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ABSTRACT

This paper contributes to the body of knowledge associated with the analysis of transdisciplinary research. We use a narrative centered approach, focusing on hybridity, sensemaking and the potential for transdisciplinary research to foster agency.

When confronted with changes, people – as individuals – and local communities – as groups – make sense of them in the light of their own knowledge, beliefs and experiences. The process by which communities make sense of changing institutional and natural environments can be defined as the interaction between their own frame of reference and the perception of the situational demands inherent to changes, together with their interpretation of these changes. Such a dynamic process of sensemaking constantly redefines the boundaries of the narratives that community members can call on to give meaning to their past, present and future. In this paper we use five case studies to analyze how this sensemaking plays out in situations of changing climate risk and changing frames of reference associated with the presence of transdisciplinary scientists. We identify the central challenge of ambiguity. We define ambiguity as situations where narratives of change assign different meanings to the changes observed. In such situations, we observe three potential outcomes in our case studies: (1) communities appear to be forced into inaction – as a consequence of agency-depriving senselessness; (2) communities appear to be cornered into maladaptation – as a consequence of a misguided sense of agency; and (3) communities try to resolve ambiguity and effectively move forward – as knowledge-based agency-fostering exercise. In light of these results, we argue that by contributing to the clarification of such ambiguities, climate science may contribute to increases in local agency, thus enhancing adaptive capacities. We conclude by proposing that climate science be place-based and

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community-centered. The purpose of such a shift would be aimed at building the agency-enhancing sensemaking of local communities.

1. Introduction

Between 2013 and 2017 we, as an international team of scientists, were engaged in transdisciplinary research in a series of study sites scattered around the globe including Uummannaq in Greenland; Tiksi in the Sakha Republic, Russian Federation; Cocagne and Grande-Digue in New Brunswick, Canada; the *Petite Côte* in Senegal; and the Kanyakumari district, in Tamil Nadu, India, among others. This project was entitled “Adaptation research, a transnational transdisciplinary community and policy centered approach” (ARTistic). It brought together scientists from France, the USA, the Russian Federation, Senegal, Canada and India.

We decided that in order to embrace the challenge of such an enquiry into adaptation, we would not adopt an expertise-centered approach. We argued that trying to force-feed scientific knowledge and the associated prejudices to local communities might act as blinkers, preventing us from accessing experiences from which lessons might be learned. As an alternative, we decided to partner with local interest groups, policy makers, community leaders and ordinary community members and explore together instances of what seemed to be local “adaptation.” As could be expected, such a journey was full of wonders.

The purpose of this paper is to relate, while adopting a reflexive stance, one of these wonders: the fact that transdisciplinary science – and its corollary, science co-construction – reconfigures local and scientific narratives in unexpected ways – fact that we observed in 5 of the 8 sites. We further argue that this reconfiguration, “sensemaking,” has the potential to influence individual and collective agencies within local communities.

Community-centered transdisciplinary science may be about giving a voice to local communities along with a degree of influence over the making of science. Yet, it is also a way for those involved to make sense of the rapidly changing and challenging reality of their natural environments. This is a space not only of science but of all knowledges and interpretation; sensemaking appears to be a significant part of responding to climate change and seems central to the ability of local inhabitants to act to shape their future. Sensemaking at the local level emerges as a key component of individual agency and collective adaptive capacity.

In this paper, in order to share our observations, we start by associating meaning with four concepts that are central to this paper: adaptation to climate change, sensemaking, transdisciplinary science and agency (Section 2). We continue by presenting the participant observation method and the associated sources that we prioritized (Section 3). This methodology section is directly followed by a brief description of the communities that generated the narratives under consideration. Section 5 contains the core of the paper: we present the type of sensemaking that we observed while in the discussion presented in section 6, we ascertain how this may be associated with agency. The conclusion focuses on envisaging climate sciences that would be rooted in place-based agency enhancing mechanisms and go beyond the mere provision of climate information.

2. Transdisciplinary research, adaptation to climate change, agency and sensemaking

2.1. Adaptation to climate change: Uncertainty as a narrative-generating device

Within a context of climate change, adaptation has for quite some time been “a concept of uncertain form” (Godard 2010; Tubiana et al., 2010). Definitions abound, yet their actual content, in terms of policy-making and action, is renegotiated on a context-by-context basis. When implementing adaptation in general, and adaptation research in our specific case, the following key challenges must be addressed: (A) the temporal dimension of adaptation that needs to be anticipated on a short- to long-term proactive approach; (B) the uncertainties surrounding the impact of climate change, particularly at local level (Hallegatte 2009); and (C) the evolutionary nature of the adaptation concept, which assumes a permanent readjustment of knowledge and choices. Deploying adaptation to climate change locally may quickly lead to challenges in planning and a quagmire of implementation procedures (Simonet 2011; Adger et al., 2007). Adaptation research is thus a formidable narrative-generating machine. Each situation, each temporal scale, each and every place, may generate its own interpretations of the concept, the risks they face, suitable solutions, and how such solutions might be implemented. In our work adaptation was embraced as a fuzzy concept dealing with uncertainty. As such it gave us the necessary freedom to explore a cultural and geographical variety of field settings. It generated a mass of stories, meeting places, hybridizations.

2.2. Sensemaking: Narrative intertwining, hybridization, substitution, marginalization

When confronted with changes, community members – as individuals – and local communities – as groups – make sense of them in light of their own knowledge, beliefs and experiences (Ketelaar et al., 2012). The process by which communities make sense of changing institutional and natural environments, sensemaking, can be defined as the interaction between their own frame of reference and the perception of the situational demands inherent to changes, together with their interpretation of these changes (Luttenberg et al., 2013). Climate change is no exception. Yet within a context of transdisciplinary research into climate change, several frames of reference from various origins coexist. Community members and scientists individually and collectively interpret climate change and its impacts differently. The research process thus becomes a meeting place. The very concept of adaptation

becomes a boundary object. A boundary object is “an entity shared by several different communities but viewed or used differently by each of them” (see [Baggio et al., 2015](#)). Through the research process, the existing interpretations of change may compete, complement or even ignore each other. Sensemaking may thus lead to different situations whereby narratives may become hybridized, intertwined, substituted and/or marginalized. In this paper, we explore the fate of narratives of change meeting in a transdisciplinary context. We explore how, through iteration and reiteration, the meaning that is associated to a specific situation may change, or exist in different forms, within local communities, or within the transdisciplinary consortium. Furthermore, we analyze the variety of sensemaking situations that we encountered.

