) Subjects who showed inconsistency in the degree of relaxation due to electroencephalograms and questionnaire results in the change in planting interval tended to relax in a closed green space. This result is different from existing research.

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Acknowledgment

This study was supported by JSPS KAKENHI Grant Number 17K14751, Grant-in-Aid for Young Scientists (B).

A study on the “Patterns” of outdoor public spaces in tourist destinations that make the sight attractive

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Introduction

There are 34 National Parks in Japan. And there are some hundreds of villages offering lodging and other visitor services in those areas. Some of them are onsen villages and attract many tourists every year.
But the problem is that, in most villages and other types of tourist destinations in Japan people stay only one night. They are not attractive enough for most of tourists to spend whole day long in or around the village. So they are promoting themselves and developing tourist attractions and activities for tourists to stay 2 nights or more.
But it's not easy to make vast investment in a situation of economic deterioration; therefore, methods for improving their attractiveness as tourist destinations and encouraging tourists to stay much longer with less investment or effort are highly expected.

Purpose of the research

To solve the situations described above, we are working on some research and analyses in order to clarify "factors" that make tourist destinations so attractive, from the viewpoint of outdoor public spaces or environments. By applying our future results, we aim at making it possible to analyze the attractiveness of each tourist destination and to propose effective methods to improve the attractiveness of the destination.
In this presentation, our first research results and draft will be described with some case studies.

Procedure

First, six tourist destinations were picked up from the onsen villages that hold the highest admiration in Japan, with reference to some destination rankings by private research institutes or travel guide books such as the "Michelin Green Guide." The six onsen villages are Kurokawa onsen, Yufu-in onsen, Kinosaki onsen, Arima onsen, Kaga-Yamanaka onsen and Nozawa onsen. Similarities in the arrangements of the outdoor public spaces around the destinations (onsen villages) were investigated, which may be factors that make those tourist destinations so attractive.
Those similarities were arranged into "patterns" following a framework called "Pattern Language" proposed by C. Alexander *1. Then, the "patterns" were tested, through verifying correlation between the correspondences to the “patterns" and the reputation of 24 tourist destinations in Japan.
Finally, following the arrangement of the "patterns," we worked out some case studies to diagnose the attractiveness of outdoor public spaces at tourist destinations, and tried to point out the pros and cons of each destination.

Result

Found "eight possible patterns that make tourist destinations attractive"

First, six patterns were found from similarities in the arrangements of those outdoor public spaces. We categorized those into four groups, then added two patterns, and, finally, eight patterns in four categories were ascertained, as described below.

We call these patterns "eight possible patterns that make tourist destinations attractive."

List of eight patterns and four groups

Group 1: Scenery / Visual Impression

Pattern 1*: A symbolic scene that express the personality of the destination

Pattern 2*: Nature in the area and views of the surrounding landscapes from the area

Pattern 7: Cleanly manicured facade and front yard

Group 2: Walkable

Pattern 3*: Streets or walkways with fun and pleasant scenery

Pattern 4*: Car-free environment

Group 3: Rest-able

Pattern 5*: Square or plaza in the middle of the sights

Pattern 8: Rest-able or stoppable places everywhere

Group 4: Stay-able

Pattern 6*: Activities or other good reasons for spending time in the open air

(other than walking around the scenery: pattern 3)

Calculated correspondences to the "patterns" as a case study

For 12 onsen villages and 12 tourist destinations listed in Table 1, correspondences to the "patterns" (for six major patterns, 1.5 points max. for each pattern, total nine points max. for each destination) was calculated. Calculated correspondences are also mentioned in Table 1.
The highest were Kurokawa onsen and Kinosaki onsen, which reached 8.5 points.
The lowest were Sakaimachi-dori in Otaru and Aidsu-Wakamatsu, which received only 2.0 points.

Tourist Destinations: Onsen Villages

Name	Kurokawa*	Yufu-in*	Arima*	Kinosaki*	Kaga-Yamanaka*	Nozawa*	Kusatsu
Location	Kumamoto/Kyushu	Oita/Kyushu	Hyogo/Kinki	Hyogo/Kinki	Ishikawa/Hokuriku	Nagano/Chubu	Gunma/Kanto
note						also known as Ski Resort	also known as Ski Resort
Image							
Calculated correspondences to the "Patterns"	8.5	6.5	7.0	8.5	6.5	4.0	8.0

... Destinations with * means 6 destinations first picked up

Tourist Destinations: Onsen villages in Hokkaido, as well as village centers of National Parks

Name	Noboribetsu	Toya-ko	Jozankei	Akan-ko	Souunkyo
Location	Hokkaido	Hokkaido	Hokkaido	Hokkaido	Hokkaido
note	National Park	National Park	National Park	National Park	National Park
Image					
Calculated correspondences to the "Patterns"	4.5	4.0	6.0	5.0	5.5

Tourist Destinations: Town sites

Name	Otaru/ Otaru Unga	Otaru/ Sakaimachi-D	Aidsu-Wakamatsu	Obuse	Nagahama	Omi-Hachiman
Location	Hokkaido	Hokkaido	Fukushima/Tohoku	Nagano/Chubu	Shiga/Kinki	Shiga/Kinki
note						National Heritage
Image						
Calculated correspondences to the "Patterns"	8.0	2.0	2.0	7.5	6.0	7.0

Name	Matsue	Tsuwano	Kurashiki	Miyajima	Hagi	Mojiko
Location	Shimane/San-in	Shimane/San-in	Okayama/Chugoku	Hiroshima/Chugoku	Yamaguchi/Chugoku	Fukuoka/Kyushu
note		National Heritage	National Heritage	UNESCO World Heritage	UNESCO World Heritage	
Image						
Calculated correspondences to the "Patterns"	5.5	6.5	7.5	6.5	5.0	7.0

Table-1 Tourist destinations in the research and calculated correspondences to “six patterns”

Verifying the "patterns" via correlation between correspondences to the "patterns" and reputation as a tourist destination

For the 12 onsen villages listed in Table 1, onsen site ranking by the research institute "Jalan" *2, which published the results of a survey asking respondents which onsen sites they want to visit again, was cited.

Then, correlation between correspondences to the "patterns" and reputation as a tourist destination was verified. From the results, the correlation was sufficiently high (R^2 = 0.609).

This could be showing that tourist destinations with more correspondence to our "patterns" tend to have a higher reputation as tourist destinations.

Considerations on the pros and cons regarding outdoor public spaces at the tourist destinations through the calculated correspondences to the "patterns"

From the results of the calculated correspondences to the “patterns” mentioned in Table 1, the findings are as follows.

At onsen villages in Hokkaido like Noboribetsu and Toya-ko, although they rank as high as village centers of the national parks, their scores are not sufficiently high compared to onsen villages on the mainland and Kyushu; therefore, their outdoor public spaces are thought to be not sufficiently attractive for tourists.

Sakaimachi-dori in Otaru and Aidsu-wakamatsu are destinations with the lowest scores among the destinations in the research, being especially poor in car-free environments, nature in the area and views of the surrounding landscapes, and having a square or plaza in the middle of the sights; therefore, they might improve their attractiveness as tourist destinations through improvement of these weak points.

Conclusions

"Eight possible patterns that make tourist destinations attractive" were found through research on the similarities in the arrangements of the outdoor public spaces of six onsen villages in Japan with the highest admiration through the following process.

Through some analyses, it was pointed out that these “patterns” are rather reliable. And it was demonstrated through some examples that we can discuss the pros and cons of tourist destinations by checking correspondences to these "patterns."

Want to discuss on...

What do you think about these proposals of ours?

We are now proceeding with our research and would like to discuss this matter with you (MMV participants), on whether these "patterns" are effective or not, for tourist destinations to be attractive not only in Japan but all over the world.

Please imagine some tourist destinations in your surrounding areas that are attractive or some that are not, and please come to discuss such "patterns" that make tourist destinations attractive and charming.

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*2 Jalan Research Institute, 2016, “Popular onsen sights ranking 2016”, http://jrc.jalan.net/j/surveys.html referred on 4/16/2018 (In Japanese)

Frequency of preschool children's outdoor physical activity and relations to body mass index and motor performance

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Background

Children today in most industrialized countries are growing up in altered living conditions compared to previous times. Due to the trends of urbanization, motorization and rapid technological progress, children spend less time actively playing in natural surroundings and more time passively consuming audio-visual media – this may lead to an increasing alienation from nature (San Jose & Nelson, 2017). Moreover, sedentary behavior potentially results in overweight and poor motor performance.
Whereas the positive effects of physical activity in general are well documented, physical activity in an outdoor natural environment may lead to additional positive effects. For example, outdoor physically active children have a lower risk for developing chronic illnesses and physical activity in natural environments was found to be associated with a lower risk of poor mental health (Thompson Coon et al., 2011). Importantly, Wells and Lekies (2006) point out that the number of hours spent outdoors in childhood is the most important factor associated with people´s long-term environmental attitudes and behaviors. Frequent experiences in nature during childhood predict higher levels of physical activity in natural environments in adulthood (Calogiuri, 2016). Therefore, it may be a public health issue to bring children back to nature as early and as often as possible.
The present study aims at the question, how frequent preschool children are physically active outdoors and if there are relations of the frequency being active outdoors to body mass index and motor performance.

Methods

Presented data originates from different health promotion projects conducted in preschools in Cologne, Germany (Klein et al., 2015). Relevant cross-sectional data is available for n=799 children (44.7% girls, 55.3% boys). Mean age of participating children was 4.7±0.9 years, mean height was 108.3±7.9 cm, mean weight was 19.1±3.6 kg and mean body mass index was 16.1±1.6 kg/m².
First, anthropometric data of the children were collected in a standardized procedure and the body mass index was calculated in kg/m². Afterwards, a motor screening with five test items covering relevant motor abilities (the "KiMo test") has been conducted (Klein et al., 2012). Parents completed a questionnaire, one question aiming at the weekly frequency their children were physically active outdoors beyond the time spent in preschool. Possible answers were "daily", "on 4-6 days" or "on 1-3 days".

Descriptive statistics are shown as mean values and standard deviations. Relations between the categorical variables “gender” and “frequency of physical activity outdoors” are tested by the chi²-test. Differences between the groups (“daily”, “on 4-6 days”, “on 1-3 days”) regarding body mass index and motor performance are calculated by analysis of variance (ANOVA).

Results

48.6% of the children were active outdoors on a daily basis, 38.2% on 4-6 days and 13.3% on 1-3 days per week. No gender-specific differences (p=0.132) and no differences in age (p=0.904) occurred related to outdoor activity.

The body mass index did not differ between children being active outdoors every day or less, neither in total (p=0.095) nor regarded separately for girls (p=0.815) or boys (p=0.076). Motor performance did not differ due to the frequency of outdoor activity in the test items “shuttle run” (p=0.303), “standing long jump” (p=0.662), “sit and reach” (p=0.830) or “lateral jumping” (p=0.861). Children being active outdoors on 4-6 days per week achieved the best results in the test item “one leg stand” compared to children being active outdoors on a daily basis or on 1-3 days (p=0.017).

