

Chapter 18

Loss and Damage in the Rapidly Changing Arctic



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Abstract Arctic climate change is happening much faster than the global average. Arctic change also has global consequences, in addition to local ones. Scientific evidence shows that meltwater of Arctic sources contributes to sea-level rise significantly while accounting for 35% of current global sea-level rise. Arctic communities have to find ways to deal with rapidly changing environmental conditions that are leading to social impacts such as outmigration, similarly to the global South. International debates on Loss and Damage have not addressed the Arctic so far. We review literature to show what impacts of climate change are already visible in the Arctic, and present local cases in order to provide empirical evidence of losses and damages in the Arctic region. This evidence is particularly well presented in the context of outmigration and relocation of which we highlight examples. The review reveals a need for new governance mechanisms and institutional frameworks to tackle Loss and Damage. Finally, we discuss what implications Arctic losses and damages have for the international debate.

Keywords Arctic · Climate risk · Adaptation · Vulnerability · Indigenous people · Communities · Policy

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18.1 Introduction

Dangerous climate change increases the need for emergency preparedness mechanisms, disaster risk responses, and climate adaptation strategies in case of losses and damages. To avoid dangerous climate change, the United Nations Framework Convention on Climate Change (UNFCCC) has called for action within a

time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner (UNFCCC 1992, Article II).

Crowley (2011) has criticised this Article II because it does not consider the international human rights principles when interpreting what “dangerous” climate change means. For example, the ability of ecosystems to recover naturally has already been compromised in many places in the Arctic, and these changes are threatening food security and traditional livelihoods already, especially those of indigenous peoples. Liability and compensation are under debate in international climate policy discussions (Huggel et al. 2015). Financing mechanisms to support adaptation or transformative actions can be provided from local, national, regional and international sources. However, this requires consensus between responsible parties and potential beneficiaries. It is also problematic that losses and damages cannot always be compensated by technical or financial support, if they include, for example, loss of culture and tradition. In these international debates, little attention and support has been given to Arctic vulnerable communities so far. These communities have to find ways to deal with rapidly changing environmental conditions, either by adapting or taking actions that can lead to social impacts similarly to global South, such as outmigration (e.g. Wolsko and Marino 2016).

Arctic climate change is happening much faster than the global average (Arctic Climate Impact Assessment 2005; IPCC 2007; AMAP 2017). According to AMAP (2017: 3), “*The Arctic ... has been warming more than twice as rapidly as the world as a whole for the past 50 years*”. The Arctic has often been referred to as “the canary in the coalmine” (Chinowsky et al. 2010), “climate hotspot” (Hare et al. 2011), or “harbinger of change” (Carmack et al. 2012). The Arctic represents a place where the impacts of climate change are already visible. Both scientific evidence (e.g., attribution studies and vulnerability analyses of Arctic communities, including the most recent reports of the IPCC) and traditional knowledge (e.g., indigenous discourses and field observations of Arctic residents) indicate that climate change has severe impacts on the Arctic and risks and impacts also have global consequences. Recent scientific evidence shows that meltwater of Arctic sources contributes to sea-level rise significantly while accounting for 35% of current global sea level rise (AMAP 2017).

According to Carmack et al. (2012) examining the Arctic is particularly important for four reasons. First, understanding change in the Arctic may reveal lessons of how change happens in complex systems and improve our understanding how to deal with these. Second, changes already taking place in the Arctic are likely to have irreversible impacts regionally and locally, leading to limited possibilities of communities to adapt, and significant consequences to the global economy as well. Globally, Arctic climate change has been estimated to cost between 9 and 70 trillion U.S. dollars over the period 2010–2100 (AMAP 2017:13). Third, climate change is advancing faster in the Arctic than anywhere else, and finally, responses to climate change through adaptation are manifold, and can be tested in the Arctic in the face of rapidly approaching tipping points.