2.3. Agency and adaptation together

In course of the ARTistic project, environmental history was called on to analyze past instances of adaptation. This analysis demonstrated the need to mobilize the concept of agency within action-oriented adaptation research ([Kennedy et al., 2018](#)). Agency is defined as “the ability of people to act intentionally to shape their worlds” ([Nash 2005](#)). Agency allows the multiple and diverse dimensions of the ability to face adversity to be unpacked ([Brown and Westaway 2011](#)). In our project, the concept of agency was applied to individual and collective manifestations of adaptation, as well as to past, present and imagined future adaptations. Transdisciplinary efforts to co-construct knowledge must take into consideration the different capabilities, and resources of all participants so that the contributions are equal and the resulting synthesis meaningful. There may be convergent or divergent sensemaking rooted in these differences.

2.4. Transdisciplinary research

Transdisciplinary science is “a reflexive, integrative, method driven scientific principle aiming at the solution or transition of societal problems and concurrently of related scientific problems by differentiating and integrating knowledge from various scientific and societal bodies of knowledge.” ([Lang et al., 2012](#)).

Transdisciplinary research is called upon when knowledge is uncertain, when the nature of problems is, or may be, disputed, and when the stakes are high for those concerned ([Pohl and Hirsch Hadorn 2008](#)). Climate change adaptation research has been recognized as having these characteristics, and transdisciplinary approaches are increasingly adopted in order to address the associated challenges ([Gosselin et al., 2011](#); [Cundill et al., 2019](#)).

Transdisciplinary practice require carefully led negotiations and interactions. The different resources, goals and values at stake and their social representations need to be considered. Mutual learning is thus a central feature of transdisciplinary research. ([Wiesmann et al 2008](#)) Adaptation to climate change transdisciplinary research has shown that such an approach to science may turn into a societal battleground for holders of conflicting interest and knowledge claims ([Siebenhüner 2018](#)). Analyzing adaptation dynamics in Germany, [Siebenhüner \(2018\)](#) demonstrates there may be situations where consensus formation and mutual agreement is not attainable.

Paradoxically, the narrative dimension of these negotiations, mutual learning, and situations of competing, and sometimes irreconcilable, claims, does not appear to be documented; neither are the inevitable sensemaking dynamics at work. This has encouraged us to share our observations.

Furthermore, transdisciplinary research, with its action and engagement oriented stance, is associated with a very precise normative stance: change is desired, should be oriented by those affected, and occurs through the redistribution of power ([Alonso-Yanez et al., 2019](#)); empowerment is central to transdisciplinary research ([Whiteside et al., 2011](#)). This generates a second paradox when considering the lack narrative centered analysis of transdisciplinary research; narratives have been long known to be an important part of empowerment processes (e.g., [Alter 1993](#); [Rappaport, 1995](#)).

Our analysis of the dynamic evolution of narratives, through a sensemaking lens, thus addresses a gap in the analysis of transdisciplinary research. It contributes to a better understanding of the conditions for interactions and empowerment within transdisciplinary consortia.

3. Materials and methods

For this paper, we adopt a phenomenological, participant observation, position. “Participant observation is a means of collecting data in natural settings used by ethnographers who observe and take part in the common and uncommon activities of the people being studied. Central to this method is a particular approach to recording observations in field notes” ([Musante 2015](#)). For a review of participant observation, its history, methods, benefits and shortcomings, see, for instance, [Jorgensen \(2015\)](#). We founded our analysis on the “appearances of things, or things as they appear in our experience, or the ways we experience things, thus the meanings things have in our experience” ([Smith, 2018](#) defining phenomenology). The general gist of phenomenology is to try apprehending the object of our enquiry through a careful and reflexive documentation of the evolving relationship that we have with that object.

We thus observed the shaping of worlds, in which we were deeply embedded and in which we played an active role. Along the way, we reflected, and are still reflecting, on a world that changes, and on the ways we and our partners changed along the way. We center our analysis on the period during which we were actively conducting the ARTistic research project. We, our project, its outputs and our partner communities are all part of the same material.

For this paper, we relied on field notes that were taken throughout the project by the project coordinator, who is also this paper’s

lead author. While these notes, pertaining to the project, its evolution, and the meandering narratives that were associated to it, are the reference corpus for this paper, many other items complemented these project-centered field notes. Table 1 presents the sources that we used.

Within these materials, narratives were identified and selected. This selection was based on the centrality, within the narrative that were present, to the initial and/or final stories that could be heard or read. These narratives were produced by our local partners, by the team of the scientists themselves or by a hybrid group originating from the project.

In order to establish chronological markers to follow the narratives' evolutions over time, we used both the field notes and time-stamped presentation made by consortium members during the course of the project. We then proceeded by identifying changes in the stories being told. Insofar as possible, we then interpreted the nature and origin of these changes. This analysis was rooted in the day-to-day practical management and scientific coordination of the project. In a second phase, we consciously removed ourselves from the corpus. This allowed us to assess our initial interpretation with the benefit of hindsight. Before moving on to our results, it is necessary to briefly describe the places associated with the communities that were part of this narrative-generating device.

Analytically, we used an approach akin to thematic analysis. Throughout the corpuses we identified narratives - i.e. discourses expressing causal claims that are linking an initial and a final situation. For each of these narratives, we identified the main theme that they were pertaining to. We grouped narratives pertaining to the same theme within a single field site. We then identified whether, and if yes how, narratives interacted with each other. Finally each narrative was reduced to a series of simple causal statements, the local interpretation of which was submitted for final approval to local (and culturally sensitive and knowledgeable) scientists.

4. Short presentation of the locations

The stories we will be analyzing come from our work within five of the eight local communities in which the ARTistic project was deployed. The three communities we do not present here generated few identifiable narratives and are the subject of results of another nature (Kennedy et al., 2018; Berman et al., 2019). We voluntarily kept the description of these communities short, mostly retaining the description found in the original ARTistic project proposal. The choice of these communities had been guided by the following necessities: being able and willing to engage in a multi-year partnership with scientists, having faced, and currently facing, identifiable changes leading to adaptation. The first criterion, i.e. the capacity to work collaboratively with scientists, proved to be most salient determining factor for choosing the various communities as evidenced in other instances of transdisciplinary adaptation research (e.g., Simon et al., 2018).