Conclusions

The present study shows that nearly half of the German preschool children are active outdoors on a daily basis and additionally more than one third on 4-6 days per week. It clearly has to be stated as a limiting factor that neither the duration nor the quality of the activities have been assessed. This also may be one explanation, why no relations could be detected between the frequency of outdoor activity and the body mass index as well as the results concerning motor performance in 4 out of 5 test items. Only in the test item “one leg stand” (representing balance) differences in favor of children being active outdoors on 4-6 days could be proven. One explanation may be that preschool children take the opportunities to balance that outdoor surroundings offer (like overturned trees or curbstones).

Another explanation of missing relations between the frequency of outdoor activity and the body mass index as well as motor performance may be the fact that numerous factors are associated to the development of overweight and poor motor performance. Being active outdoors is just one parameter of many that are expected to be significant (like nutrition and physical activity in general). Moreover, the present study has been conducted in the urban area of a metropolis. The physical activity of inhabiting children may often take place in closed rooms like gyms. Finally, parents self-reported the frequency of their children’s outdoor activity by questionnaire. In this context social desirability of the answers has to be taken into account.

In summary, it is an encouraging result that a considerable amount of preschool children is active outdoors on at least every second day up to daily, even in an urban metropolitan area. Regarding the numerous positive health effects of being physically active, that may be increased if the activity takes place in a natural outdoor environment, it is a public health issue to promote outdoor activities of children. Future concepts for the management of natural resources for recreation should account for options for outdoor physical activity of preschool children.

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Risk factors associated with practicing Mountainbiking on single-use bikepark trails

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Introduction

High social demand for outdoor activities observed in developed world, causes growth in any type of active recreation in natural areas. Dominating are running and jogging, fishing and biking, including mountainbiking (MTB), both in rate and frequency of participation. While average total level of participants in different sport disciplines remains constant (*Outdoor Participation Report, 2017*), rise in popularity of mountain resorts offering both winter and summer cable cars operation is observed (*Garibaldi at Squamish*, 2014). Significant share of summer-season offer in mountain regions is dedicated to MTB, which largely contributes to local economies (Boozer, Self, 2012).
MTB is recognised as sustainable, environmentally neutral outdoor activity. Current research proof, that impact is mostly short-term and connected with trail construction period (Allen, 2014). If the trail is built properly, than spatial extent of impact is reduced to narrow band of land, where erosion and accumulation processes occur and this part requires regular maintenance. Research shows, that influence on flora is minor, no major negative impact on fauna is observed as well (Quinn, Chernoff, 2010).

The research concept, method, scope and aim

The aim of the research is to verify if the long-term impact of MTB related to heavy-metal and hydrocarbons pollution is considerable and may require further investigation.
Observing increase in demand for professionally established mountain cycling trails, we've asked questions concerning long-term impact of MTB on single-use trails. As most research focuses on macro-scale effects of MTB, such as soil erosion or habitat (plant and animal) disturbance, we decided to verify, if there's any traits of accumulation of heavy metals from worn brake pads and discs and hydrocarbons from tyre rubber in trail surface. To analyse those aspects, a renowned MTB centre in Saalbach-Hinterglemm (Austria, Kitzbüheler Alps region) was selected. During research visits a questionnaire at local bike-rentals and services was carried, to find out what is the potential for heavy metals and carbohydrates delivery to trails per annum. Within 400-km long trail system, as sample objects to analyse, trails opened for use in different period and attracting different number of individual rides per day were identified. To confirm the number of users at trails, simultaneous manual counting at different trails was carried. From selected trails soil samples were collected in two rounds at the same spots: early season (beginning of July) and late season (beginning of September). At

each trail samples were collected from 4 or 5 spots at two points: first point was identified as intense braking area, just before the corner, second is the free-rolling section, when no braking occurs as the bicycle is accelerating. At each point, spots for collecting samples were located: at centre of trail (sample A), right and left edges of trail extent (sample B and C), 5 m from the edge of trail, where eroded rock material (subsoil) was collected (sample D) as a reference. In certain cases also sample E was collected, as a dry or wet deposit of trail material. The samples were prepared for chemical analyses in search for Aluminium, Zinc, Copper, Iron and Manganese, as a components of bike brake systems. Also other chemical analyses, such as pH and microelement levels were carried. A spectrometric analyses for search of hydrocarbons were carried as well. Total number of analysed samples reached 43.

Results, discussion

The questionnaire followed in local bike-services, shows annual demand for parts only for local rental bikes, that are used solely at local trail system, reaching 3000 tyres and 6000 sets of brake pads. The most commonly-used type of tyre is changed in rental bike when loses 120 g of rubber, which results in 360 kg material deposited in trail surfaces per year. Average semi-metallic set of brake pads losses 10 g of friction material before replacement, so there is 60 kg of brake-dust left on trails each year. Presented data show numbers only for rental bikes, it's hard to estimate data for private bicycles that are short-term used on local trails.

After verification, as sample objects the Hackelberg Trail (HacT), the Blue Line (BluL) and the Hohalm Trail (HohT) were selected. First two were made available for use as early as in 2000 (est.), the latter in 2013. The number of daily individual rides fluctuated from 14 at HohT to 2400 (!) at HacT during major event of MTB Festival, while at BluL numbers did not exceed 1400 users/day. At HohT samples were collected only during first study trip, as during summer season trail surface was modified.

Early results of chemical analyses indicate rise of selected heavy-metals in A-samples with reference to D-samples (table 1), specifically for braking points. Such strong relationship is not observed in samples for free-rolling points, although for Zn and Cu differences are significant. In seasonal section slight increase of heavy-metal levels are observed in the same spots, but this aspect requires further investigation. Spectral image of all A-, B- and C-samples shows presence of aliphatic hydrocarbons, while in most of D-samples hydrocarbons have not been detected. Further investigation is needed for analyses of hydrocarbons mobility, as not all E-samples show presence of them.

Results obtained can be affected by natural bedrock mineralogy. The study area is located within Western Greywacke Zone (WGZ), naturally rich in metallic elements (Kucha, Raith, 2009) and has long tradition of copper mining.

Sample number	Abbreviation	Al.%	Cu ppm	Fe%	Mn ppm	Zn ppm
1	**HacT1_1A**	**4,2198**	**26,9**	**3,3878**	**449,1**	**74,5**
4	*HacT1_1D*	*3,6136*	*5,1*	*0,6048*	*22,3*	*15,3*
11	**HohT1_1A**	**4,8701**	**11,3**	**3,0605**	**187,7**	**43,9**
14	*HohT1_1D*	*3,1783*	*5,5*	*0,6143*	*22,0*	*18,1*
20	**BluL1_1A**	**5,0920**	**20,9**	**6,9295**	**1070,6**	**95,4**
23	*BluL1_1D*	*5,4070*	*8,2*	*6,9520*	*690,8*	*79,5*
27	**HacT1_2A**	**4,1781**	**38,0**	**3,4437**	**403,1**	**79,1**
30	*HacT1_2D*	*3,9666*	*4,0*	*0,7536*	*50,9*	*16,0*
36	**BluL1_2A**	**5,0155**	**27,2**	**6,7295**	**974,7**	**98,7**
39	*BluL1_2D*	*5,0531*	*7,5*	*6,5732*	*684,6*	*74,8*

Samples collected at centre of trail

Reference samples

Table 1. Relation in heavy-metal levels between A- and D-samples at brake points.

Conclusions

Observed increase in heavy metals levels between A- (centre of trail) and D-samples (reference) and presence of hydrocarbons in spectrometric image, suggest the need of further investigation of long-term impacts of MTB at single-use trails. To be discussed is, whether received test results indicate any dangerous levels, what would be the migration traces for heavy metals and hydrocarbons and if indicated levels may impact flora and fauna or water resources. Issues rise also about the performance of different trail surfaces in accumulation of heavy metals and hydrocarbons. All above should be further translated into sustainable trail management practices.

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Can we predict visitor loyalty in protected areas? The case of Kornati National Park

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Introduction

The Kornati Archipelago (Croatia) stretches over an area of 320 km^2 and includes 149 islands, isles, and reefs. Part of the Archipelago, encompassing 89 land units and adjacent marine area with total area 217 m^2 was proclaimed a National Park in 1980 due to exceptional geomorphological features, anthropogenic terrestrial vegetation, rich marine biodiversity, and oceanographic specificities.

The Kornati Achipelago is visited exclusively by boat. Visitors to Kornati National Park (Kornati NP) can be divided into two basic groups: individual visitors and group visitors. The number of visits has increased over time, from 166,941 in 2015 to 172,603 in 2017 (according solely to the tickets sold). The main motives to visit Kornati NP are leisure and relaxation and enjoying nature (Markov et al., 2016).

It is generally believed that in tourism, high service quality and resulting satisfaction lead to positive word-of-mouth endorsements, referrals, and repeat visits, which ultimately affect the financial performance of suppliers associated with the tourism industry (Žabkar et al., 2010). Satisfaction is the most commonly used customer perceptual metric by managers - because it is generic and can be universally gauged for all products and services and it is clearly understood by respondents (Gupta and Zeithaml, 2007). The degree of tourists' loyalty to a destination is reflected in their intentions to revisit the destination and in their recommendations to others, and thus, information about tourists' loyalty is important to destination marketers and managers (Yoon and Uysal, 2005). Depending on temporal orientation, loyalty can be measured as past account or future prediction. When measured in future temporal manner, loyalty can be expressed as the likelihood to recommend, the likelihood to repurchase, or depending on the context, the likelihood to visit/repurchase from the retailer again. Understanding how satisfaction during a tourism-related service encounter develops and how it affects behavioural intention to return or to develop positive word of mouth is of substantial interest to managers and researchers.

Aim of the research

The aim of the paper is to analyse the relationship between visitor satisfaction and loyalty in Kornati National Park.

Method

The survey was conducted by Polytechnic of Šibenik in the period 2015 - 2016 by using a structured questionnaire prepared in five languages. The sampling was conducted using a stratified random sampling. Although the sample includes group visitors (visitors on excursion boats) and individual visitors, here we analyse only visitors on excursion boats (in total, after data cleansing, 250 group visitors were interviewed in 2015 and 177 in 2016). The survey was conducted by using a self-filling questionnaire under the supervision of interviewers at several locations in Murter and Kornati NP. The research content includes sociodemographic characteristics of visitors, travel information, motives and information sources and self-developed items to measure satisfaction on several attributes that were relevant for managers in protected areas and questions about willingness on recommendation and revisiting. Visitors' satisfaction was analysed for 10 different categories: park information availability (*sinf1*), usefulness of guides and maps for visitors available in the park (*sinf2*), usefulness of information on biodiversity (*sinf3*), staff professionalism and kindness (*sval1*), possibility to enjoy in nature (*sval3*), availability of local products (*sval4*), range of available activities (*sval5*), number of other visitors in the park (*sval6*), value for money (*sval9*), and overall satisfaction with the park (*sovr*). The relationship between visitor satisfaction and loyalty is analysed by performing univariate tests and by applying structural equation modelling (SEM).

