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Transience of public attention in conservation science

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Abstract

Societal awareness of, and engagement with, environmental problems is a critical prerequisite for effective conservation programs. Research has revealed a strong general pattern whereby public attention received by cultural products diminishes over time. If transposed to conservation, this transience of societal attention is likely to be of major importance because it can limit motivation to support conservation efforts. We address the concept of attention transience applied to conservation, discuss its major drivers and mechanisms, and provide a short overview of conservation issues for which this phenomenon is expected to be particularly relevant. Attention transience leaves a brief window of opportunity for conservationists to focus public awareness and to mobilize necessary support. In this context, it is critical to maximize the conservation benefits generated during these short bursts of attention, especially through tailored conservation marketing campaigns with targeted message framing and regular efforts to re-focus attention on key issues.

In a nutshell

- Transience of societal attention is an important issue in conservation, as it may contribute to narrow windows of opportunity to support conservation goals and efforts.
- Societal attention transience is observed for a wide range of global issues, including climate change, environmental disasters, threats to declining species, and extinction events.
- Measures to cope with attention transience can either aim to affect attention dynamics, or to maximize efficiency of conservation interventions and advocacy during brief peaks of public interest.
- To address attention transience effectively it is important to recognize people's cognitive and psychological constraints, and consider tried and tested media communication practices.

Introduction

Societal interest is key to the success of many conservation programs (Jarić *et al.* 2020). Greater societal interest can create windows of opportunity for policy actions, increasing conservation efforts, commitment, and investments (Clements 2013; Carpenter and Konisky 2019). However, as information dissemination and consumption accelerate due to the revolution in communication technologies, public attention may decay more rapidly, often within days to weeks (Lorenz-Spreen *et al.* 2019). Such *transience of societal attention* (see Glossary in WebTable 1) is a pertinent issue in conservation. Interest may diminish as relevant topics become less newsworthy, limiting motivation to support conservation goals (Downs 1972). Furthermore, the perceived salience of an environmental issue, and how long it remains perceived as salient, determines its likelihood of being included in policy agendas and actions (Pralle 2009). Such societal attention transience affects a wide range of global issues, including climate change, environmental disasters, threats to declining species, and extinction events (Pralle 2009; Clements 2013; Acerbi *et al.* 2020; Fink *et al.* 2020).

Here, we provide a conceptual overview of attention transience in conservation and discuss its major drivers and mechanisms. We highlight conservation issues where attention transience is relevant and illustrate these with examples drawn from conservation culturomics, using indices of online societal interest (Ladle *et al.* 2016; Panel 1). Finally, we outline major implications of attention transience related to conservation issues, and suggest key mitigation measures, policy recommendations, and future research directions.

The theory of attention transience

Public attention transience is especially manifested during *focusing events*, which can be defined as sudden, relatively uncommon attention-grabbing events, which often concentrate attention on previously dormant issues (Birkland 1998). The process of attention propagation through media following such events has been recognized as 'moment inertia' (Thaler et al. 2017). Focusing events can arise from news coverage of environmental disasters, new scientific findings, or reports from high-profile organizations or key opinion leaders; locally, they can be also driven by direct experiences. Following an initial peak of public attention to the event, attention tends quickly to decay and return to background levels (Figure 1). Within a conservation perspective, such focusing events can be driven by observed or predicted threats to biodiversity, ecosystems or their services, and also relate to threats to human safety and well-being.

Conservation-attention dynamics can be conceptualized using the *issue-attention cycle* (Downs 1972). This cycle consists of five stages: (i) pre-problem stage; (ii) alarmed discovery and euphoric enthusiasm, which includes increased public awareness of the problem; (iii) gradual realization of the high costs of solving the problem; (iv) decline of intense public interest, driven by discouragement or boredom; and (v) post-problem stage, wherein attention to the issue fades, to be replaced by other issues and events. Downs (1972) suggested that such dynamics are mainly driven by a systematic, intrinsic and predictable cycle of heightened and declining public interest, and to a lesser degree by changes in the actual conditions. Furthermore, Djerf-Pierre (2013) argued that environmental attention dynamics are driven mainly by social interactions and competition for attention. Recent findings support the latter notion, showing that modern attention transience is driven by intensifying content production and information flows that compete for temporally and cognitively limited public attention (Lorenz-Spreen et al. 2019).