4.1. Uummannaq, Greenland

Uummannaq is an island covering an area of 12 km² and a fjord with a polar climate located in the middle of the west coast of Greenland. Uummannaq was selected for the project as it underwent a process of adaptation to changes introduced by Danish colonialism and then continued by postcolonial influences within the Danish kingdom as well as by home-rule government. At the time of the project design, its biggest challenge was to find a way to remain a sustainable and attractive community in spite of the

Table 1

Reference corpus used in the course of the participant observation and subsequent analysis.

Item	Primary author(s)	Primary purpose
Field notes	Project coordinator	Keep track of the project progresses, documents observations made along the way.
Papers stemming from the project's work	Authors: Baztan et al. (2017) Berman et al. (2019) Kennedy et al. (2018) L'Hévéder et al. (2017) Vanderlinden et al. (2015)	Share our results with the scientific community. Submit our results to the scrutiny of our peers. Respect the commitment made to the funding bodies.
Conference presentation and posters	All consortium members	Share our results with the scientific community. Submit our results to the scrutiny of our peers.
Documented artistic outputs of the project	Forgues and Surette (2017) Thomson (2018) SatheesanThomson and Muraleedharan (2016) Jensen (2017) Stenders (2017)	Conduct a robust and culturally sensitive enquiry into local experiences. Produce long-lasting art forms as a tribute to the local communities' commitment process.
Report made by the partners during meetings	National team leader and members for each site on a yearly basis	Touch base with all the site teams on an annual basis. Prepared before the consortium meeting and circulated before being discussed.
Meeting minutes and reports	Project coordinator and coordinating team	Perform official and practical project housekeeping.
Project proposal and reports to the funding bodies	Project coordinator and coordinating team	Original project proposal. Ensure regular, contractual reporting to funding agencies.
Policy briefs	Chouinard and Fauré (2018)	Share our results with policymakers.

demographic concentration in urban areas, economic globalization and the need for rationalization to build the country's future independence. Climate changes cause dramatic impacts on landscapes and people. The key feature that led us to select Uummanaq lies in its vulnerable nature, explained by history, combined with current challenges associated with climate. The key local partner was a local institution which is a residential care home, Uummanaq's Children Home, which is closely associated with its resource umbrella: the Uummanaq Polar Institute (UPI). The UPI is dedicated to bringing cultural resources to the youth from the Children's home and promoting Inuit culture abroad. The working relationship with some of the consortium members had already existed for more than 10 years for the purpose of scientific research and more than 20 years for other type of joint projects.

4.2. Tiksi, Sakha Republic, Russian Federation

Tiksi is one of Russia's settlements on the coast of the Laptev Sea. As such, it is experiencing the transformations associated with climate change in the arctic. Since the end of the Soviet Union, Tiksi has also been confronted by a dramatic reduction in its economic activity and population. It has lost a very large part of its employment base, and many see its future as quite unpromising. As a study site, Tiksi offered lessons to be learned from a fragile community that will nevertheless have to adapt to climate change in ways associated to its arctic nature. Local stakeholders envisaged for the research partnership consisted of the local authorities, the managers of the Lena Delta National Park and indigenous associations representing the interests of local reindeer herders. Such a partnership is established in line with the very formal established institutional set up, as is customary in the Russian Federation.

4.3. Senegal's petite côte

The town of Mbour and its surrounding rural and urban communities are located along Senegal's *Petite côte* coastal area. The *Petite côte* economy relies heavily on the agricultural, fishery and tourism sectors. Agriculturalists are facing increasingly erratic rainfall (Sane et al., 2018) combined with a seemingly never-ending series of land reforms (Ndiaye 2019). Fisherfolks are increasingly confronted with changes in resource availability that are sometimes framed as manifestations of climate change. Tourist operators are faced with beach erosion and concerns regarding rainfall and are currently engaged in "adaptative actions" such as protecting their beaches with boulders and redefining the "good" season and their target clientele (Ly 2018; Ndour et al., 2018; Ngom et al., 2018). It is interesting to note that the pressures faced by all these sectors place them on a collision course regarding the use of available space. This final element led us to select Mbour as a study site. Local partners include fisherfolks unions, women's groups engaged in fish processing and mangrove rehabilitation, as well as traditional and modern authorities, village leaders and business operators within the tourism sector. It must be noted that all the members of the Senegalese research team had conducted research on *Petite côte* for more than 10 years. Furthermore, they conducted yearly field courses with their graduate students during which they established a long term relationship with local stakeholders.

4.4. Kanyakumari district, Tamil Nadu, India

The Kanyakumari district includes typical tropical coastal villages with a high population density exceeding the general average in India. It has a historical legacy of dealing with community-based adaptations – such as those relating to regime shifts during the monsoon. Kanyakumari has undergone dramatic instances of historical adaptation (Subramanian 2003; Kaliraj et al., 2017). Known adaptation processes include mobility, emerging new fisheries, the development of new transboundary social networks between coastal communities and inland communities etc. In Kanyakumari the central partners are a local NGO, the South Asian Fishermens' Federation, and other fisherfolks unions. This federation has a long track record in defending the rights of Tamil Nadu's fishermen. It has developed working relationships with academic institutions. One of these relationships was firmly established with the Indian team of scientists participating in the ARTistic project.

4.5. Cocagne and grande-digue, new Brunswick, Canada

Over the last decade, the Cocagne and Grande-Digue area coastal zone in South-East New Brunswick (Canada) has been particularly affected by storms that have been attributed, at least locally, to climate change (Chouinard et al., 2015). Yet the Cocagne and Grande-Digue area is accustomed to adaptation to externally-driven changes, such as (1) the shift from an economy based on natural resources to one based on services, and (2) population emigration due to the globalization of the labor market, to name but two. Local initiatives have developed plans to foster adaptation to changing climatic conditions: observations on environmental changes and places at risk, identifying consensual adaptation options, including a system of dikes, the elevation or displacement of buildings and roads, putting houses on stilts, and the design of a "buy-out" program (Chouinard et al., 2011). These community-led initiatives led us to select this case study site. The *Université de Moncton* has a working relationship with Cocagne and Grande-Digue partners dating back to the late 1990s. Several research action projects have already been successfully conducted and transdisciplinary practices are well established. A broad multi-scale partnership was set up for the ARTistic project. The project partners were: Pays de Cocagne Sustainable Development Group, a local NGO with more than 15 years of partnership with the *Université de Moncton*, the *Association francophone des municipalités du Nouveau-Brunswick* (association of francophone municipalities), the *Commission des services régionaux de Kent* (which is the administration delivering public services to unincorporated communities), the *Association acadienne des artistes professionnels le.s du Nouveau-Brunswick* (which brings together Acadian professional artists) and the New Brunswick – Department of the environment and local government.