Results

In this paper, data collected in 2015 served as training data, while data collected in 2016 served as the test dataset. The degree of visitors' loyalty to a destination is measured by means of behavioural intentions which were operationalised with two indicators related to revistation and recommendation. Visitors' satisfaction was analysed for 3 different satisfaction categories: *satisfaction with information* (this was operationalised with three indicators: *sinf1, sinf2, sinf3*), *satisfaction with activities* (*sval4, sval5*), and *main satisfaction indicator* (*sval1, sval3,* sval6, sval9, *sovr*). Most of the visitors were on their first visit (~80%) thus loyalty was oriented in the forward temporal oriented manner expressed as willingness to recommend the destination and to revisit the destination. In total, 40.2% of visitors stated that they intend to revisit NP Kornati, while 16.4% of visitors stated that they don't intend to revisit with 43.4% not sure about their revisiting. Moreover, most of the visitors would recommend visiting Kornati National Park (86%), 12% of visitors would maybe recommend, while a minority (2%) would not recommend a visit. Each satisfaction indicator was analysed separately due to loyalty variables. All satisfaction indicators except *sinf3* were significantly higher in the group of loyal visitors (recommending/revisiting) than in the group of non-loyal visitors. Afterwards, due to the fact that both, satisfaction and loyalty are latent constructs, the relationship between loyalty and satisfaction was analysed by applying structural equation modelling (SEM) (Figure 1).

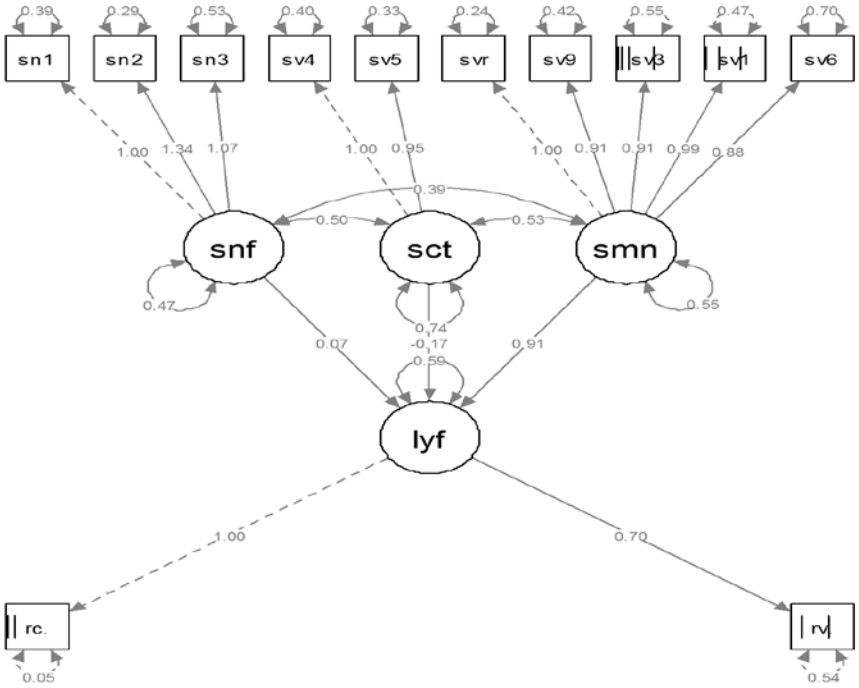

Figure 1. SEM results (Robust estimation: χ^2= 91.275 (p=0), CFI=0.934, TLI=0.910, SRMR =0.047, RMSEA=0.069)

In the SEM model, one regression equation has been set: regressing *main satisfaction factor*, satisfaction with information, and satisfaction with activities on loyalty factor. The results suggest that visitor loyalty is positively related to visitor satisfaction where only *main satisfaction factor* stands out as a significant predictor of loyalty. A standard deviation increase in *main satisfaction factor* brings about 0.91 standard deviation increase in loyalty factor. In particular, overall satisfaction, staff professionalism and kindness, value for money, and the possibility to enjoy nature are main drivers of *visitor loyalty.* This model was tested on the 2016 survey data. The SEM model confirms the same structure having visitor *loyalty* positively related to visitor satisfaction where only *main satisfaction factor* stands out as a significant predictor of *loyalty*.

Conclusion

Understanding which factors increase visitor loyalty is a valuable input for developing marketing and management strategies in NP Kornati.

Visitor loyalty is positively affected by visitor satisfaction where overall satisfaction, staff professionalism and kindness, the possibility to enjoy nature, and value for money are the main indicators of visitor satisfaction. The results are not surprising since they show that main drivers of visitor loyalty comprise overall satisfaction dimension, monetary dimension, social interaction, and primary motives for visiting.

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How do global changes affect ski resorts and how do ski resorts adapt to global changes? General trends and local responses

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Climate change is now universally accepted, although its effects still need to become more refined. Like winter sports, which are largely dependent on weather conditions, many tourism sectors will undoubtedly endure very directly the climate disruptions (Le Scouarnec and Martin, 2008). These phenomena could not leave indifferent the laboratory of excellence "Innovation and Mountain Territories" (LabEx ITEM), dedicated to the multidisciplinary study, in human and social sciences, of the issues which characterize the mountain territories. Indeed, for many mountain territories, winter tourism is a central economic activity whose regression would have serious consequences for the economic development and the living conditions of local populations. Several members of the LabEx have therefore wished to participate in the understanding of these complex upheavals by the publication of a collective book dedicated to the analysis of the pressures that affect the winter sports resorts and to the adaptation strategies that they deploy for answer to these pressures. This book also aims to fill three gaps identified in the academic production : a focus on climate change at the expense of global changes as a whole; the lack of studies dedicated to the adaptation strategies of ski resorts to global changes; a lack of study on emerging markets.

From climate change to global changes

First, winter sports are not only affected by the climate, but by a number of largely connected evolutions called "global changes". Among these, we must first mention economic developments such as the increase in economic inequalities of developed regions and the increase in consumption in other previously poorer regions, the decline of previously established markets, the emergence of new trends and the increased competition between destinations bul also their concentration. Then come cultural evolutions such as the demand for more individualized tourist stays and the reduction of skiing in favor of new sports or leisure activities. Finally, societal changes influence both supply and demand. These include the environmental imperative that can affect the consumption patterns of tourists and which is translated, on the supply side, by restrictive legislations for tourism destinations. Security issues related to natural hazards (diseases, extreme weather events, etc.) and political (terrorism, wars, etc.) also influence consumer preferences, as well as the aging of the population (Dawson and Scott, 2013 ; Hatt and Vlès, 2014 ; Kuscer, Mihalic and Pechlaner,

2017). Beyond the only climate change, the book proposed by LabEx ITEM will therefor identify the main changes affecting winter sports tourism.

Adapation strategies to face global changes

Secondly, most of the academic work is devoted to assessing the impacts of climate change on winter sports resorts to the detriment of the analysis of adaptation strategies. Anchored in the natural sciences and modeling, the first propose scenarios of warming while the second, developed by the human and social sciences, highlight the vulnerability of tourism to climate disturbances. Interdisciplinary studies, which intersect models of climate change with adaptation strategies of territories and resorts, are not non-existent but still need to be developed (Demiroglu, Dannevig and Aall, 2013). What is more, the most studied adaptations are of a technical nature. On the contrary, the book proposed by the LabEx ITEM will focus on different ways of adapting tourism destinations, both technical, economic and social.

A global picture of global changes and winter sports resorts: comparaison between old and ermeging destinations

Thirdly, studies related to the influence of climate change on ski resorts focus on the Alps, followed by North America, Northern and Eastern Europe and Oceania. Regions like Asia and the Middle East, where the winter sports market is expanding, are poorly studied (Yang and Wan, 2010 ; Demiroglu, Dannevog and Aall, 2013). There is also a lack of perspective on the specific situations of these different regions, whereas, depending on their history and resources, these regions do not necessarily provide the same answers to global changes. The book proposed by the LabEx ITEM will therefore focus on different regions of the world (Europe, America, Asia and the Middle East) by showing how they respond sometimes differently to cross-sectional phenomena described as "global changes".

Structure of the book

Through a huge repertoire of cases structured in five parts (each consisting of three chapters), the book will describe the types of changes that affect winter sports resorts and their adaptation strategies, according to their historical trajectories and their specific resources. The first part will give the framework of the book by detailing the forms that winter sports resorts can take and the viability of their business models (with particular attention to the community based model, the corporate model, the small resorts and their management system). The second part will focus on the main adaptation strategies adopted by the ski industry: technical solutions (climate change scenarios and snowmaking), diversification (seasons and practices) and modes of governance. Little studied compared to the supply, the expectations of tourists and how they respond to global changes will be studied in the third part of the book. The fourth section will focus on the sustainability issues of the resorts, from both a social and environmental point of view. In particular, the issues of environmental labels, the economic impact of winter tourism on local populations and seasonal work will be addressed. Finally, the last section will be dedicated to three emerging markets : Turkey, Poland and China. Their development prospects, their specific difficulties and how they are affected by global changes will be at the heart of this last part.

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Renovation of the tourist trails in the Tatra Mountains

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Due to substantial transformations of the surface within tourist paths in the Western Tatras, the Tatra National Park performs a reclamation of degraded slopes. It is implemented under projects "Reduction of tourist pressure on habitats and species in the area of the Tatras" co-financed by the EU (started in 2013, 2017). The Western Tatras belongs to naturally valuable areas where against a dense network of tourist paths runs. Hiking is currently one of the most important factors affecting the transformation of the surface. By descending from marked trails tourists contribute to the destruction of vegetation and deterioration of soil cover properties.

Mostly renovated paths are located on the alpine, sub-alpine and forest zones. Paths are overhauled by native materials - stones, mineral soil and wood. The area around the trails trampled, devoid of vegetation - soil and eroded is protected by jute mats and slats. Parallely to the renovation activities, the Tatra National Park leads a monitoring of visitors getting around in strictly protected areas as well as monitoring out-of-trail human activities by means of camera traps.

Methodological proposal for the analysis of the 'online reputation' of protected areas

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In today's world, social media is an important and necessary tool for the delivery of accurate information. Social media makes it possible and easy for users to express opinions about the experiences and service offered. With the development of social media, recreation and tourism users can also better express their opinions much more critically. Social media, a management tool, has resulted in users being able to express positive or negative feelings about their experiences. In addition, this tool enables the service provider to improve their facilities and services, and ultimately the recreation/tourism experience. One example of this is the website called TripAdvisor, which provides consumer ratings for hotels, attractions, agencies and restaurants. TripAdvisor includes recreation/tourism attractions such as protected areas, parks, museums, historic buildings and so on. A drawback of these types of sites is that anyone can list any comment—and analyzing the data is not an easy task. This proposed poster focuses on a methodology of assessing comments regarding outdoor recreation settings such as parks and protected areas, as well as the facilities, services and information they provide. This method relies on a spreadsheet with categories and keywords to parse out and categorize comments about satisfaction, crowding, and so forth.

With the advances in social media over the past 10 years or so, the internet has become one of the primary source of information for those seeking information about recreation and tourism. Websites like TripAdvisor have become benchmarks for opinion analysis. Bizinelli et al (2013) suggest that, within contemporary society, technology now provides people with an active voice, which expands the horizons of communication, and creates new ways of expressing thoughts in an interactive way. According to Limberger, Boaria and Anjos (2014), social media has changed the way tourists seek and exchange information. This user-generated content allows this information to reach other tourists, influencing the decision of new visitors. Silva and Gandara (2016) created an online reputation assessment methodology, which we will demonstrate. When adapted, this analysis can also be used to fully understand visitor management comments on protected areas.