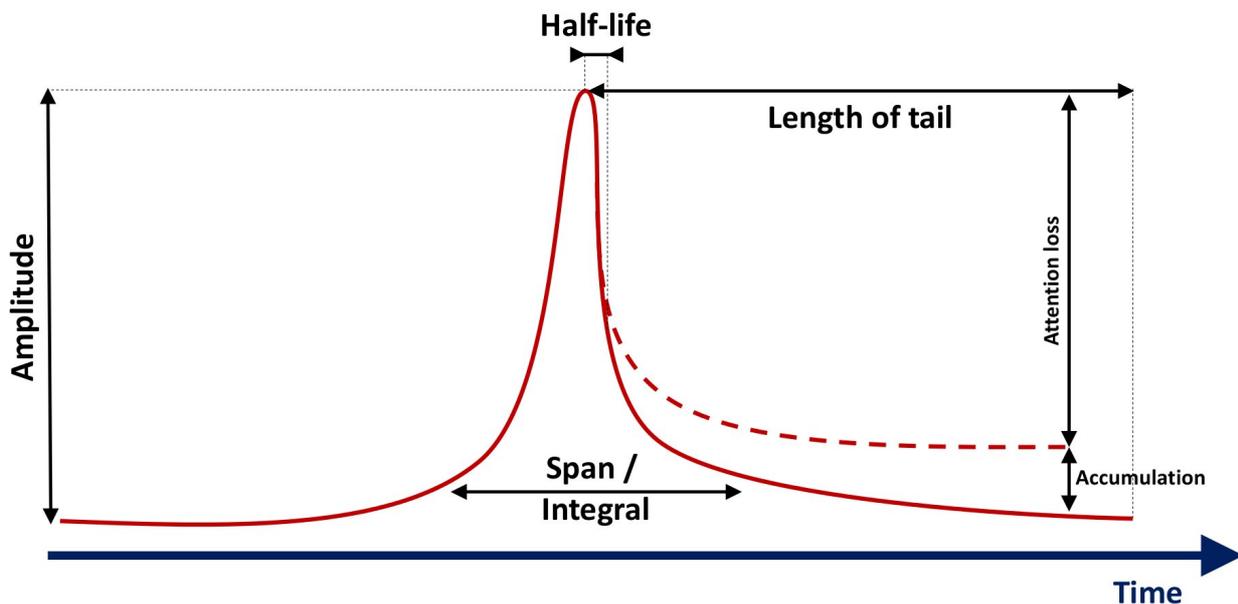


Figure 1. Components of the issue attention cycle, which can be used to measure, characterize, and study attention transience dynamics. *Amplitude*: relative height of the peak attention compared to the average background level during the preceding period; *span*: duration of the issue cycle; *integral*: cumulative attention allocated during the issue cycle; *length of tail*: period between the peak of attention and its decline to background levels; *attention half-life*: time required for attention to decline by half compared to the peak level. Attention can also decline to a new, higher level (dashed line), as a result of accumulation of latent interest.

Attention dynamics and decay characteristics

Attention decay following a focusing event is often very rapid, with the attention half-life (Figure 1) often spanning a few days or weeks, using culturomic indices as an imperfect proxy (Panel 1). For example, publication of the “World’s 25 Most Endangered Primates” list led to a spike of online search volume followed by a quick decline, with attention half-life of about two days (Acerbi *et al.* 2020). Public reactions following the death of the last male northern white rhinoceros (*Ceratotherium simum cottoni*) also lasted only a few days (Fink *et al.* 2020). The killing of Cecil the Lion (*Panthera leo*) caused a surge of public interest which then declined by two-thirds over the course of a week (details below, Carpenter and Konisky 2019; Figure 2b). The observed half-life of so-called “climategate” controversy was six days, and declined further to 10% of the peak attention within three weeks (Anderegg and Goldsmith 2014). Nevertheless, the “climategate” controversy might have also produced longer-lasting effects on public perceptions and decision making beyond this period. High levels of attention may be sustained over longer periods when the events develop or unravel gradually (Figure 2a) or are surrounded by ongoing controversy (Djerf-Pierre 2013).

Following focusing events, attention can decay to pre-event levels, or establish a new higher baseline level (Downs 1972), with the difference representing accumulating carryover effects (Ryo *et al.* 2019; Figure 1). Conservation issues can also experience recurring attention peaks that produce a wave-like pattern, for example in the case of annual commemoration days of an environmental accident or an extinct species (Djerf-Pierre 2013).

Attention transience of different conservation issues

Attention decay can happen with many conservation threats, including habitat loss, climate change, biological invasions, and pollution. We focus here on a few relevant conservation issues and events: (i) environmental accidents and disasters, (ii) emerging threats and impacts, (iii) species extinctions and rediscoveries, and (iv) conservation marketing and advocacy campaigns. We have tried to identify a set of examples which is as diverse as possible, but the list is not intended to be systematic or exhaustive.

Environmental accidents and disasters commonly attract considerable public attention (McDonald 2009). Such disasters are more likely to generate focusing events if they both affect the environment and threaten public health, livelihoods, amenity, or safety. Environmental accidents and disasters that have led to strong focusing events include oil spills (eg Deepwater Horizon in 2010 and Sanchi oil tanker collision in 2018), mining and industrial disasters (eg Baia Mare cyanide spill in 2000), nuclear accidents (eg Fukushima Daiichi radiation leaks in 2011, following a major earthquake and tsunami), and natural disasters such as fires, floods and hurricanes (Ashlin and Ladle 2007). Their attention decay tends to be fast, with attention half-life typically spanning days or weeks (Figure 2a). However, interest in disasters lasts longer when they develop over longer periods or in case of follow-up activities such as cleanup, public debates, or commemoration events (Djerf-Pierre 2013).