5. Results: Stories of change, changing stories

5.1. Stories from Uummannaq, Greenland

In the initial months (months 1–11) of the project, the main story line was one of extreme multidimensional changes in Uummannaq, a highly-developed historical adaptive capacity and unique potential to inform the world while being informed by the scientific community and other arctic communities. This storyline emanated from the more than 20 years of experience enjoyed by one of the scientists, serving as a proxy for the community, and the local partners who were well known. This information source was combined iteratively with a formal literature review. This literature review pertained to the nature of the Greenlandic environment under a changing climate and the impacts on Greenlandic populations (e.g., [Box and Decker 2011](#); [Derry, 2011](#); [Kielsen Holm 2010](#); [Nielsen 2009](#); [Nuttall, 2010](#)). It confirmed the “factual” nature of the narrative.

This narration may be described as follows, as the “Uummannaq narrative #1” (UN#1):

1. Uummannaq is the product of years of adaptation to an extreme environment and to very peculiar conditions associated to Danish colonialism and postcolonial influences within the Danish kingdom. These are given.
2. Climate change is particularly threatening, and adaptation may currently be under way. Climate change is not, however, only threat. Cultural erosion and political and economic upheavals associated with Greenland’s wishes for accession to independence are also to be feared.
3. The ARTistic team will identify the community’s main current concerns and document what is done.

Following an initial fieldwork session, the following story was reported from the field by the research team. This “story from Uummannaq” is best summarized in [Baztan et al. \(2017\)](#) as the “Uummannaq narrative #2” (UN#2):

The Uummannaq community is strongly influenced by memories of previous adaptation to extreme climatic conditions in an isolated place. This gives community members the feeling they will be able to adapt in the future: “How brave our ancestors were, even without money, surviving thanks to their physical strength. They still help us survive today.” And as another puts it in a nutshell: “We all adapt to changes, it’s in our nature.”

The clear convergence of UN#1 and UN#2 is, in principle, reassuring. This is a story of trust in one’s ability to “shape one’s world,” come hell or high water. Such a story of trust in one’s agency does not leave much room for other stories such as stories of changing risk, unknown before climatic changes, and major ecological shifts.

Yet within this story, regular references to sea ice changes were identified by the research team. The research team felt that this theme may be an opportunity to engage in a more meaningful conversation with the community, and more importantly about its future. A second fieldwork session was organized. It was organized around scenarios for the future of Uummannaq. From this fieldwork a new story emerged. It may be summarized as follows, “Uummannaq narrative #3” (UN#3):

1. Sea ice is of critical importance to the local community.
2. Sea ice is the subject of a high level of interest among the international scientific community.
3. This convergence sets the stage for a translation exercise, transferring the state of the art of sea ice and climate change knowledge to the local community.
4. Such a translation exercise will allow for a locally-centered assessment of the current scientific agenda.

UN#3 departs from UN#1 and UN#2. There is a new story under way. This new story focused on a specific local community concern: sea ice. This local concern allowed for the assessment of current knowledge by local communities, becoming of interest to the research team. The local narrative somehow displaced the reference story of the research team, the hybrid narrative being thus carried by the non-locals.

The result of the second field session indicated that community members believe that western science, as proxied by the IPCC reports, is imperfectly salient – although sea ice is of interest, the scale at which scientists work is not the scale that is of interest to them; the qualitative information they need is not present in a way that is useful to them. These results also indicate that IPCC science, is, according to community members, imperfectly credible – some of these results seem, in their understanding, to contradict observations made by hunters and some community members believe that the knowledge of the hunters is more credible. These disconnects were further confirmed by the scientific team by using a bibliometric analysis. From these results a new story emerged from the research team in the form of the “Uummannaq narrative #4” (UN#4), best captured by quoting [Baztan et al., 2017](#):

“Our study demonstrates that climate change science created by natural scientists does not match the needs of small Inuit coastal communities such as Uummannaq. [...] [our results as well as those of others] indicate how to use knowledge co-production approaches to study research topics relevant to Inuit communities, leading to better research work, enhanced collective awareness both for researchers and community members and efficient application of findings for planning and policy making.”

UN#4 is a new story, narrated by the research team. It is the product of the researchers’ sensemaking. Confronted with the strong feeling of agency within the community, the research team changed tack, reworked its discourse and reshaped its world. While this is quite ordinary within the context of inductive research, it is important to report here in the light of what occurred at the community level.

At the community level things are different. Two Greenlandic artists (a documentary film director and a graphic designer) were

hired to propose artworks capturing the stories they heard while they observed the various field work sessions. The stories that the artists proposed, in the form of a 20-minute video (Jensen 2017) and a series of 24 posters (Stenders, 2017) were very close to UN#1! The voice of the community carries an almost unaltered discourse. Interactions with scientists did not lead to a reconfiguration of their narratives.

5.2. Stories from Siberia: When the existence of intertwined causal linkages generates potentially incapacitating ambiguity

In Siberia extensive fieldwork by the local team in Tiksi generated a corpus of recorded video interviews and focus groups. Supplementary fieldwork was conducted by interviewing the authorities in Yakutsk, in the company of the project's scientific coordinator. When questioned about current changes that the community is facing and the associated challenges, many stories emerged. These touched the issue of changing environmental conditions disrupting ecosystem services: changes in fisheries timing and productivity without adaptation of the associated logistics and logistical timing; increases in the sable population without the necessary adjustment of trapping quotas; reindeer herding being increasingly labor-intensive due to the falling health status of the herds without the associated changes in payment transfers from the government; late onset and early degradation of winter roads; acceleration of river bank erosion; respiratory ailments associated with more intense summer fires; increases in wolf predation on reindeer herds. For each of these issues, several stories existed, expressing various causal statements. Some referred to local animistic beliefs, others to the political upheaval associated with the demise of the Soviet Union. Some talked about direct impacts of climate change, others about indirect impacts: regardless of the human origin of climate change, many respondents believed climate change to be a natural phenomenon. These multiple stories followed an archetypal pattern that is best exemplified by the wolf predation stories.

Tiksi wolf narrative #1 (TWN#1):

1. Nowadays, across Russia, the young generation is less and less respectful of the standards and rules of the former generations. Young people do not listen to older people anymore and this is a source of many social problems.
2. The same situation prevails with wolves.
3. In the past, wolves would only catch reindeer on the fringes of the herd that were too sick or too old to follow along. This was a matter of respecting the work of herders and the balance of things. In the past wolves would hunt with restraint as they were better educated.
4. Nowadays, young wolves reject these rules. They hunt without restraint.
5. This is why predation by wolves is on the rise.