The proposed analysis: categories and aspects related to protected areas

In order to analyze the online reputation of protected areas on the TripAdvisor website, and to identify visitor's opinions regarding satisfaction, quality and experience, categories of analysis have been defined. Three main categories are suggested: Landscape, Services and Activities. These categories encompass key aspects of analysis, with the use of keywords (Table 1).

Category	Aspects	Positive	Negative	Keywords
LANDSCA	Scenic beauty			stunning, wonderful, incredible scenery, etc.
	Well preserved			preserved nature, forest presence,

PE	nature conservation,			pristine
	Presence of animals			sightings, contact with fauna
	Landmarks in the landscape			geomorphological and hydrographic elements (mountains, plateaus, rivers, etc.)
	Location			untouched place, far, near
	People			full, empty, crowding
	Surroundings			region, people of the region, community
SERVICES	Buildings			concierge, visitor center
	Cleanliness			dirty, garbage, trash, clean area
	Access			good, bad, easy, difficult
	Facilities			parking, wifi, free transport
	Interpretation			panels, video, brochures, lectures, leaflets
	Information			behavior, attractiveness of the region
	Guiding Services			service of guides, monitors, etc...
	Food			restaurants, snack bars, snacks, food quality
	Prices			free, price paid, expensive, cheap.
	Time			timetables for activities, opening and closing time.
	Shopping (souvenirs)			items for purchase, lack of items to buy, product highlights
	Safety			emergencies, risks, accidents, security, etc.
ACTIVITIES	Activities			trails, baths, experiences, specific activities in the AP
	Tourist attraction			landmark, little visited, all must know, unique.

Table 1: Protected Area Categories of Analysis

To test the methodology, analyzes of Brazilian protected areas were carried out, including the Tapajós National Forest, Anavilhanas National Park (both in the Amazon) and Iguaçu National Park. In Anavilhanas, for example, 33 comments were analyzed, 66% positively highlighted the scenic beauty of the place. And in relation to the negative aspects, 3% of the analyzed comments criticized the guides who carry out activities in the National Park (Teixeira et al, 2017). Results showed that sites such as TripAdvisor provide visitors with the opportunity to comment, which can be a good and inexpensive method of evaluation. Tools such as the table presented facilitate the analysis of these comments and may contribute to Public Use management and satisfaction monitoring. These results will be discussed in detail through the case studies in the settings discussed above.

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Recreational boating and visitors observations in MPAs: methodological approach and challenges

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Introduction

Traditionally the management of marine protected areas has given priority to the acquisition of biophysical data, whereas the social dimension was often dealt with as an afterthought. But recently it has become essential to understand the characteristics of human activities. However, there is still little structured information available describing recreational activities at sea in detail and allowing a global vision of their development.
The presentation aims (i) to present the main methods implemented for the spatial and dynamic analysis of water-based frequentation in marine protected areas in France, (ii) to share this experience in a critical way in order to improve the methods that allow for a more comprehensive assessment of nautical activities.

Method

The following analysis and assessment of methods allowing for the monitoring of recreational activities is based on the approaches used by the research programs of the LETG laboratory in Brest. Their respective projects rely on different areas of expertise and techniques in order to collect data on recreational activities. The programs focus on protected areas in the Atlantic Ocean, the Channel and the Mediterranean Sea. Several of these methods have been tested for visitor monitoring observatories.

Results and discussion

The comprehensive study of boating and water-based activities requires various data: quantifying boats and flows (number of boats, type, size, age), monitoring their temporal course (periods of high frequentation), spatializing frequentation (boat lanes and preferential destinations) and characterizing practices (categories of users, motivations, perception of the activity and its environment).
We will distinguish the methods according to the type of data they allow to collect (quantitative, spatio-temporal or qualitative data).

How many? Quantitative methods

The quantitative approaches are essential for understanding the intensity of the different activities in marine protected areas. However, the methodological difficulties of implementing the counts are numerous at sea. Two types of counts can be distinguished: (i) direct counts, to evaluate the instantaneous or dynamic frequentation of well delimited sites; (ii) analysis of administrative data (registrations, licences) for an overall evaluation of fleets (Sidman and Fik, 2005). The latter does not answer the following questions: where are these boats? how many sail? where are they going and when?

Where? Remote sensing methods

The sea constitutes an open environment, on which satellite or airborne remote sensing methods provide snapshots of frequentation. Aerial overflights photography is used for beach frequentation analysis , mooring or boat counts (Le Berre et al., 2013; Smallwood and Beckley, 2012). These methods are limited when they must be carried out over large marine areas (time) or repeated frequently (cost and analysis time). Satellite remote sensing can provide snapshots of frequentation over large areas. The use of very high resolution images (e.g. Ikonos), and pattern recognition methods, is also being developed. But the spatial resolution of satellite images may prove too low to characterize small boats and these methods still experimental requires specific skills.

When? Instrumentation monitoring methods

At sea different activities can coexist in the same area at the same time, or share it at different times. Taking into account the time dimension is therefore important, particularly for the management of uses. Passive acoustics allow continuous recording of the sound environment (marine traffic and 'noisy' activities) through the deployment of hydrophones. However, underwater acoustics has two major disadvantages: firstly, this method only works for motorized boats.. Secondly, the accurate localization relies on the use of several sensors placed in a study area.

Spatio-temporal methods

To describe maritime activities and traffic intensity, the most widespread data source is now Automatic Identification System (AIS). This method is of particular interest when trying to understand the behavior of ships by locating, characterizing and quantifying maritime flows and by allowing a fine temporal reconstruction of traffic (Le Guyader et al., 2011). However, not all boats are equipped with this device. In our field of study of recreational boating, AIS data mainly concern large pleasure crafts and passenger ships.

Who and why? Contribution of social sciences

To improve knowledge about users (age, gender, socio-professional category) and their practices (frequency of navigation, areas frequented, motivations, etc.), the use of methods from the human and social sciences is frequent. Most often these are "face-to-face" interviews or remote surveys (by mail, telephone, Internet). The objective is to define behaviors on the sites, which can eventually be extended and generalized.

The survey can be coupled with GPS or mobile phone technologies to record tracks. The main limitations of these methods concern deployment difficulties or low efficiency at sea. The contribution of participatory methods can help to intensify data collection, but it remains limited in France.

Conclusion

The various methods presented provide useful and complementary data for mapping maritime activities (tab. 1). However, they also have disadvantages which are related to costs as well as their intrusive or low operational nature.

Tab. 1. Methods of marine activities observations: Interest and limits

Tupe of data collected	Methods	Exemples	Interests/limits				
			How Many	*Who*	*How*	*Where*	*When*
Quantitative	Count	Direct counts	strong	poor	moderate	moderate	moderate
		Aerial survey	strong	moderate	poor	moderate	moderate
		Automatic registration methods (video, counters...)	strong	poor	poor	poor	strong
		Licences (boats registration …), statistics...	strong	moderate	poor	poor	poor
Qualitative	Boats and users characterization	Survey, interview	poor	strong	strong	moderate	moderate
		Focus group	poor	strong	strong	moderate	moderate
		Log book	poor	strong	strong	moderate	moderate
		Direct observations (terrestrial ou by air)	poor	strong	strong	moderate	moderate
Behavioural	Uses description	Observations	poor	strong	strong	moderate	moderate
		Reconstruction of itineraries	moderate	moderate	strong	moderate	moderate
		Observation notebook	poor	strong	strong	moderate	poor
		Participative cartography	moderate	moderate	strong	moderate	moderate
		GPS tracking	moderate	moderate	moderate	strong	moderate
		Phone data	strong	moderate	moderate	strong	strong
Spatial	Spatial distribution	Regulatory information	moderate	moderate	moderate	strong	moderate
		Spatialization by aerial photographie or satellite image (remote sensing)	strong	moderate	poor	strong	moderate
		Radar, sonar	moderate	moderate	poor	strong	strong
Temporal	Temporal distribution	Hydrophone	strong	moderate	poor	poor	strong
Spatiotemporal	Spatiotemporal evolution	AIS	strong	strong	moderate	strong	strong
		Observations by personnal from semaphore	strong	strong	poor	moderate	strong

Methods operational efficiency

poor moderate strong

In the end, to set up long-term observation series of maritime activities and their interactions with the environment, various issues need to be addressed/taken into account/considered. They are (i) scientific and technical (development of marine sensors, control of treatment

protocols and dissemination of results), (ii) political and societal, particularly with regard to the social acceptability of the observation of maritime activities.

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Shark problematic issues in La Réunion : A sustainable monitoring of the sea territory ?

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Introduction

Here we will expose our PhD project. The object is to investigate the ecosystem and socio-system co-viability. To that extent, we focus on the monitoring of the coastal territory in La Reunion island, in the west Indian Ocean. In February 2011 began one meaningful environmental conflict in this island : the « shark crisis » (term use by the stakeholder groups). Several shark-human interactions occurred this year and have increased since. The « *ordinary risk* » of unexpected encounter with a squale has been built and became an « *absolute risk* » (Thiann-Bo Morel & Duret, 2013). Since, La Reunion island is known worldwide to be a "sharks island"...

Research questions related to this proposal communication

To understand the socio-environmental and cultural dynamics in this context, we are working in a pluridisciplinary approach that will stand in our interdisciplinary laboratory, UMR Espace-Dev, and especially with the squad AIMS (*Integrated Approach of Environments and Societies*).
We decide to expose on three major questions :

1) Why the risk culture was taking so long to raise ?

Between 1980 and 2000, so that' 10 years before the "shark crisis", 22 sharks-humans interactions are collecting around the Reunionese's coastal territory. In this context, where sharks always have been present in the Reunionese's seas and the surf was an imported sport, we study the evolution of the public representation of the shark risk. We put a postcolonial reading grid to understand these sport issues.

This questioning refers to two other interrogations :

1.a) During the "golden age" of surfing in La Réunion (1970-2000), why are sharks are told to be this absent/quiet ?

1.b) What about the native culture/practises about sharks ?

2) How is the conflict between the stakeholders structured ? To what extent is questioning the Reserve Natural Marine of La Réunion (RNMR) by the surfer's communities ?

The emphasis is placed on the analysis of actors' systems and territorial action along the west coast. We want to focus on the surfer's representations/opinions of the RNMR and mostly on what they are questioning.

3) What about the monitoring of the sharks-humans interactions in the other seas territory ? Is the case of La Réunion a specific one ?