Focusing events are often initiated by reports about ongoing or emerging threats and impacts. They typically present environmental alarms, new scientific evidence pointing to serious risks, or worsening impacts. They may also represent scandals or morally questionable behavior that draw collective disapproval. Such was the case of killing Cecil the Lion, a tourist attraction in Zimbabwe's Hwange National Park, by a trophy hunter (Carpenter and Konisky 2019). The killing led to an intense global focusing event, prompting strong expressions of anger and criticism. It also drew collective attention towards general ethical and conservation concerns associated with trophy hunting. Attention towards this event and related issues decayed quickly (Figure 2b), without evidence for direct impacts on the adoption of new policy measures (Carpenter and Konisky 2019). Similar transient focusing events also occur following reports of invasive or introduced alien species. For example, discovery of the invasive northern snakehead (*Channa argus*) in a new region

of the United States was followed by a strong but short-lived surge in news and social media attention and calls for action (Jarić *et al.* 2021).

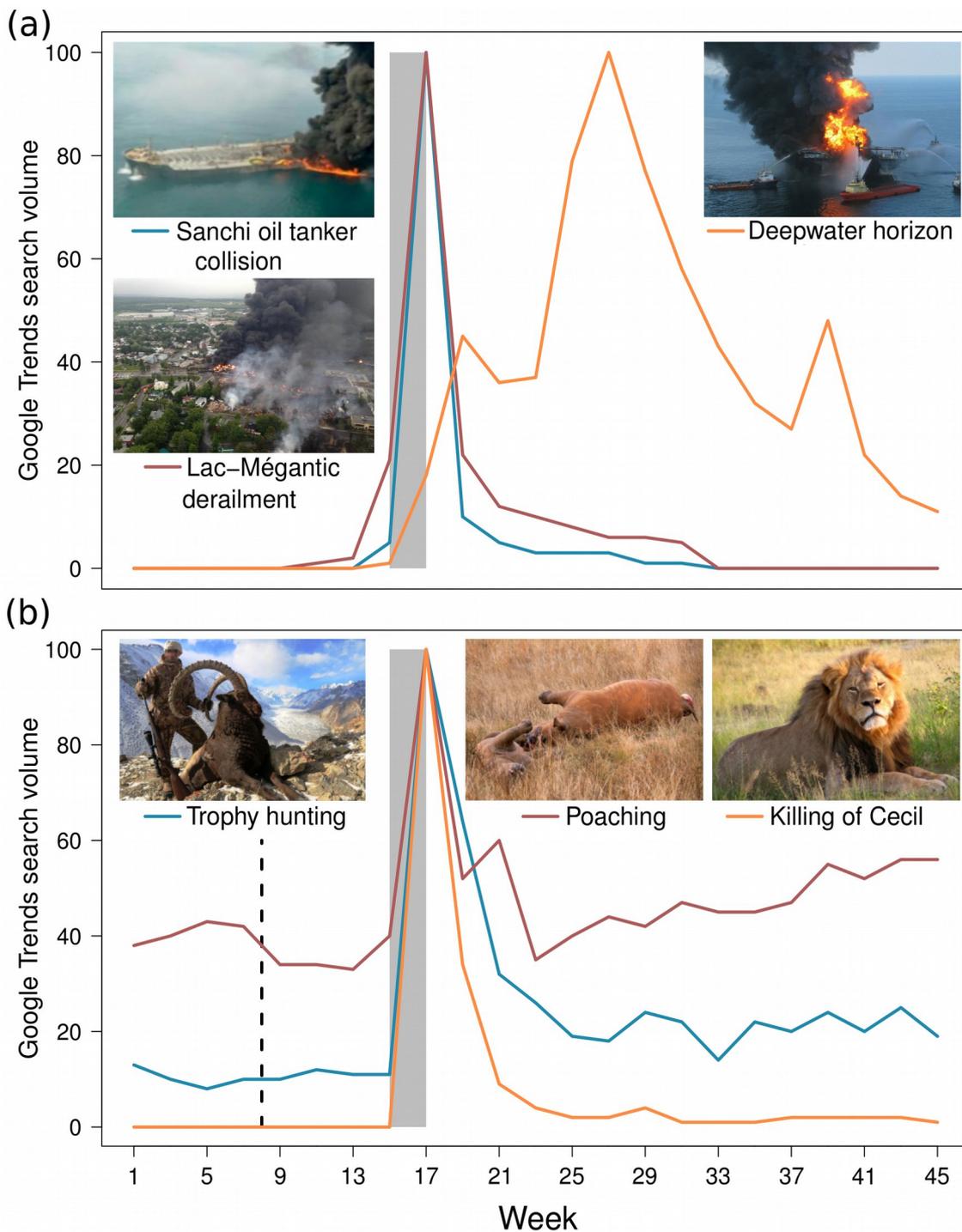


Figure 2. Trends in attention decay following major environmental accidents and conservation issues, based on Google Trends data (WebPanel 2). (a) Attention peaks and decay for Deepwater Horizon oil spill (2010), Lac-Mégantic derailment (2013), and Sanchi oil tanker collision (2018). Approximate time of the accidents is set to match in the figure (grey area). (b) Killing of Cecil the Lion on 2 July 2015 (black vertical line) led to a massive focusing event (grey area) (Carpenter and Konisky, 2019), which also drove attention towards the issues of trophy hunting and poaching. More information in WebPanel 1.