This story expresses causal statements associated with a nostalgia for old times linked to the belief that animals are connected to humans in ways that goes beyond the western science's understanding. Facing changes, imagined analogues are used creatively as frames of reference.

Tiksi wolf narrative #2 (TWN#2):

1. With climate change, the Tundra is undergoing a process named shrubification: low grasses and sedges are being taken over by sometimes thick, woody shrubs.
2. The supplementary biomass is available in the summer to feed the wildfires, with a clear north-south gradient.
3. These wildfires push the wolf populations northward. This creates higher concentrations of wolves in reindeer herding territories.
4. This is why predation by wolves is on the rise.

This story connects climate change, its impact on the ecosystem and associated impacts on population dynamics. Such a story is intimately connected to the widespread observation shrubification, often interpreted as a manifestation of climate change. An everyday experience of a changing Taiga is used as an interpretative frame.

Tiksi wolf narrative #3 (TWN#3):

1. Since the onset of climate change, reindeer herds have become weaker because of a higher prevalence of parasites and diminishing productivity of the rangeland. It therefore takes more time and energy to tend to the herds.
2. Herders' wages are nevertheless still computed taking the previous conditions into account. The total manpower cannot be increased, therefore there is less time to watch out for, and manage, wolves.
3. Wolves might therefore come and when they come, they find weaker reindeers that are easier to capture.
4. This is why predation by wolves is on the rise.

In this third narrative about wolf predation in the Siberian north, climate change and political constraints are used as joint causes of increases in predation. Humans and nature are engaged in a *pas de deux*, where opportunistic behavior by wolves is rewarded.

In Tiksi, sensemaking is at work. Confronted with changes, community members "make sense of it in light of their own knowledge, beliefs and experiences" (Ketelaar et al., 2012). They clearly use their frames of reference to interpret what they observe. Yet the numerous potential frames of reference lead to a situation where no robust explanation stands out. We have a situation characterized by ambiguity. We define ambiguity as situations where narratives of changes assign different meanings to the changes observed, and where no obvious choice seems to be made.

In Tiksi, the stories being told seem to ignore agency entirely. All causes are external to the community's possibilities for action. Either the climate or the forces of history or the central power may be identified as root causes. In the narratives collected in Tiksi, the shaping of the community members' world does not belong to them. The only way in which they seem to be able to shape their world is by trying to influence these external forces. Yet ambiguity may be quite disempowering when confronting potential causes. Who would one turn to? To the climate? To history? The only possibility is the central state, regardless of the meaning associated with the changes observed. We would suggest calling such a situation of ambiguity a situation of "agency-depriving senselessness."

5.3. Stories from Senegal: When ambiguity may generate causality-shopping and maladaptation.

In Senegal three major themes co-existed at the beginning of the project. These were closely associated with three economic sectors: agriculture, fisheries and tourism. The associated challenges were explicitly connected to climate change – or at least increasingly erratic rainfall, environmental degradation – including dwindling fish landings, institutional changes - such as land reform, and issues associated with power imbalance - people from Senegal's capital city exercising their influence on all economic sectors. As in Tiksi, these multiple causal expressions led to ambiguous situations.

What is the main cause of dwindling fish catches? Is it overfishing, mostly foreign, or associated with foreign interests? If yes, action is needed: the government can be pressurized; protests can be organized; captains of foreign boats can be brought to justice. It is possible to imagine how the associated narrative might play-out. Let us name this narrative "*Petite côte* fisheries narrative #1" (PCFN#1). Is it environmental degradation, especially of mangroves, and the associated disappearance of spawning grounds? If so, we need to mobilize local environmental protection agencies, and local NGOs to protect and rehabilitate the mangrove. We will name the associated narrative "*Petite côte* fisheries narrative #2" (PCFN#2). Is it climate change that generates a displacement of commercially valuable species? If so, adaptation funding must be raised, research must be conducted, donor countries need to pay attention, compensate the community and fund local and international scientists. Similarly we name the associated narrative "*Petite côte* fisheries narrative #3" (PCFN#3).

When considering the beach tourism sector, the narrative that we observed stresses that the sector is threatened by accelerated beach erosion. In this narrative, such an accelerated erosion may find its source in poor sediment planning when installing poorly designed anti-erosive structures – in this case, research and engineering are the solution; it may find its source in the overexploitation and theft of sand, associated with the real estate boom experienced by Dakar and the *Petite côte* – those responsible, while very powerful, should be brought to justice; finally it is also attributed, in stories of changes, to modified oceanic currents and storm intensity associated with climate change – in this case, adaptation funds should be raised as donor countries are partly responsible for climate change and benefit from huge resources inherited from their past colonial and environmental sins.

Finally, looking at the plight of farmers, the narratives that are collected link their difficulties to soil degradation and/or institutional instability (leading to incomplete land reforms and associated land grabs) and/or climate change and associated changes in rainfall patterns. Along the way solutions are considered.

On the *Petite côte* ambiguity is "everywhere". Nevertheless, the context is not the same as in Tiksi. Every causal chain identified has solutions on which the local community can act – agency is an important part of the stories being told. Yet no real criterion for choosing the "right" story appears in the narratives. This "choice" of a dominant narrative is nevertheless a critical issue. Locally, nationally and internationally, the "climate change-centered narratives" somehow displace responsibility to external, wealthy actors. The temptation may be strong to ignore institutional frailty, abuses of power, environmental negligence, ignorance and anything that cannot be attributed to external forces.

While the local scientific team kept working with the local community on the analysis of the complex causal chains under scrutiny, the emergence of climate change as an explanation for everything became increasingly present in public spheres within local communities. The mere existence of the ARTistic project, an "adaptation to climate change project", seemed to imply that there was no need to even consider alternative explanations. In this situation we, as transdisciplinary climate scientists, may unwittingly contribute to a misguided choice. A story is retained not for its ability to represent reality. A narrative is selected regardless of its potentially inaccurate causal statements. This may lead to the random selection of inefficient solutions. We suggest naming such a situation as a "misguided sense of agency leading to narrative selection fostering maladaptation." Such a situation raises explicitly the issue of the responsibility of transdisciplinary scientists. A potential mistake here may have been that we appeared only interested in the single issue of adaptation to climate change. Problem selection and framing may not have been sufficiently carefully conducted.