In the UMR Espace-dev, the study of the islands, as laboratory of the complexity of interactions between environments and societies, is one of the transversal thematic. The law

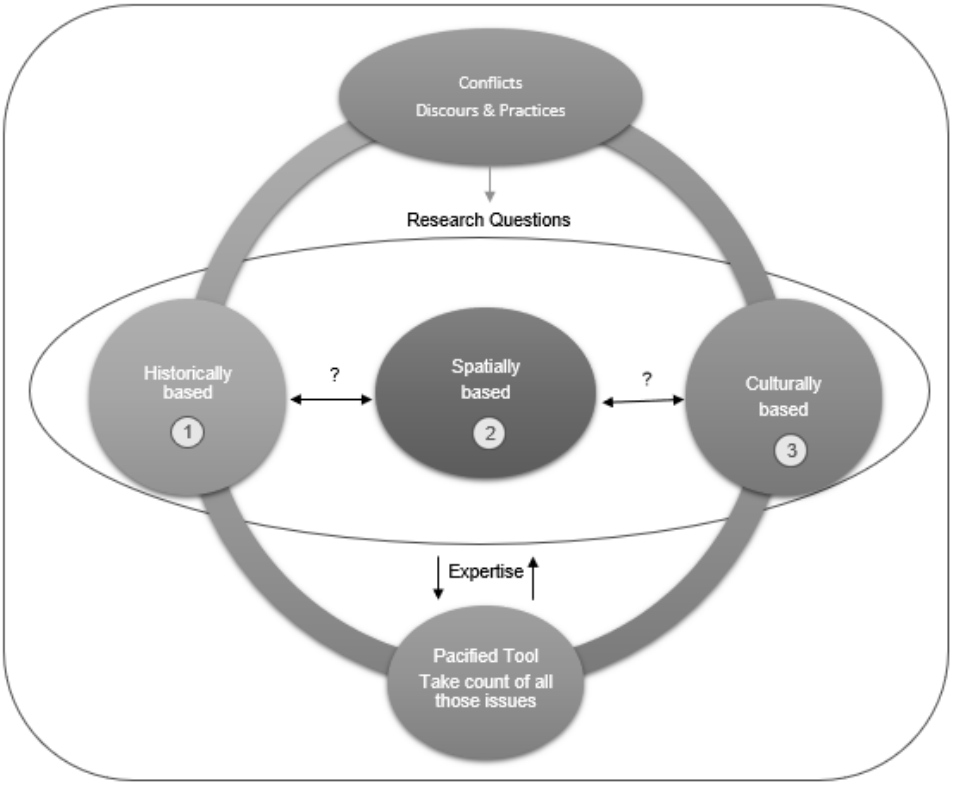
is different between country and societies, but the environmental conflicts are similar in general points.
In this research we are betting that :

> H1: The territorial development (coastal urbanization), the post-colonial context (assimilationist ideology), the French state global management, especially the economy of scale (2 million € for the risk reduction in 2018), the instrumentalization of the risk management (development of numerous devices), are all systems that interfere with an integral and sustainable monitoring of the shark problematic.

At the opposite, we think that :

> H2 : A collaborative monitoring based on the principles of the Research in Participatory Action (RPA) will generate a territorial and environmental mediation vector of a sustainable development.

2.a Scheme of the PhD project



In this research, we will question the elements of the stakeholder's discourses in this "crisis".

Data collection methodology

For the elaboration of a pluridisciplinary approach, we are working with a variety of tools which global purpose is to understand the relationship between the islands society and their

environment. In this way, our data collection is composed of three main stages, to answer at the three questions asked previously :

a) From digital to symbolic

This first phase is composed of four steps :

- direct observation of the environment (natural or human), stakeholder in situ surveys
- semi-structured interviews and accounts of life of the stakeholders
- media treatment about the sharks-humans interactions since 1980
- Mapping of the socio-territorial interactions

All these data collecting steps will give us the tools to understand the socio-territorial and cultural dynamics of the Reunionese's society, about the shark problematic context.

b) Collaborative monitoring of the sea territory

This second phase is based on the principles of the RPA (Gonzalez-Laporte, 2014) but also of the Environmental Damage Regulations (EDR) and the Alternative Dispute Resolution (ADR) (Fisher & col, 1991). Along these lines, we want to set up participatory workshops to measure the possible changes or impacts of an environmental mediation in the RNMR.
This step is composed of three approaches :

- The premediation : identification of the nature of the conflicts and determination of the
  flow
- The mediation : negotiation on the main issues ; preparation of a draft agreement ; review and ratification of the agreement ; establishment of strategies for implementing and monitoring the agreement
- The postmediation : implementation of the agreement ; control, monitoring and surveillance ; reinforcement mechanisms

c) Design of a participatory database with other territory

The last part of the project is to collaborate with other institutes, scientists, who are working or want to participate in the realisation of a database regarding sharks-humans interactions. First, we will focus on the Indian Ocean region. Then, as a second step, we want to open the data process collection to other seas (Pacific Ocean, Caribbean seas) and propose a comparative approach between continental territories and islands.

Conclusion / Taking home message

La Réunion and other islands territory are showing us all the complexity to manage protected areas, as the uses (nautical activities or sport into the RMN for example). An environmental participative effort, interactive and collaborative appear to promote a pacified monitoring of the territory. In this process, how can we pacify these antagonistic predisposed interactions ?

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Use of a Mobile Data Application to Monitor Law Offense Cases at Black Forest National Park

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Introduction

Protected area managers aim to better understand visitors and their behavior. Besides traditional methods like surveys and observations, the use of ICT increased in the last years. Counting devices are adopted to count (Arnberger, Haider and Brandenburg 2005), GPS trackers are used to track routes (Taczanowska, Bielański, Gonzalález, Garcia-Massó and Toca-Herrera 2017) and voluntarily provided online data is used to analyze visitor experiences (Walden-Schreiner, Leung and Tateosian 2018).
Here, we present a case study of Black Forest National Park in which we customized the application CyberTracker to collect data on law offense cases. With the rise of applications on mobile devices used by park rangers to track species in a protected area, the possibility arose to use such a tracking application also for visitor monitoring.

The CyberTracker application

The CyberTracker application (www.cybertracker.org) is an efficient GPS field data collection tool.
Originally the application was developed to enable non-literate trackers being involved in animal tracking (Liebenberg, Steventon, Brahman, Benadie, Minye, Langwane & Xhukwe 2017). Its customization to the individual project requirements, i.e. the data to be recorded and the user navigation, does not require programming skills. Collected data can be easily reviewed and analyzed in tables, maps and diagrams on a desktop PC. Several data formats are available for data export. Although we operate a central server-based PostgreSQL-database for data storage and a combination of R and QGIS for data analysis, simple analysis is provided within the desktop version of CyberTracker.
Besides being an efficient application to collect field data, CyberTracker's biggest advantage is the fact that it provides a development platform to customize the application according to the individual requirements of each protected area of operation. Screens may be composed easily on a GUI and subsequently installed as new application onto a mobile device, such as smartphone or tablet. Screen elements include text, images and registration widgets for audio, photo or video sequences. The position of the collector will automatically be acquired through the onboard GPS device of the mobile device. Offline maps may be included for orientation in areas without network coverage.

Black Forest National Park implementation

In many protected areas various groups of personnel range the areas due to their assigned duties. Above all rangers of protected areas spent most of their working hours in the field. Hence, there is a huge number of potential field data to be collected while carrying out the assigned field duty. In order to be effective, it needs to be adapted to the special requirements

of the protected area of operation. Thus the application needs to be flexible in design without requiring deep IT-knowledge. For this reason we opted for the application CyberTracker. Within Black Forest National Park, CyberTracker originally was meant to supplement the systematic ecological monitoring programme at permanent sample plots and allow for data collection of random observations. Soon the idea emerged to use CyberTracker also to monitor law offense cases. Each record logs additional information including a time stamp, geoposition, weather conditions and the name of the operator.
While designing the data collection navigation, the main concern was to minimize the number of clicks necessary to compile a data collection record in order to keep the tracking process feasible and coherent across trackers (see Figure 1 for the user guidance in CyberTracker for logging an observation).

First results and outlook

Following a period of design and evaluation March 2017 until May 2018 was the first pilot period of operating the CyberTracker system in the Black Forest National Park. Nearly 1.000 law offense cases were recorded during this first year. Preliminary evaluation of the collected data shows highly interesting distribution patterns. The distribution of law offenses cases is as follows: swimming (0%), car driving (8%), campfire (4%), unvalid permit (4%), dog unleashed (20%), garbage (7%), overnight stay (2%), vandalism (3%), collecting fruits (3%), and off path system (42%). The distribution of these patterns as well as the spatial and temporal distribution is of great use for park management such as adapting visitor information and visitor guidance. With regards to the objectives of the rangers the collected data throughout the years will assist to evaluate the effectiveness of visitor information and law enforcement in protected areas. It will assist park management to optimize the efficient control the vast area of the National Park with the limited resources of personnel.

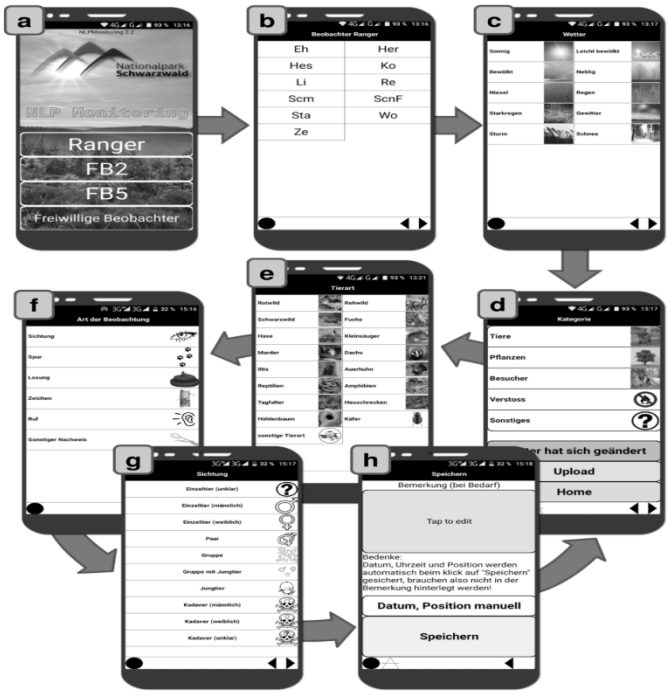

Figure1: User guidance in CyberTracker for logging an observation.

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Estimation of the environmental load of mountaineering activities in the Mt.Manaslu region

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Introduction

Manaslu is one of the 8,000-meter peaks ranking as the 8th highest peak in the world, located 130 km northwest of Kathmandu, the capital of Nepal. Since Manaslu's normal route (general climbing route) is relatively less difficult, the number of Manaslu's climbers have increased rapidly over the last 10 years. Sixty years have passed since Manaslu was first conquered by a Japanese expedition. The popularity of its scaling and the rapidly growing tourism in the Nepal Himalayas after 1970 are noticeably affecting natural, social, and cultural environments in the area. This in turn, is creating serious environmental issues at the Manaslu Base Camp (4,800 m above mean sea level), the entry point for climbing Mt. Manaslu.

In this research, we aim to develop a system that can combine high resolution imagery and Digital Surface Model (DSM) in the base camp and simple monitoring into one method in order to estimate the environmental burden associated with the climbing activities in the Manaslu Base Camp. We performed aerial photography of the base camp using Unmanned Aerial Vehicle(UAV) and created DSM from Structure from Motion (SfM) of the obtained images. At the same time, positioning data of the feature was acquired through a Differential Global Positioning System (DGPS) survey, and a 3D topographic map was created.

Method

The geographical area covered in this study is the Manaslu Base Camp in the Manaslu Conservation Area's, Gorkha District which is located in Northwest Nepal. In order to elucidate the actual usage of the Manaslu Base Camp, a field survey was carried out in August, 2016 at and around the Manaslu Base Camp using UAV. We conducted the following investigations at the Manaslu Base Camp: survey of the Base Camp, questionnaires to all the mountaineering parties at the Base Camp, survey of the water quality at the Manaslu Base Camp. We monitored the actual usage of the Manaslu Base Camp in order to clarify the number of tents and their locations by photointerpretation using high resolution satellite images.