Species extinctions often capture public attention (Clements 2013). Extinctions highlight anthropogenic impacts on the environment and are often associated with *environmental grief* and shame and tend to increase societal attention (Jarić *et al.* 2022). Consequently, declaring a species extinct often generates strong focusing events, which are nevertheless transient, with attention rapidly declining back to baseline levels (Figure 3). For example, the announcement of the Chinese paddlefish (*Psephurus gladius*) extinction (Zhang *et al.* 2020), a relict and iconic freshwater species, attracted strong but transient media coverage and public attention. Similar patterns of rapid attention buildup and decay can also be produced by initiatives aimed at extinction reversal, such as reintroductions, rewilding, or de-extinction (Seddon *et al.* 2014). Moreover, rediscoveries of species considered to be extinct (ie 'Lazarus taxa') can also increase public attention, as in the case of the rediscovery of the night parrot (*Pezoporus occidentalis*) in Australia. Nevertheless, attention afforded to extinct and rediscovered species varies substantially among species and depends on various factors, including species' cultural heritage, charisma, and presence in everyday culture (Hopper *et al.* 2016; Jarić *et al.* 2022).

Other conservation issues can develop gradually over many years or decades. They are typically characterized by relatively constant baseline attention levels, even when actual impacts are worsening. Attracting and engaging the public for such slow-developing issues is challenging (Anderegg and Goldsmith 2014), since marketing campaigns or new findings and reports tend to produce intensive but only transient surges of attention. Such patterns have been observed for attention related to climate change, the Aral Sea's demise, and bleaching in the Great Barrier Reef (WebFigure 1).

Factors affecting attention transience

The diverse factors that affect attention dynamics can be grouped into three broad classes: intrinsic, psychological, and external. Intrinsic factors represent characteristics of the conservation issue, including the magnitude and spatio-temporal scale of its impact. For example, major, global, and enduring events, such as climate change, are likely to generate a stronger response in public attention and experience slower decay than those that are less significant, more local and/or short-lived. Psychological factors include various psychological aspects and cognitive limitations that drive attention decay. For instance, *attention saturation* constitutes an attention overload by the overabundance of information and messages commonly received through news media, while *issue fatigue* constitutes exhaustion of interest and attention following prolonged exposure to a particular issue (Djerf-Pierre 2012; Lorenz-Spreen *et al.* 2019). Other relevant psychological and cognitive factors include limited attention span, selective attention, the *extinction of experience*, shifting baselines, and loss of public knowledge (Soga and Gaston 2016; Jeschke *et al.* 2019; Lorenz-Spreen *et al.* 2019). These factors, in turn, can be affected by internal and external effects such as personal hardships or global crises. Constant exposure to negative news and issues may lead to compassion fatigue, emotional numbness and *solastalgia* (ie the distress produced by environmental change), and cause issue avoidance (Albrecht *et al.* 2007). Nevertheless, other psychological factors (eg identification with the place; Bonaiuto *et al.* 2008) may counteract such decay mechanisms and effects.

External factors mainly include conservation advocacy, media, and marketing efforts, but also various sociocultural aspects. High frequency and heightened turnover rate of news coverage and dissemination by the media is key to attention transience. Naturally, media saturates, challenges, and disrupts sustained attention (Lorenz-Spreen *et al.* 2019). News flow has drastically intensified with the advent of round-the-clock news services and social-media platforms such as Twitter, Facebook, and WeChat. Competition for newsworthiness is considered the main driving force behind shortening attention spikes and intensifying news turnover (Djerf-Pierre 2012; Lorenz-Spreen *et al.* 2019).