5.4. Stories from Kanyakumari and Cocagne and Grande-Digue: Hybrid stories as empowerment mechanisms

Sections 5.1 to 5.3 seem to indicate that transdisciplinary research may be locally ineffectual at best (Uummanaq and Tiksi), and toxic at worst. These sections also seem to indicate that transdisciplinary scientists may be the main beneficiary of the sensemaking dynamics at play. This is incompatible with the normative load of transdisciplinary research, and may be severely exploitative of local communities.

Fortunately, things played out differently in two of the communities. In Kanyakumari sensemaking allowed the conditions to be set for increased agency. In Cocagne and Grande-Digue it is part of a long-standing partnership jointly empowering the local community and the scientists.

The initial story line for Kanyakumari may be described as follows (KFN#1) (Thomson 2016):

1. The population in general, and the fishermen in particular, have developed an intimate knowledge and associated vocabulary

regarding weather patterns and their effects on the fishery resources.

2. This intimate knowledge has had far-reaching implications in terms of a fine-tuned social and economic organization of local life in order to face normal and exceptional years.
3. This includes individual and household-level risk management strategies such as wage labour and temporary migrations. At the operational fishing level, such strategies include resource pooling, proactive technological adoption and displacement of the fishing grounds.
4. This applies, *caeteris paribus*, to coastal, inshore, mid-shore and high sea fishermen.
5. Nowadays, changes are observed. These seem more important than before. Changes in rainfall patterns, wind and water temperature have induced changes in the resource and call for even more adaptation.
6. Consequently, fisherfolk are moving further afield.

Such a story line, reminiscent of those from Uummanaq (see UN#2 in Section 5.1), is reassuring. Science may be called on in conditions that will need to be negotiated. Yet midway through the project, the central story line changed and the new story line (KFN#2) is described here:

1. The fisheries sector is going through an unprecedented social crisis.
2. This crisis takes several shapes, all of which are extremely threatening to the well-being of fisherfolks and their families.
 - a. Inshore fisherfolks are facing unprecedented levels of violence when away. They are victims of organized crime and very little is done by the authorities to protect them.
 - b. Mid-shore fisherfolks are disappearing at sea more often than before; some are jailed in Sri Lanka, in Deo Garcia and in the Gulf countries. The government does not offer help.
 - c. High seas fisherfolks are being jailed abroad, as far away as Iran and the Russian Federation. Very little is being done to secure fair treatment or a speedy release.
3. All these issues are associated with travelling further afield in order to catch fish.
4. Protests are being organized in front of government offices in order to get help, without success – the purpose of governmental agencies in general, and the police, the coastguard, and the department of foreign affairs in particular is not to protect fisherfolks from their own risk-taking behavior.

While this storyline became established, the project held a training workshop in Kerala. The leader of the Southeast Asian Fishermen's Federation (the local partner in Kanyakumari) made a presentation along the lines of KFN#2. In the audience were members of the project team in India, including climate scientists from India's National Institute of Oceanography. Their analysis of changing SSTs, sea currents and salinity levels in the Gulf of Bengal, the Indian Ocean and the Arabian Sea provided insights into the probable weather causes underpinning fisherfolks strategies to move further and further away from their home ports. The conversation that ensued led to a third Kanyakumari narrative (KFN#3).

- 1) India's climate scientists have observed that the sea surface temperatures, local currents and general weather patterns have been changing in the Bay of Bengal, the Indian Ocean and the Arabian Sea.
- 2) Such changes in ocean conditions have important impacts on the fishery resource and thus on fishermen.
- 3) Regarding the inshore fleet: modified sea currents impact on the productivity of nearshore water. Fish are moving northward along the Bay of Bengal coast. Inshore fishermen have to fish further from their traditional fishing grounds. They are not welcome in these new fishing grounds as they are already the subject of fierce competition between local fishermen. Violence ensues.
- 4) Regarding the mid-shore fleet: pelagic fish, their principal target, are following higher SSTs, taking them further from home. At the same time, storms have been more severe. They are thus facing higher risks at sea due to both the distance and more severe storms.
- 5) Regarding the high-seas fisherfolks: the boats they use are generally less and less able to meet their needs due, among other cause, to changes in the environment including the climate.
- 6) This phenomenon, which might very well be attributable, at least discursively, to climate change, takes several shapes, all of which are extremely threatening to the well-being of fisherfolks and their families ...
 - a. the story is then spliced into KFN#2 with a substantial change to the last item.
- 7) Fisherfolks are victims of elements beyond their control. As they are forced into the trouble they are in, it seems legitimate for their representatives to request government intervention – isn't it the role of the government in general, and of the police, the coastguard, and the department of foreign affairs in particular, to protect the Indian population from harm?

This splicing of weather science stories, combined with the overarching "climate change impacts on everything" narratives, leads to a substantially changed situation. The framing of fisherfolks as voluntary risk-takers may now be contested on scientific grounds. Hybridization favors the community. The situation might not be fundamentally different from the situation in Senegal. Yet in Kanyakumari, the community was stuck, deadlocked, in a situation where it was simply impossible to shape the world, seemingly rightfully so – at least in the dominant narrative. Adding scientific information to reframe the situation has the potential to give agency back to the community. The meaning associated with the ongoing crisis had changed. Sensemaking did not so much relate to a change of situation; the meaning associated with the situation eluded those impacted. The sensemaking related to very specific activities: exercises of joint analysis, discussing, and sharing, around scientific findings. This sharing did not take the form of scientific

publications or outreach documents. It took the form of knowledge mobilization events with community representatives or even in communities.

Knowing what is going on may empower local communities and this leads us to our final example: Cocagne and Grande-Digue. In Cocagne and Grande-Digue, an initial narrative was presented by the Canadian research team (CGDN#1):

1. The Cocagne and Grande-Digue area has long-standing experience of adapting to environmental, social and political changes dating as far back as the 18th century and beyond.
2. It has been involved in a uniquely successful partnership with scientists from the *Université de Moncton* for several years now and some of the partners have known each other since the 1970s.
3. During the course of the ARTisticc project, this partnership was mobilized to address ARTisticc's research questions.
4. Beyond the broad objectives of ARTisticc, the Canadian team considered that the slate is now clean, as community consultations would soon begin and would determine what this project would be about in concrete terms.