In the survey of the Base Camp using UAV, we acquired a high resolution image using Phantom 4 of DJI. Using the obtained high resolution image, 3D terrain data and an ortho mosaic image was generated from the SfM, and a map of the Manaslu base camp was created. In the DGPS base camp survey, we recorded location information of features such as tents, toilets and routes in the Manaslu base camp. We conducted a water quality test in the Manaslu base camp using a portable multi - item water quality inspection machine.

Results

Survey of the Base Camp

A topographical survey of the Base Camp was conducted to pinpoint the location of each tent and to grasp the topographical features of the area. The Base Camp in the post-monsoon season is shown in the MANASLU BASE CAMP TOPOGRAPHIC MAP 2016 AUGUST.

We were probably the first in the world to create a topographical map of the Manaslu Base Camp that shows detailed positioning of the campsite. There were 32 kitchen tents,58 toilet tents, 42 altars (places to pray for safe climbs) in the post-monsoon season. The resolution of the obtained high-resolution image was 0.009 m. The flight time used for image acquisition was about 60 minutes. In the aerial shooting using UAV, we flew 50 to 80 m above ground and photographed a small area of about 600 m × 200 m.

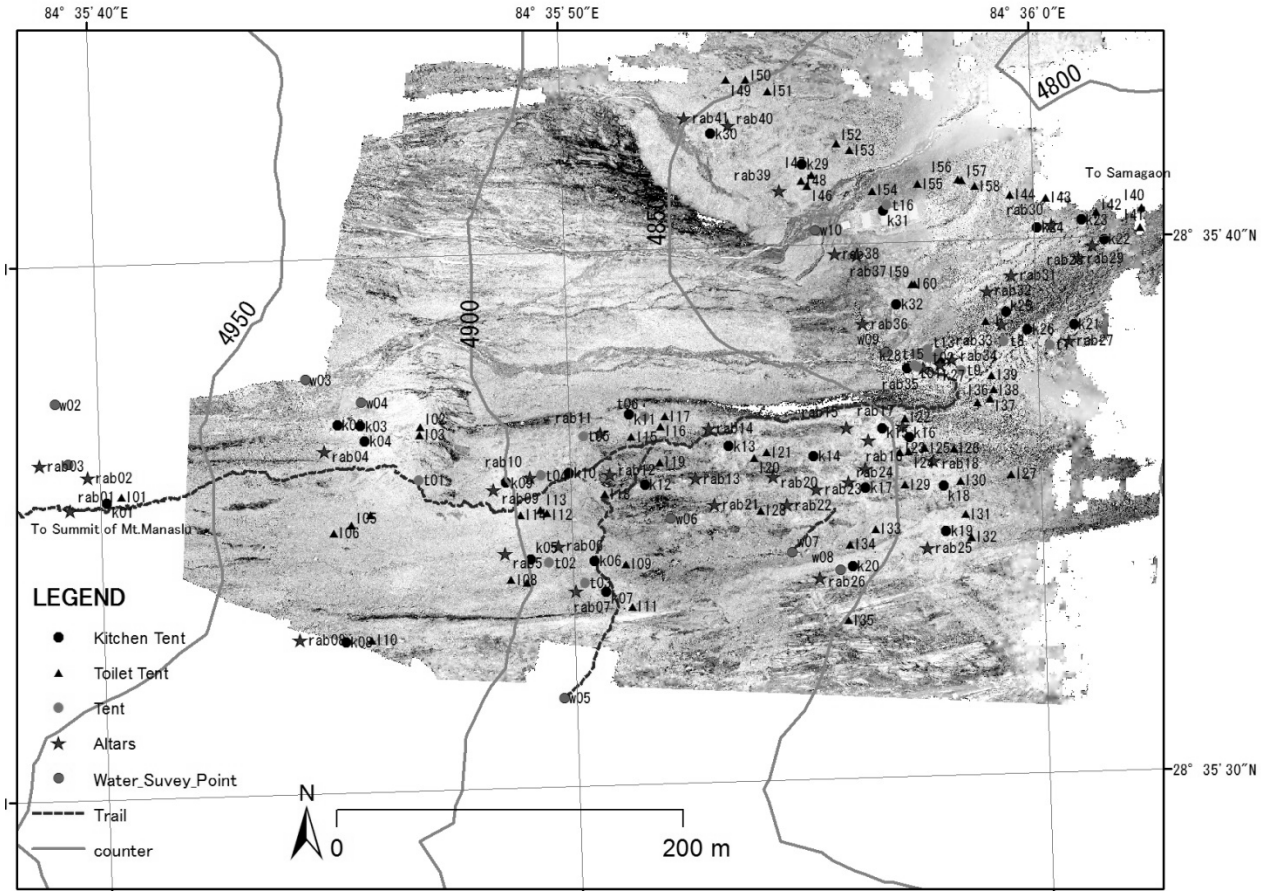

Figure 1. Manaslu base camp topographic map 2016 august

Questionnaires to all the mountaineering parties at the Base Camp

Inquiries were made to every party staying at the Manaslu Base Camp in 2016 August. The questionnaires enquired about the following information: Number of members in each party; number of belongings brought in and out; number of donkeys used to carry equipment; and environmental considerations taken by each party. Results of the questionnaire show that during the post-monsoon season, at least 46 tons of equipment was brought into the Base Camp. Furthermore, over 780 donkeys and many porters were used for transportation during the post-monsoon season. The enormous amount of excrement produced by these donkeys is one of the main sources of resource contamination.

Survey of water quality at the Manaslu Base Camp

Water quality research was conducted at 10 locations of the Base Camp: water collection points; filtering drainage; and inflow points of contaminated water. HNO_2 at the collection points were 10 mg/L, which indicated that the water was badly contaminated from the upper campsite. Drinking or cooking water is usually sterilized by boiling. However, it was

revealed from this research that the headspring itself was contaminated. We can conclude that the sources of contamination were not only from the toilets used by people, but also from the enormous amount of waste generated by the donkeys, and waste water from the kitchens, showers, and laundry areas of each party.

Conclusion

A few of the findings of this study after three surveys in August 2016 at and around the Manaslu Base Camp are as follows. (1) A topographical map of Base Camp was prepared pinpointing the location of each and every tent of the area. We are the first in the world to prepare such topographical map of the Manaslu Base Camp using UAV. (2) Inquiries were conducted with each group staying at the Base Camp regarding the number of members in each party, quantity of goods brought in and out, and number of donkeys used for transportation. The results of the questionnaires show that during the pre-monsoon period in 2016 an astounding 46 tons of goods were brought into the Base Camp. Furthermore, over 780 donkeys were used for transportation. (3) Water quality research was also conducted at water collection points of the Base Camp. The water was found to be badly contaminated because of the urine and excrement of donkeys that were found scattered over the Base Camp.

Kruger National Park Bush Braai experiences – critical success factors, visitor preferences and willingness to pay

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Introduction

Diversification of experiential products in Kruger National Park

As part of its Responsible Tourism Strategy, the South African National Parks (SANParks) acknowledges a need for the evolution of its product and experiential offerings in order to remain relevant in a highly competitive tourism market, which in turn supports the sustainability of its conservation mandate (SANParks, 2011). During peak months of the year, most rest camps in the Southern section of the Kruger National Park (KNP) are fully occupied, leaving little opportunity for revenue growth from this product category.

The Bush Braai experience

The Bush Braai, popular as a bush dinner experience for conference goers and other groups of tourists staying inside the KNP, has been available for a number of years from rest camps within the KNP. A typical Bush Braai experience involves a guided game drive in an open safari vehicle (OSV), to a remote setting in the African bush where guests are greeted by lanterns, fires and the distant sounds of animals calling. Visitors are treated to local cuisine, involving a braai (the South African term for grilling meat over an open fire) made up of a variety of game meat, supplemented with side dishes such as vegetables and salads and rounded off with deserts and coffee or tea. Guests are accompanied by guides who lead interpretive discussions and answers questions from guests. Armed rangers ensure the guests' safety from wildlife throughout the entire experience (SANParks, 2018).

A need was identified by SANParks to extend the product offering to visitors staying at accommodation facilities outside the Park, essentially allowing this market segment access to the Park after gate closing times for an enriched experience involving a game drive and dinner in the bush. At the time of the research, future plans involved operating such a service from three gates in the south of the Park: Crocodile Bridge, Phabeni and Phalaborwa. A strong and clear market orientation is needed to advance consumer acceptance of a product perceived as 'new' by some tourists (Kirca, Jayachandran & Bearden, 2005), which lead the management of SANParks to request research to gauge visitors' perceptions of an ideal Bush Braai experience to aid the product development and strengthen the existing product offerings run from the rest camps in the Park.

Methods

Primary data was collected through a quantitative research approach involving internet-administered questionnaires distributed in February and March 2016 to three target populations: A) Visitors to the KNP who stayed at the Crocodile Bridge and Pretoriuskop rest camps during the preceding 12 months; B) privately owned OSV operators who bring guests

from other tourist establishments to the Park for guided game drive experiences during daytime hours and C) tourists staying at accommodation establishments bordering the Park.

Three different questionnaires were developed for each population, with the core aspects measured being:

- Level of interest in the product;
- Perceived key determinants at play towards first purchase motivations, customer satisfaction and repeat purchase;
- Expectations and preferences towards the experience;
- Willingness to pay (WTP) and
- Potential inhibitors towards acceptance of a Bush Braai product.

An introductory letter explaining the purpose of the study together with the link to the online questionnaire was emailed to visitors of the KNP, OSV operators and managers of tourist accommodation establishments. A total of 496 complete responses were received from KNP visitors while 29 out of the 108 OSV operators responded. Obtaining responses from tourists staying outside the Park proved to be difficult as the majority of tourist establishments either did not have a mailing list of clients or were unwilling to forward the request to clients. Subsequently, data from the 13 responses received from population C were excluded from the results.

Results and conclusion

Slightly less than half of KNP respondents (48%) said they would very likely book a Bush Braai on their next trip to the KNP with another 34% indicating they might be persuaded through the right product and marketing message. A strong 76% of OSV respondents on the other hand said they would very likely sell the product to their guests.

The majority of KNP respondents reportedly would opt for an informal (80%), relaxed and affordable (63%) experience that can be enjoyed by the whole family with a long sunset drive to the location (56%) and traditional South African braai food (48%) served on an arrangement of small intimate tables for up to four people (47%). For this, the majority of respondents were willing to pay in the region of €14 – €29 per person.

OSV respondents on the other hand, entertained the concept of an affordable (45%) and informal (72%) experience and a slightly more expensive option in the region of €21 – €43 per person which would include more comfort and quality (41%) and traditional South African food (48%) for their guests. This indicated that guests of the OSV operators represent a market with differing needs.

The factors identified by KNP visitors as critical for a pleasurable Bush Braai experience, listed in order of importance, were: Having a memorable wildlife experience, being in a beautiful setting, experiencing quality guiding and good quality food. Comfort was perceived as being less important among KNP visitors.

In an open-ended question, all respondents were asked to describe what their ideal Bush Braai experience would be made up of. The results from a thematic analysis (Table 1) illustrate there is a fair amount of agreement between what KNP visitors and OSV operators expect from the product. The table below describes the phrases most often mentioned by respondents from the two groups, categorized according to themes.