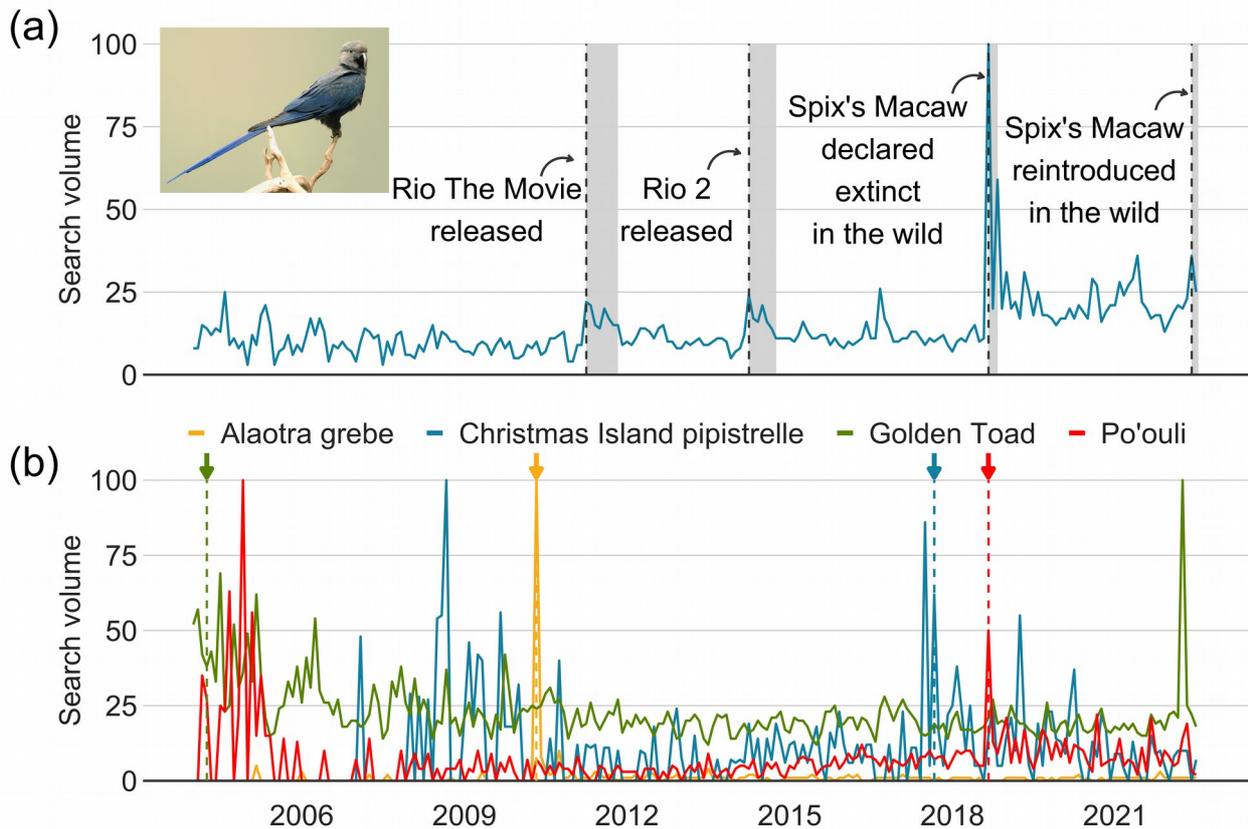


Figure 3. Temporal trends in societal interest towards threatened species, with attention peaks surrounding reports of their extinction and subsequent attention decay. Time series are based on Google Trends entries for each species (WebPanel 2). (a) Relative search interest in Spix's macaw (*Cyanopsitta spixii*). Grey areas represent half-life of search interest after each event (photo: Randy; CC-BY 2.0). (b) Relative search interest in four species declared as possibly extinct: Alaotra grebe (*Tachybaptus rufolavatus*), Christmas Island pipistrelle (*Pipistrellus murrayi*), golden toad (*Incilius periglenes*), and po'ouli (*Melamprosops phaeosoma*). Dashed vertical lines and arrows indicate dates when species were declared possibly extinct by IUCN.

Media can also influence public attention and perception of conservation issues by selecting which stories to cover and their respective narratives (McCombs and Shaw 1972). Conservation stories also compete for attention with other topics. For example, the media's interest in climate change raised concerns that it will overshadow other important environmental issues, such as biodiversity loss (Verissimo *et al.* 2014). Biodiversity issues are also often more ephemeral and neglected by popular media, especially during periods of economic problems, sociopolitical unrest, international conflicts or other broad global issues (Pralle 2009). Attention transience is additionally strengthened by the tendency of media to focus on dramatic, polarizing, and novel topics, which further intensifies their turnover rate (Djerf-Pierre 2013).

Sociocultural differences affect the attention that news receives and its consequent decay. Conservation issues and events may trigger different responses among different people and social groups based on their pre-existing views (McDonald 2009). Attention towards environmental problems is likely to be more enduring among politically and environmentally engaged individuals. Such attention also depends on personal predispositions and circumstances (Djerf-Pierre 2012). Attention will decay faster when the conservation issue is not well understood by the public, when the immediate, direct impacts have subsided, when the problem is perceived as being solved, or conversely with evident failures to solve it (Pralle 2009).

Panel 1. Culturomic indices of collective attention

The global communication revolution, brought about by the advent of the Internet and digital media, opened new possibilities to the study of human culture, attention, attitudes, and values (Michel *et al.* 2011). The emerging field of culturomics, focused on understanding human culture through the quantitative analysis of large bodies of digital data, has also been applied in conservation science and practice (Ladle *et al.* 2016). These novel approaches offer a unique opportunity to directly measure, explore, and monitor spatio-temporal trends in collective attention (Lorenz-Spreen *et al.* 2019). Online engagement and information-seeking indices, such as search-engine query volumes (eg Google Trends platform), represent good proxies for collective attention and have been increasingly used to study attention towards various conservation issues (Clements 2013; Carpenter and Konisky 2019; Verissimo *et al.* 2020). Other culturomics data sources that may be used to study collective attention include Wikipedia page views, social media activity, news coverage, and online images (Acerbi *et al.* 2020; Fink *et al.* 2020). Ultimately, using multiple data sources will considerably improve understanding of attention dynamics (Fink *et al.* 2020). It should be noted, however, that culturomics data are less suitable indices to measure cumulative effects and heuristics of attention. This topic represents an important frontier for future research.

Mitigation and adaptation strategies

Mitigation and adaptation measures to cope with attention transience may aim to: (i) affect attention dynamics by either increasing the strength of attention peaks, their recurrence and frequency, or slowing down the attention-decay process; or (ii) maximize efficiency of conservation interventions and advocacy during those brief peaks of public interest (Figure 4). Both aims can be aided by efforts to predict the occurrence and frequency of attention peaks and the speed of attention decay. Attributes of attention dynamics (Figure 1) can help inform and guide conservation actions (Ryo *et al.* 2019). Mitigation measures directed at altering attention dynamics can be intensive short-term efforts or longer-term, continuous or periodical activities. Short-term efforts aim to strengthen, sustain, and extend people's attention to accomplish a particular conservation goal. Conversely, long-term efforts may aim to sustain attention by reinvigorating it through periodical actions, such as environmental awareness and remembrance days. For example, the annually held National Threatened Species Day in Australia was initially established to commemorate the anniversary of the death of the last captive thylacine (*Thylacinus cynocephalus*) in the Hobart zoo in 1936 (Zieger and Springer 2020). This commemorative day focuses attention on the tragedy of Australia's lost fauna and the need to take actions to protect what remains. Long-term efforts are especially relevant for slow-moving issues such as ecosystem degradation (WebFigure 1). For such issues it is more challenging to engage society and maintain attention (Anderegg and Goldsmith 2014).