Later in the course of the project, and in coherence with this initial statement (CGDN#1), the local implementation involved careful consultations with the community. This led to a series of research plans, divided into the following fields: natural science, social sciences and the humanities. The story that emerged was as follows (CGDN#2):

1. In Cocagne Grande-Digue, science with and for the people would be conducted along the more traditional division of science – according to the work-task organization of the ARTisticc project.
2. In this process, which would include various levels of local participation from interviews and focus groups to citizen science, we would increase the knowledge base relating to the Cocagne and Grande-Digue area. The research questions were directly identified, “chosen,” by the local partners.
3. As a first step, a comprehensive inventory was taken of the knowledge currently available and shared.

Finally research was conducted leading quite naturally to the following narrative (CGD#3)

1. In Cocagne and Grande-Digue, citizen-centered science was conducted.
2. The participation of the citizen in the science-making process was very high. Community members provided a wealth of data in all scientific disciplines.
3. Observations in the field, from townhall meetings and from governmental agencies, as well as papers presented in national and international conferences and papers being prepared for publication show that this process was beneficial to all involved.
4. One example of uptake is the co-construction of a policy brief with key partners, that has the potential to impact local, regional and national policy making and is widely distributed.

In the Cocagne and Grande-Digue area, the narratives that were most visible related not so much to environmental and social changes, but more to the process of transdisciplinary science. The invisibility of the narratives of change may be explained by the fact that the narratives of changes presented by the community and scientists were aligned. The central issue for the case study was to see how the joint partnership could increase the accuracy of knowledge on local change – past, present and future – and increase the community's grasp of these changes. Cocagne and Grande-Digue appear to be archetypical of the transdisciplinary enquiry envisaged by those who wrote the ARTisticc project proposal.

This may be exemplified by a key central, and quite unique, characteristic of the Cocagne and Grande-Digue site. In Cocagne and Grande-Digue historians were part of the transdisciplinary team. Their enquiries, and associated results, helped people to connect their current circumstances with larger questions about demography, migration, the rural economy and resource exploitation – and science making. Seeing a longer view helped with understanding of causes of change. It also provided a reinforcement of the feeling of interconnectedness of sources of changes, and reasons for optimism.

6. Discussion and conclusion

In this research we analyzed a situation of sensemaking associated with the implementation of a transdisciplinary research project exploring coastal adaptation to climate change. Our results show that transdisciplinary adaptation research may generate hybrid narratives in many ways. We also see that sensemaking in such situations interacts dynamically with agency in various ways.

6.1. Sensemaking

In his seminal book, Weick (1995) states that:

“If accuracy is nice but not necessary in sensemaking, then what is necessary? The answer is something that preserves plausibility and coherence, something that is reasonable and memorable, something that embodies past experience and expectations, something which resonates with other people, something that can be constructed retrospectively but also can be used prospectively, something that captures both feeling and thought, something that allows for embellishment to fit current oddities, something that is fun to contrast. In short, what is necessary in sensemaking is a good story.” (pp. 60–61).

Our results indicate that transdisciplinary science, and the associated sensemaking, may lead to “good stories,” stories that make

sense for those involved in their production, stories that are adopted. In a worrying parallel to Weick's "If accuracy is not needed", our results also indicate that robust science is not necessarily needed in order to create narratives that are adopted by community members.

Within a transdisciplinary framework, what then is a "good story?" Who is in a position to judge the validity of an hybrid narrative stemming from dialogues between scientists and a local community. If we work under the hypothesis that a good story is one that is adopted, we can observe the following.

The stories that took place in Greenland diverged; stories co-existed and were compatible. Both "families" of stories, UN#1 and UN#2 on the one hand, and UN#3 and UN#4 on the other, carry or mirror the identity of the community (UN#1 and UN#2) or of the team of scientists involved (UN#3 and UN#4). One single common story did not, however, seem to emerge from the transdisciplinary consortium. The judging of the story somehow remained within each community. These different stories did co-exist. They were even occasionally adopted by members of both communities – on an ad hoc basis.

In the case of Tiksi and the *Petite côte*, stories were adopted by these communities and were thus deemed locally to be good stories. Yet for the scientific members within the research consortium, these stories were not really satisfactory. "Climate change" as the only explanation was seen as "inaccurate" by the scientists. Such a story could not be adopted "as is" by the research team. In Tiksi, the story that conveyed the local community's disempowerment and heteronomy may have been accurate, yet they came into conflict with the values and beliefs of the research team as whole. The scientists involved saw autonomy, agency and adaptive capacity as central to human experience. Negating the possibility for these, and considering that such a negation may be performative, was simply unacceptable to the team. Transdisciplinary climate change research in our case is associated with a very precise normative stand: a transdisciplinary research project should lead to empowerment; it must not stabilize situations of disempowerment. While the power to choose a story ultimately lies in the hand of the narrator, in these two cases, the stories chosen by one group (the local community) could not be relayed by the other (the scientists).

Finally, in the Kanyakumari and Cocagne and Grande-Digue cases, a shared narrative emerged, uniting the community and the scientists. In Kaniakumary the accuracy of the causal chain that is spelled out (climate change- > changes in current, SSTs, and storm climate- > changes ecosystem services- > push fisherfolks further out or further north) remains to be robustly demonstrated. Accuracy is not (yet?) an important part of the discussion. Plausibility is what seems to be used as a validation criteria. In Cocagne and Grande-Digue, the partnership was involved in a transition from plausibility to accuracy. Such an enhancement of accuracy maybe sourced to the presence of the scientific team. Yet, and this needs to be emphasized, it may also be sourced to the contributions of data and interpretations from local actors and organizations. Local historical stories and emotions were confronted with scientific protocols and a robustness assessment in order to develop a robust, multiple perspectives and widely shared history of the area.

In this section we considered that a good story is one that is adopted. A good story may nevertheless also be judged on its performative potential, regardless of whether this is realized. This would seem coherent with transdisciplinary research as a source of well guided action and with the need to take agency into account.

6.2. Agency

"If the first question of sensemaking is "what's going on here?", the second, equally important question is "what do I do next?" (Weick et al., 2005).

In our case, agency – as an ability to shape one's world – came into play in various ways: a strong feeling of agency within the local participants in Uummanaq, a strong manifestation of agency (scientists working in Uummanaq, local community and scientists in Senegal), a strong lack of agency (Tiksi community) and an agency reinforcement mechanism in situations of low (Kanyakumari) or high (Cocagne and Grande-Digue) initial agency.