Theme	KNP visitors	OSV operators
Ideal location	Overlooking a dam; near a waterhole; on a sandy riverbank; in a dry riverbed; on top of a mountain.	At a remote waterhole; in a dry riverbed; true wilderness; overlooking a river; atop a hill.
Sights, sounds, smells and atmosphere	Listening to the nightlife; tranquility; watching the sunset; under the stars; roar of a lion; smell of braai meat on the grill.	Calls of the wild.
Culinary requirements	No fancy food; good red wine; wors (sausage), chops and steak; pap & salads; ice for drinks; coffee & dessert.	Traditional South African food; braai meat; welcome drink; pap & sauce; buffet style; milk tart (traditional dessert); cash bar.
Preferred lighting	Camp fire ambiance; lanterns; dim light; light and crackle of a bonfire; candlelit; fire torches.	Camp fire; oil lamps; lanterns.
Interpretative requirements	Guides sharing memorable stories about their experiences in parks; knowledgeable guide.	Good storytelling.
Facilities	Ablutions and a place to wash hands.	
Other requirements	No rowdy guests.	Crisp white linen with animal print overlays; safety & security of guests.

Table 1 Elements of an ideal Bush Braai experience as perceived by KNP visitors and OSV operators

The results indicate wildlife watching plays an integral role in activity offerings in the KNP and that both the current market of overnight visitors to the KNP and guests of OSV operators could be considered target markets for the Bush Braai products. For the OSV market however, the product would need to be operated somewhat differently than the traditional market.

The findings from the study equipped management with an initial indication of the viability of the product and insights into the preferences and expectations of a Bush Braai experience.

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Managing visitor impacts on World Heritage Site Škocjan Caves, Slovenia

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Managing visitor impacts on destination communities

Škocjan Caves is an exceptional natural site on a global scale, which is also used for tourism purposes. A balance between the two can only be provided by good knowledge of the natural characteristics of the cave and by specifying the permissible level of anthropogenic load. On karst, interdisciplinary methods must be the basis of research, as this is a complex system that entails events from the geological past as well as present-day events, i.e. flowstone growth, flowstone deposits in rimstone pools, active floods, and, last but not least, the impact of climate change on the microclimate of the cave's interior.

Our original interdisciplinary problem-solving approach can potentially influence the addressing of similar issues on a global scale. With the analysis of meteorological conditions in the atmosphere above the cave, we will identify parallels with the cave microclimate and evaluate the potential impact of external climate and future climate change on the cave. For this proposes the ongoing (2017-2020) interdisciplinary applicative project "Karst research for sustainable use of Škocjan Caves as world heritage" is being implemented.

The research aims to determine the actual state of the karst in the Škocjan Caves and surface, perform system measurements (meteorology and hydrology), identify the current tourism impact, and determine the best methodology and measures for sustainable use of the tourist cave. Interdisciplinary methods should be karst-based studies since this is a complex system involving both past geological and current events, e.g. flowstone growth, flowstone deposition in rimstone pools, active flooding. The innovative interdisciplinary approach for solving the karst problem should impact the solving of similar cases worldwide. We shall analyse meteorological atmospheric conditions above the cave, compare them against the cave's microclimate, and evaluate the potential effect of climate changes on the cave. The monitoring of the cave's climate and of hydrological conditions of the Reka River shall enable long-term monitoring of various parameters, analysis, and data collection. The monitoring shall include the DTN internet technology for data collection as it is also suitable for karst caves. It is an innovative technology that should impact the development of new research branches in terms of automatically collected data measurements in extreme and remote cave environments. Measurements of CO2 (both as a natural and anthropogenic source) in the cave shall be carried out which should help understand the sources and sinks of CO2 in the karst in relation to the global climate changes. The project goal is to use modern karst research methods (determination of geological structure and development of the karst phenomena, speleo- (micro)biology, cave climate monitoring (on-line systems connected wirelessly/via optical fibres for monitoring micrometeorological parameters), geochemical modelling of percolated water, numerical hydraulic modelling (the Reka River flooding model), and the method of data display (e.g. spatial presentation of geological structures). The latter shall visually emphasize the connection between the initial geological structures (fault structures and tectonised bedding) and the initial development of cave channels or preferential scope of the water basin of percolated water inflow, and serve as an interactive and innovative teaching tool. Flooding probability model, built using the perceptron neural

network is also a global innovation. For the difficult parts of automated monitoring, the DTN technology of data transfer shall be used, a global novelty first tested in Slovenia. Example will be used from study in Postojna Cave, where MEIS and IZRK researchers, together with other European partners, have proven on the case of Postojna karst cave that DTN type of internet (delay and disruption tolerant networking) is suitable for collection of meteorological and other automatic measurements in huge karst caves. According to published reviewer's comments, the article presents »ingenious solution to the problem of data communication in a cave system« and »extremely interesting« and »excellent work«. DTN internet is otherwise used for the most demanding environments (from interplanetary communications at NASA to remote Lapland areas). The first news about successful experiment in Postojna cave was commented: »THIS IS JUST GREAT!!! WHAT A STORY TO TELL!« by dr. Vinton Cerf, widely recognized as one of the "Fathers of the Internet" for his work on the design of the TCP/IP protocols and the architecture of the Internet, and also one of the authors of DTN. Just after the article publication dr. Cerf also forwarded this news to the DTN interest group of researchers. This proves that we are the first in the world in using DTN technology for the data collection in karst caves. Because caves take millions of years to develop and due to significant suppression of external factors, they are extremely sensitive areas that require a sustainable use. This is particularly true of the caves protected by UNESCO that are subject to intensive tourist use. Assessing the existing negative impacts on the Škocjan Caves and determining the measures for reducing these impacts shall contribute to a sustainable economic use of the caves in the future. The measuring network allows the manager better monitoring and management even after the project concludes. Project partners have implemented a similar technology development approach in a project in the Postojna Cave (MEIS d.o.o., IZRK ZRC SAZU). The results shall help increase the competitiveness and innovation of Slovenia in the field of sustainable use of tourist caves. Around 150,000 visitors who annually visit the Škocjan Caves shall benefit from the project's improved and nature conservation-oriented experience. The flooding forecast information system shall provide a safer use of the beautiful water passage of the Reka River.

We wish to obtain a complete image of the dynamics of the Škocjan Caves. This image will include the speleological, geological, biological, microbiological, meteorological and hydrological events in the cave. Based on a comprehensive understanding of the system we will be able to provide guidelines for further sustainable tourism use of the UNESCO World Heritage Site – the Škocjan Caves.

Managing a show cave that is also a World Heritage Property requires the assurance that the impact on the cave is minimised, that the cave is properly presented to the visitors, and that the safety of visitors and staff is well taken care for. The agency tries to minimize the tourist impact on the cave environment by establishing different visitation protocols and especially by promoting off-season visits.

Towards standards for quantification of recreational use in forest areas – indicators and data collection tools applied by the State Forests National Forest Holding, Poland

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The social functions of forests are becoming increasingly recognized as being very important for the society. A balanced multi-functional forest management is necessary to maintain its key functions, such as timber production, nature conservation and provisioning of recreational space (Pröbstl et al., 2010). In order to successfully manage forest areas and to gain realistic view on actual visitation levels and use of tourist infrastructure, it is necessary to find reliable and effective tools and methods for visitor data collection and data analysis (Arnberger, A., Brandenburg, C., Muhar, A., 2002). From the management perspective definition of indicators and standard tools that could assist management of tourism and recreation in the forests is particularly important (Fredman, 2014; Sievänen et al, 2014; Sievänen et al, 2008; Rauhala, et al., 2002; Eco-Counter, 2018)

The objective of the study was to create the list of indicators and to define reliable tools that can be utilized for measuring recreation use. The main focus was placed at systematic quantification of visitor loads at recreational trails.

The concept of indicators was supported by empirical data collected during a pilot study in two forest areas: Tricity Landscape Park and Kozienice Landscape Park, located in Poland. Visitor monitoring campaigns encompassing 1-year period have been carried out in each study area in 2015 and 2016. Combination of the following data collection methods has been applied: automatic counting (Eco-Counter: PYRMT2) and manual counting of visitors; on-site interviews (PAPI); on-line interviews (CAWI); trip diaries (paper map sketches) and GPS-tracking.

List of indicators of recreational use and suggested data collection methods has been presented in Table 1. Total sums of recreationists visiting specific forest, normalized by area [ha] is an important indicator at a regional level. However, it requires additional standardized methods of measurements extrapolation to the area level.

Practical experience gained during the field work in two pilot areas was crucial for developing data collection standards and indicators describing recreational use that is being applied in various management contexts, such as general communication and public relations (underlying the social function of forests), allocation of recreational infrastructure and provisioning visitor information, planning logging (timber production), justification of budget allocation. Presented standards have been disseminated among the 430 forest units governed by the State Forests in Poland and are the first step in the ongoing discussion concerning standardized quantification of recreational use and systematic monitoring of social forest functions.

Table 1. Indicators of recreational use and suitable data collection methods.

Nr	Indicator	Location	Data Collection Method
1	Annual sum of visits	Specified trail segment	Automatic counting
2	Share of visits in annual sum - per month [%]	Specified trail segment	Automatic counting
3	Share of visits in annual sum - per day [%]	Specified trail segment	Automatic counting
4	Share of visits in annual sum - per hour – during weekdays, excluding bank holidays [%]	Specified trail segment	Automatic counting
5	Share of visits in annual sum - per hour – during weekends & bank holidays [%]	Specified trail segment	Automatic counting
6	Daily sum [top 3 peak days]	Specified trail segment	Automatic counting
7	Daily average	Specified trail segment	Automatic counting
8	Daily average during weekdays [excluding bank holidays]	Specified trail segment	Automatic counting
9	Daily average during weekends & bank holidays	Specified trail segment	Automatic counting
10	Hourly sum [top 3 peak hours]	Specified trail segment	Automatic counting
11	Share of visits by recreational activity [walking, cycling, jogging, Nordic Walking, other]	Based on standardized observations at key entrance points in the study area	Manual counting
12	Share of visits by gender [male, female]	Based on standardized observations at key entrance points in the study area	Manual counting
13	Satisfaction with recreational visit to the forest [Likert scale]	Representative sample at key entrance points in the study area	On-site interview (PAPI)
14	Annual sum of visits / ha	Entire study area	Automatic counting and statistical modelling
15	Daily sum of visits / ha [top 3 peak days]	Entire study area	Automatic counting and statistical modelling
16	Daily sum of visits / ha [average]	Entire study area	Automatic counting and statistical modelling

Acknowledgements

Authors would like to express their gratitude to colleagues from State Forests National Forest Holding in Poland for initiating the project and successful collaboration at all stages of the project. We would like to thank all the involved persons. We owe special thanks to Anna Pikus and Maria Rothert from the Department of Social Functions of Forest, Ewelina Sobańska (Gdansk Forest District) and Artur Mazur (Kozienice Forest District).