Engaging the public with issues can be aided by increasing media coverage (McDonald 2009), for example by using a wide range of platforms. New communication media, and more efficient use of key communication and marketing concepts such as *framing*, *priming*, and *agenda setting*, can also help increase and sustain attention (McDonald 2009). Effective conservation-marketing approaches and strategies are also key for these purposes (Ryan *et al.* 2020). Beyond broad campaigns, targeting particular societal groups, or *segmenting* to select susceptible groups can produce effective outcomes (Metcalfe *et al.* 2019). There are many valuable insights obtained in conservation marketing initiatives that can increase effectiveness of campaigns. Promising approaches include the use of positive or negative stories and language, dramatic storytelling, emotive language, moral framing, foregrounding solutions, emphasizing evidence-based decision making and scientific consensus, focusing on human health impacts and personal experiences (McDonald 2009; Pralle 2009; Byerly *et al.* 2018; Acerbi *et al.* 2020).

Actions may also aim to sustain attention by shifting it to different conservation targets that share the same overarching goal, to produce cumulative effects on salience. Intensive coverage of one environmental issue can also sensitize the public to related issues, and even lead to news waves, as a sequence of interrelated issues covered by media (Djerf-Pierre 2013). Such approaches can lower attention saturation and fatigue that may arise from extended coverage focused on a single issue (Pralle 2009).

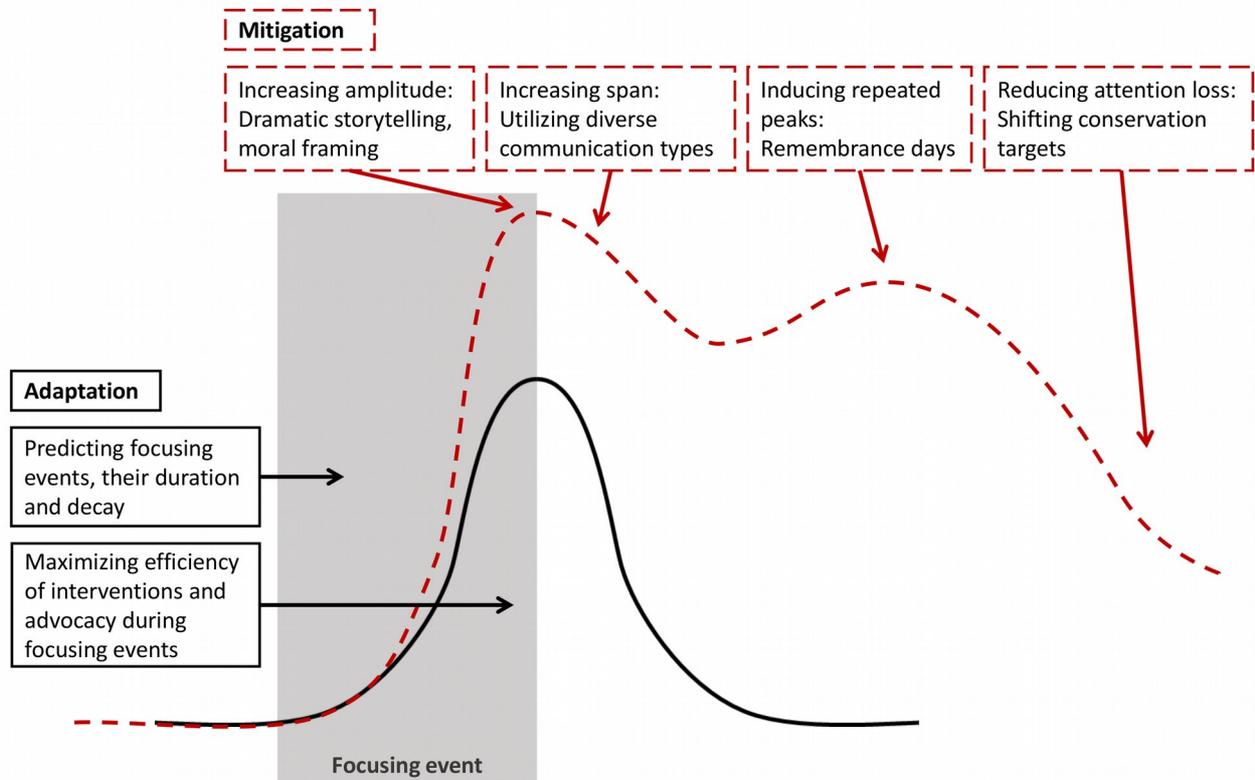


Figure 4. Visual summary of possible measures to mitigate or adapt to attention transience. The black curve indicates attention dynamics induced by a focusing event (grey bar); measures to adapt to attention transience are given in black frames. Mitigating measures (examples given in red dashed frames) may help to alleviate attention transience (red dashed curve).