Our cases show several dimensions of the ways agency might interact with sensemaking in situations where different narratives meet as interpretation frames. In Uummanaq, we witnessed mutual reinforcement. In Tiksi, we observed the risk of reinforcing the feeling of disempowerment. In Senegal there was a risk that the scientific narrative increased the plausibility of a narrative that was inaccurate in its narrowness, potentially generating the wrong actions. In Kanyakumari and in Cocagne and Grande-Digue, we saw that agency was reinforced through joint sensemaking.

Ketelaar et al. (2012) explored the connection between agency and sensemaking in a very different setting (teacher position in front of a teaching innovation). Their results indicate that one central feature is that of group-building. In their case, the sensemaking agency nexus seemed to be closely linked, developing a feeling of cohesion among those affected or involved. In our cases, agency-enhancing through sensemaking is connected to the collective construction of a shared story, a hybrid narrative (Kanyakumari and Cocagne and Grande-Digue); alternatively the sharing of stories, without hybridization may also create a sense of cohesion (Uummanaq). A central dimension that will need further analysis is that of narrative sharing as a trust building and a trust nurturing mechanism.

6.3. Knowledge and power as central categories

"Sensemaking strikes some people as naive with regard to the red meat of power, politics, and critical theory. [...] Sensemaking discussions do tend to assume that meanings survive as a result of voting, with the proviso that sometimes the votes are weighted equally and sometimes they are not." (Weick et al., 2005).

The results associated with Senegal's *Petite Côte* are reminiscent of the complex interplay between power, knowledge and rationality as illustrated by Richardson (2005). Richardson shows that imposing a knowledge base as reference knowledge amounts to

imposing one's rationality. He further demonstrates that such an imposition is the product of power play. One of transdisciplinary science's basic tenets is that power over knowledge production needs to be better distributed (Alonso-Yanez et al., 2019). Finally, within the realm of adaptation research, Vink et al. (2013) propose a conceptual matrix based on the dimensions of knowledge and power. They apply this matrix to the existing literature on adaptation. This analysis leads them to argue that more research on the knowledge and power interplay is needed.

The result that we obtained by using the sensemaking is a step in that direction. Within the Senegalese case study, the narrative-centered sensemaking approach allowed us to keep alive dissonant voices while documenting the interpretative frames that led to these dissonances in spite of the progressive dominance of the "climate change" narrative. The Uummannaq case study illustrates that, by using our approach, we kept a close watch of the progressively diverging interpretative frames that were used by the community on the one hand, and by the research team on the other hand. The Tiksi case study shows how dissonant voices and frames may be mobilized and organized in order to, in later steps, engage into various conversations between different communities, nonscientific and scientific. Finally, in the Indian and Canadian case study the sensemaking lens allowed the identification of a pathway where knowledge and power interact in order to foster empowerment, not conflictual rationality imposition.

As already identified by Dervin (1998) in another setting, we observe that "Sense making, as an approach, is [...] a methodology disciplining the cacophony of diversity and complexity without homogenizing it." Within the field of transdisciplinary adaptation to climate change research a sensemaking approach may thus contribute to keep the diversity of knowledges and interpretations alive yet somehow disciplined - in a way that may prevent the use of knowledge to impose power or vice versa.

6.4. Furthering sensemaking centered enquiries into adaptation to climate change

In the work we present above, we are somehow one step short of addressing adaptation as a deeply transformative process. Yet ultimately agency, world shaping, is about transforming the world in a way that is desired. In their analysis of transformative science, Schneidewind and Augenstein (2016) propose a classification of transformation thinking into three schools: idealist school, the institutional school, and the technological innovation school. They associate the following conception of humankind to the idealist school: "Humans are sensemaking, social and communicative beings." Sensemaking may thus be central to transformative thinking. This being said, it is important to stress that transdisciplinary enquiries are often consubstantial to transformative science (Schneidewind et al., 2016a,b).

For example, Schneidewind et al. (2016a) identify that transdisciplinary and transformative research is in conflict with the established disciplinary organization of science. Within adaptation research, such conflictual situations may generate a diversity of narrative. Sensemaking, may in such cases be mobilized in order to document how such a diversity evolves, and contribute to the final desired outcome of better adapted human communities.

6.5. Conclusion

In the ARTistic project we set out to analyze adaptation using a transdisciplinary approach. Along the way we discovered some of the ways the setting up of hybrid narratives around issues of adaptation and climate change may deploy itself. We observed, and shared in this paper, how sensemaking may have various effects on the agency of those that are involved in the hybridization process. We particularly observed how plausibility, as opposed to accuracy, in many instances, was more important when selecting stories that "makes sense" for local communities. Ambiguity was an outcome of the research process that we had launched. We are now in a position to propose some conclusions:

First, stories do matter, and significantly so. Adaptation centered transdisciplinary research entails the setting up of a battleground for holders of conflicting interest and knowledge claims (Siebenhüner 2018). In such a context, grounding the associated processes in local stories, and accepting that ambiguity may emerge along the way, may foster outcome respectful of the diversity. This entails the risk of seeing inaccurate, yet plausible, stories taking precedence over accurate, science-based stories - yet a close watch of the narratives and their respectful questioning can be organized. Transdisciplinary scientists must thus keep a very careful watch on the ways hybridization occurs, ambiguity emerges, and on the interplay between accuracy and plausibility. Transdisciplinary scientists may also want to keep a close watch on the coexistence of different stories. In such situation, the lack of hybridization may reflect high level of trust and mutual respect. Alternatively it may indicate that the communities in presence are not listening to each other.

Second, stories are connected to the history, needs and political economy of the local communities in which they are observed. Plausibility may not be the only factor influencing the adoption of a narrative. Consciously or not, the adoption of narrative may be opportunistic, geared towards influencing local balance of power. Transdisciplinary scientists must thus remain aware of local political forces. Local playing fields are not necessarily entirely level, and a close watch on both narratives, and sensemaking processes, as well as their evolution, may help in getting a grasp of what is actually happening in terms of power play.

Third, stories and their deployment play a role in the ability of local communities to cope with changes. Agency and narratives are dynamically connected through sensemaking. In a transdisciplinary context, this means that science may benefit local communities through increased knowledge AND an increased sense of agency.

Following these conclusions, transdisciplinary scientists may experiment with research processes that use local narratives as an entry point. In doing so, science, and action, will jointly benefit. A focus on narratives and sensemaking may help in respecting the interplay between plausibility, accuracy and ambiguity in situation of multiple interpretations. It may facilitate dealing with issues of knowledge and power which are central to transdisciplinary climate change adaptation research.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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