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Assessing recreational impact in a protected peri-urban park. The case of Collserola Natural Park (Barcelona - Spain)

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Introduction

The study of the environmental consequences of outdoor recreation/nature-based activities and their effective management in peri-urban protected natural areas is an emerging field of global importance, and more so given the ever increasing pressure of such recreational uses (Monz et al, 2013). Two main input data are needed in order to assess the consequences of environmental impact of recreational use: first, related to the number of people using the specific recreational facility (trail, recreation area, etc.) and secondly, the environmental impact generated by this use. Trail survey methodologies are shown as useful for management of wilderness and backcountry trail networks (Marion et al, 2011). However, few studies corroborate the connection between the results obtained by the trail survey methodology and the actual level of recreational use of the trail system (Monz et al, 2013). Therefore, using Collserola Natural Park as the study area, this research was set out with the aim of assessing the utility and effectiveness of a trail survey methodology in the evaluation of recreational impact in a peri-urban natural park. Collserola Natural Park is a protected Natura 2000 site covering over 8,000 ha of mostly Mediterranean pine and oak woodlands situated directly beside the city of Barcelona, in the centre of its corresponding metropolitan area with a nearby population of 3.2 million inhabitants, 43% of the population of Catalonia.

Methodology

The pilot study was carried out in a sub-section (1,699 ha) of Collserola Natural Park corresponding to the municipality of Barcelona, and based on the consideration of two different reports (Farías and Morera, 2017) and (Ursul, 2017) which had separately reported the two specific inputs needed to develop this study there: the number of visitors who use the trail and the quantified impact on the trail selected. The first report used two different methodologies: one for estimating the number of visitors and another to characterize the visitor's profile, uses and preferences. The second report also used two different methodologies to analyse trail degradation impact in the study area; first, a linear assessment using qualitative sampling of categorical data, such as trail difficulty, trail erosion, main soil type, drainage presence, etc. Secondly, quantitative impact assessment at sampling points located along the selected trails, mainly considering parameters related to erosion and soil loss based on the calculation of trail cross-sectional area (the CSA method, e.g. see Leonard and Whitney, 1977), as well as other trail characteristics such as its rugosity, maximum incision and width of active tread.

In the case of the linear and point sampling evaluations, and taking into account the variability of the length of the different trails, overall mean impact values obtained were applied to the entire length of the corresponding trail section. In the combined study presented here –trail degradation assessment in relation to visitor numbers-, more than 10km of trails were included, representing 9% of the total trail length in the overall pilot study area.

These 10km of trails concentrate an estimated total of 1,132,588 annual visits by park users, representing more than 25% of the total number of user visits estimated in the overall park area corresponding to Barcelona municipality. The statistical analysis of the relationships between visitor use intensity and trail impact was based on the calculation of the Pearson's correlation coefficient *R*.

Results

The results obtained from the relationship between the number of users and the environmental impact showed certain variability according to the type of impact assessment (linear or point sampling). Whilst the results of the linear assessment showed a weak relationship (R^2=0.0439, p=0.513) between use intensity and impact, quantification based on point sampling showed a significant correlation (R^2=0.8755, p=0.002**) (Figure 1).
In this regard, further examination of the relationship between recreational frequentation and type of activity (whether on foot or mountain biking -MTB-) and the measurement of the environmental impacts obtained from quantitative point sampling, revealed a stronger and significant correlation in the case of activities on foot (R^2=0.7194, p=0.016*) in comparison to MTB usage (R^2=0.406, p=0.124).

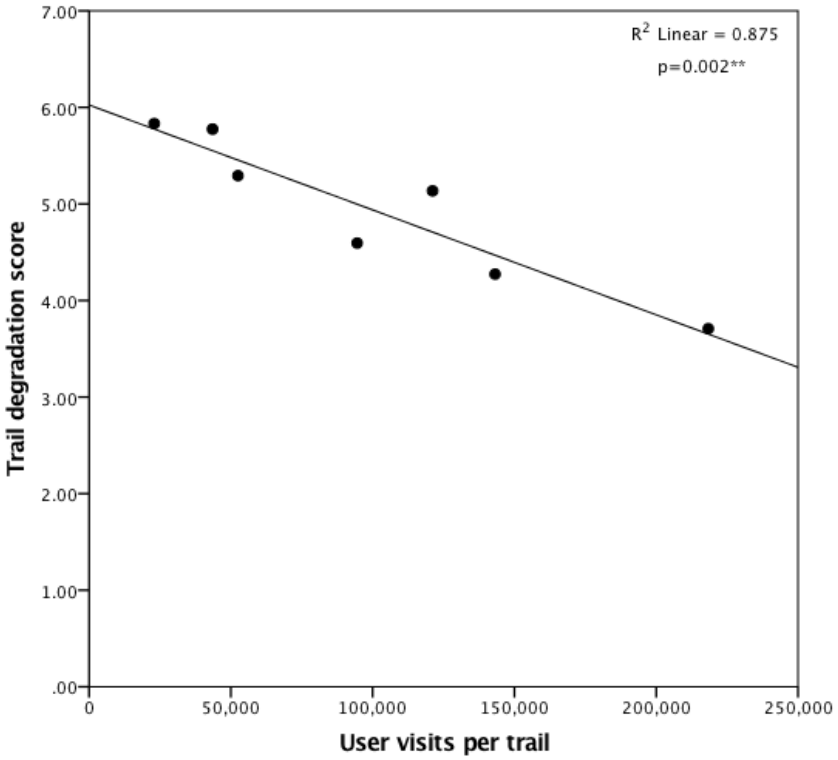

Figure 1. The relationship between recreational use intensity (estimated annual total of user visits per trail) and trail impact assessment based on data from quantitative point sampling (0 being highly degraded and 10 showing no degradation at all).

Conclusions

Based on quantitative point sampling, our results show that observed trail impact is significantly correlated with visitor use intensity, although not so for qualitative linear sampling. Moreover, trail impact in our study area may be more related to use intensity (number of visitors) rather than to the type of activity *per se*. Nevertheless, it should be

recognized that our study is still limited in terms of the number of trails where both assessments -use intensity and impact- were carried out, and *per user* impact might indeed be greater for MTB than for walking activities, as other studies have previously revealed greater trail impacts for recreational MTB activity (Marion, 2006).
As such, further work is needed in order to evaluate more precisely the relationship between public use and recreational impact on trails in Collserola Natural Park.

Acknowledgements

This study was possible thanks to the Ecology, Urbanism and Mobility Department of the Barcelona City Council and the Public Use, Divulgation and Environmental Education Service (UPDEA) and the Natural Environment Service of the Collserola Natural Park Consortium. At Collserola Natural Park we would especially like to thank Marià Martí, Lluís Cabañeros, Isabel Raventós, Màrian Navarro, Raimón Reventós, Joan Capdevila, Josep Oriol Soler & Francesc Llimona for their help with this study.

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Interpretation Plans and Visitor Management Policies in Czech PLAs

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Nature Conservation Agency of the Czech Republic ("NCA") administrates 24 Protected Landscape Areas ("PLAs"). Management plans are being compiled for all the PLAs, but it is too large document for detailed planning in visitor management.
First of all, interpretation plans were introduced in 2006 in connection to the House of Nature Programme (visitor centres in Czech PLAs, see Pešout et al. 2016). While Houses of Nature are one of measures how to interpret PLAs, PLA Interpretation Plans propose many other measures, e. g. web pages, guide service or another visitor infrastructure. When planning interpretation of PLA, it must be clear, which parts of the area are too sensitive, which offer suitable features for interpretation, which are already overcrowded. Visitor monitoring data is therefore a part of a PLA Interpretation Plan. With this knowledge, we can plan not only interpretation, but also measures to prevent damage caused by visitors. Some trails might be stabilised, while others closed or new ones created. These issues do not fit into interpretation plans, as they have nothing in common with interpretation. Nevertheless, they need to be considered. And all this has to be planned and later performed not only by the NCA, but by partners in the area as well. This is another reason, why it cannot be included in PLA management plans.
Visitor Management Policy ("VMP") was introduced as a tool to interconnect PLA interpretation plans with visitor infrastructure planning. The VMP scheme does not reflect to any similar approach that may exist in other countries. VMP structure was simply compiled from a structure of Interpretation Plan, to which other visitor management agenda was added. VMP goals are: 1/ define and confirm basic restrictions for tourism development, 2/ propose solutions to to eliminate tourism negative impacts to nature, and 3/ create PLA interpretation plan. VMP structure is followed by process of its creation: analysis – planning – application – evaluation. Issues for VMP are discussed at meetings, round tables and other discussions organised by external VMP authors with NCA staff, operators of infocentres, tourism destination agencies, municipalities, museums, NGOs, tour operators etc. Compiled methodology for VMP was revised upon finishing first three VMPs (PLAs Beskydy, Český kras and Pálava). The documents are currently discussed with the Ministry of the Environment of the Czech Republic.

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Interpret Europe – for all who use first-hand experiences to give natural or cultural heritage a deeper meaning

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Interpret Europe ("IE") is dedicated to heritage interpretation. It is the most prominent task of heritage interpretation to support people in experiencing deeper meaning in heritage. In Yosemite Valley, nature conservationist John Muir reflected on wild nature. In 1871, he first coined the term 'interpretation' for becoming acquainted with natural heritage (Wolfe, 1978). To explain professional heritage interpretation, the interpretive triangle is used and the combination of four qualities is highlighted. The four key parameters: meaning, experience, participation and stewardship, describe what heritage interpretation is aiming for.

IE was founded as a network in 2000 and as an association in 2010. In 2018, IE has more than 500 members in 47 countries. IE intends to serve the many European stakeholder organisations in the field that are mainly dealing with natural or cultural heritage and with non-formal learning. IE does not intend to compete with them. Two key strategic goals have been agreed for the years 2016-2020: to embed heritage interpretation at European and national levels, and to foster a growing membership that supports and is supported by the association. IE works on three levels and also has three coordinator groups: 1/ Managing coordinators and their teams are directly supporting the Directors; 2/ Country coordinators and their teams care for the development of heritage interpretation and of Interpret Europe in their countries; 3/ Subject coordinators and their teams take responsibility for the development of their subject areas within IE.

Communication is at the heart of IE's activities, not only with European stakeholder organisations but also within the association. IE has its own closed Facebook group for its members to allow more intense and/or more casual exchange. IE runs its own training and certification programme. Certified IE trainers have the possibility to run IE courses under their own conditions in their own countries where all IE members can participate. IE has developed following courses: Certified Interpretive Guide, Certified Interpretive Host, Certified Interpretive Writer, Certified Live Interpreter, Certified Interpretive Planner. IE offers also trainer courses enabling trainers to teach these courses. Certified attendees of those courses can significantly improve the quality of interpretation of natural and cultural heritage all around Europe. National Park guides and PR professionals, infocenter staff, freelance guides and other professions could be found among already certified interpreters.

IE has its own Research Team. Within the EU Lifelong Learning Programme, IE was involved in several European projects, such as Interpreting Our European Heritage, InHerit, HeriQ – Quality in Heritage Interpretation, HISA – Heritage Interpretation for Senior Audiences. Since Interpret Europe was founded, it has run 8 annual conferences in different European cities and towns (2018 in Köszeg, Hungary, is dedicated to the European Year of Cultural Heritage). IE intends to advocate for heritage interpretation at a European level. It is a member of the European Heritage Alliance and of the Stakeholder Committee for the 2018 European Year of Cultural Heritage. Furthermore IE is involved in the Voices of Culture talks at the European Commission and recently produced award-winning recommendations on "Engaging citizens with Europe's cultural heritage".

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With the financial support of

ISBN : 978-2-9551251-1-3