Predicting occurrence of focusing events, their duration, and their decay, while challenging, is critical. Past dynamics of peak attention can indicate the available duration to prepare an intervention once an issue emerges. Moreover, anticipating the likely span of the attention window is key successfully to gain public traction for any intervention, such as fundraising, education campaigns, or mobilizing public support for policy or management. Furthermore, anticipating when attention to conservation topics diminishes or disappears can inform investments to rekindle attention.

Public attention, while necessary, is often not sufficient in itself to trigger conservation actions (Pralle 2009; Carpenter and Konisky 2019). However, brief periods of elevated attention represent optimum moments for conservation interventions and advocacy (Males and Van Aelst 2021). Focusing events commonly act as policy windows – brief periods of favorable conditions for policy change (Kingdon 1995 cit. in Carpenter and Konisky 2019) which need to be used effectively to harness public support. Consequently, it is key to be proactive and prepare to react quickly, capitalizing on focusing events, regardless of whether they were unexpected or anticipated (Birkland 1998; Clements 2013). There is also a need to develop future metrics, moving beyond societal attention, to assess whether such windows of opportunity were used to mobilize action.

Conclusions

Ultimately, there is a brief window of opportunity during and shortly after focusing events within which conservationists can effectively act to maximize support for their efforts. To address attention transience effectively, it is important to recognize people's inherent cognitive and psychological constraints and consider tried and tested media communication practices (Wright *et al.* 2015; Ryan *et al.* 2020).

The attention-transience phenomenon raises many pertinent questions, with important implications for conservation science and management. For example, how do decay rates compare between conservation and other topics (cf. Candia *et al.* 2019; Lorenz-Spreen *et al.* 2019)? How does attention decay differ across conservation issues, and why are some topics more persistent? Do patterns of attention decay vary among species, ecosystem types, countries, and regions? What are optimum marketing strategies to mitigate the effects of attention saturation and fatigue? Can conservation benefit from the peak-shaped attention dynamics? Does conservation really benefit from leveraging spikes in attention, or do lasting conservation outcomes derive only from ongoing engagements and interactions? These and other questions represent important areas for future research.

Many major and pressing conservation challenges lie outside the realm of traditional conservation biology. Understanding public attention and enhancing it through public engagement is one such challenge that we cannot afford to ignore.

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Open Research statement

Data presented in figures were retrieved from the Google Trends platform (<https://trends.google.com>). Search query details are described in WebPanel 2.

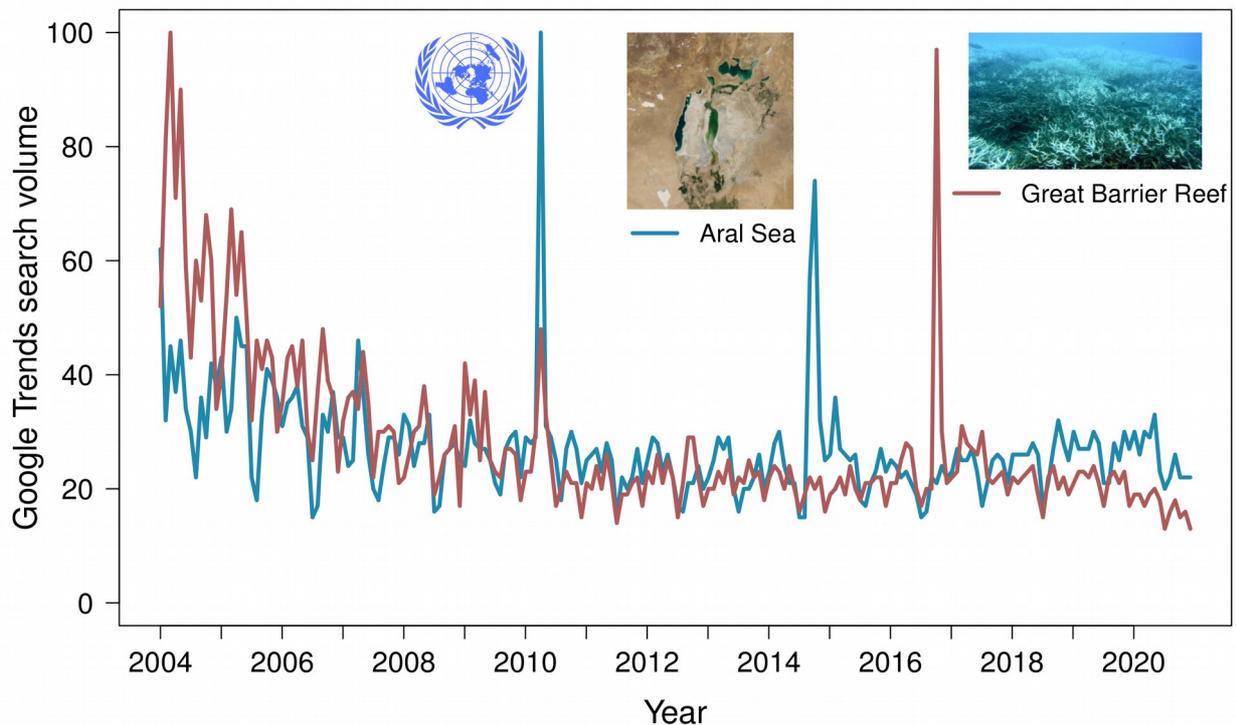
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WebFigure 1. Societal attention related to two long-term environmental threats and disasters: the drying of the Aral Sea and bleaching of the Great Barrier Reef. Time series are based on Relative Search Volume during 2004-2020 for Google Trends entries for ‘Aral Sea’ and ‘Great Barrier Reef’ (WebPanel 2). Ongoing environmental disasters associated with the coral bleaching in the Great Barrier Reef and the drying, and shrinking of the Aral Sea and conversion to the Aralkum Desert, have both been taking place over the past decades. However, despite an increasing severity of impacts, social attention has remained relatively constant, except for a few transient attention spikes following intensive media coverage of particular news (left to right): (1) UN General Secretary Ban Ki-Moon's visit to the Aral Sea and his statement that "the depletion of the Aral Sea is one of the planet's most shocking disasters" (April 2010); (2) publication of satellite images showing that "sea's eastern lobe completely dries up for the first time in 600 years" (August 2014); (3) publication of an "obituary" for a Great Barrier Reef by journalist Rowan Jacobsen (October 2016) which sparked controversy and emotional reactions.

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WebTable 1. Glossary

Term	Definition
Agenda setting	Ability of the news media to influence the importance placed on the topics of the public agenda.
Attention saturation	Attention overload by the overabundance of information and messages commonly received through news media.
Attention transience	Temporal pattern of diminishing public attention received by cultural products.
Culturomics	Study of human culture through the quantitative analysis of large bodies of digital data (Michel <i>et al.</i> 2011).
Extinction of experience	Progressive loss of daily interactions between people and nature (Soga and Gaston 2016).
Focusing events	Sudden, relatively uncommon attention-grabbing events, which often concentrate attention on previously dormant issues (Birkland 1998).
Framing	Range of phenomena involving frames of reference that wield an influence on an audience (McDonald 2009).
Issue-attention cycle	A process by which the public gains and loses interest in a particular issue over time (Downs 1972).
Issue fatigue	Exhaustion of interest and attention following prolonged exposure to a particular issue (Djerf-Pierre 2012).
Priming	A phenomenon whereby people find it easier to retrieve recently stored or frequently accessed information, with information often provided by news coverage and other information prompts (McDonald 2009).
Segmentation	The process of dividing a prospective audience into groups based on shared benefits, requirements, similar wants and needs, or the likelihood that they will respond similarly to an intervention (Metcalf et

Solastalgia | al. 2019).
The distress that is produced by environmental change (Albrecht et al.
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WebPanel 1. Extended information for Figure 2.

Figure shows trends in attention decay following major environmental accidents and conservation issues. Time series are based on Relative Search Volume for Google Trends entries for each term, with each time series scaled to a standard range of 0–100. (a) Attention peaks and decay for Deepwater Horizon oil spill (2010), Lac-Mégantic derailment (2013), and Sanchi oil tanker collision (2018). Approximate time of the accidents is set to match in the figure (grey area).

Following the peak attention, it declined back to previous levels within weeks, with attention half-life of less than a week. Longer attention half-life, tail and overall span for Deepwater Horizon was probably due to the nature of the accident (a chronic event), with an extended period of oil leaking and oil spill spread. (b) Killing of Cecil the Lion on 2 July 2015 (black vertical line) led to a massive focusing event following the first report by National Geographic on 15 July 2015 (grey area) (Carpenter and Konisky, 2019). The attention rapidly declined, with attention half-life of less than a week (a point event). Attention towards the event also drove attention towards the issues of trophy hunting and poaching, which had relatively slower decay and attention half-life of 2-3 weeks.

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WebPanel 2. Search query details for data retrieved from the Google Trends platform.

Data presented in figures (Figures 2 and 3, and WebFigure 1) were retrieved from the Google Trends platform (<https://trends.google.com>), using global ("Worldwide") searches with the following time spans and search topics (Google Knowledge Graph IDs in parentheses):

Figure 2

Weekly data:

- a) Sanchi oil tanker collision (/g/11f3s0x0fl); from 30 August 2017 to 25 March 2018
- b) Lac-Mégantic rail disaster (/m/0w5b6vk); from 6 January 2013 to 1 September 2013
- c) Deepwater Horizon oil spill (/m/0bs5k0_); from 3 January 2010 to 29 August 2010
- d) Killing of Cecil the lion (/g/11bv3xjvrc); full year 2015
- e) Trophy hunting (/m/065pmj); full year 2015
- f) Poaching (/m/0dxm5); full year 2015

Figure 3

Monthly data, from 1 January 2004 to 15 July 2022:

- a) Spix macaw (/m/02_zzr)
- b) Golden toad (/m/0c3p_w)
- c) Aloatra grebe (/m/06wjh8)
- d) Christmas Island Pipistrelle (/m/0b9g28)
- e) Po'ouli (/m/04n2t04)

WebFigure 1

Monthly data, from 1 January 2004 to 31 December 2020:

a) Aral Sea (/m/0h_18)

b) Great Barrier Reef (/m/0jbxl)