In this chapter, we examine what “dangerous climate change” means in the Arctic context, by identifying critical risks and impacts in the region in general, and then presenting cases from the literature that are beyond Arctic communities’ capacity to adapt, in particular. The examples provide evidence on Arctic regions’ need for institutional support to cope with the consequences of climate change, despite being part of developed countries. So far, neither the United Nations Climate Change Conference of the Parties (COP) nor the subsidiary bodies under the UNFCCC have discussed Arctic climate changes in detail (Duyck 2015a, b). Yet, changes already affect Arctic communities, questioning whether they are in fact bearing a “disproportionate or under abnormal burden” (cf. UNFCCC, Article II). Examples of losses and damages more broadly are climate change affecting critical infrastructure and traditional livelihoods (Bronen 2015) as these harms can affect societies across generations (Sejersen 2012; Himes-Cornell and Hoelting 2015). Similar actual and potential losses and damages are under discussion in developing countries too. Their capability to adapt to change or transform their livelihoods to something that still allows them to maintain their land, livelihoods and culture, is critical to affected communities. If this is not possible, and the residents have to leave and abandon their livelihoods, they are faced by Loss and Damage in its “narrow” sense. Thus, we review Arctic studies to understand what losses and damages mean in the Arctic context, what are global consequences of Arctic change, and what implications these changes have for the international Loss and Damage debate.

18.2 Rationale for Including the Arctic in the Loss and Damage Debate

Internationally, the debate on Loss and Damage has predominantly concentrated on discussing the risks and impacts of climate change on developing countries so far. International climate negotiations have been the main arena and as other chapters in this volume show, a consensus on the definition of Loss and Damage is yet

to emerge (Mechler and Schinko 2016; see introduction by Mechler et al. 2018; chapter by James et al. 2018). A broad definition in the literature makes a distinction between avoidable, unavoided and unavoidable impacts of climate change, where “irreversibility” refers to ‘losses’ and “impacts that can be alleviated” refer to ‘damages’ (see Mechler and Schinko 2016: 290). In essence, this means that Loss and Damage can be narrowly defined as the “residual, adverse impacts of climate change beyond what can be addressed by mitigation and adaptation” (see Huggel et al. 2015: 454). Here, we employ this definition of Loss and Damage related to climate change impacts that are unavoidable.

18.2.1 Little Responsibility of Emissions

On a global scale, Arctic traditional and indigenous lifestyles have hardly contributed to greenhouse gas emissions, although traditional livelihoods of the Arctic communities take place in high-emitting first world countries, and fossil fuels extracted from Arctic regions contribute to global GHGs and serve all countries (Pechsiri et al. 2010). Global mitigation responsibility of all countries, developed countries, emerging economies and developing countries, is not only important to reduce vulnerability of communities of global South but also of the Arctic communities. This has been shown by empirical evidence in the IPCC 4th assessment synthesis report (IPCC 2007).

18.2.2 Identifying the Most Vulnerable by Following Human Rights Principles

From the climate justice point of view (see chapter by Wallimann-Helmer et al. 2018), and as considered by Inuit political leaders (see Ford 2009; Crowley 2011), climate change is primarily a human rights issue because it puts the ecosystem services-based traditional livelihoods at risk, and leads to social and economic impacts in Arctic communities (Maldonado et al. 2013). Marginal livelihoods, especially those located in Arctic coastal areas, face both slow-onset and extreme events that heavily affect critical infrastructure, and cause harm to local and traditional livelihoods (Huggel et al. 2015). Some traditional ways of living, for example, can no longer be practiced due to changes in sea ice conditions (Sejersen 2012; Shearer 2012; Bronen and Chapin III 2013; Bronen 2015). Yet, international roles and responsibilities to deal with Loss and Damage are not clear, and current national level legal frameworks seem not to provide “optimal” solutions to support adaptation of vulnerable Arctic communi-

ties—and in fact, even limit adaptation in many ways. According to the International Commission on Intervention and State Sovereignty, nation state governments have the responsibility to enhance protection of vulnerable groups, minorities, and support work to advance human rights (ICISS 2001, cited in Bronen 2015). But still, the UNFCCC Parties are not meeting their international legal obligations under the Article II (see Crowley 2011; chapter by Simlinger and Mayer 2018).

18.2.3 Unequal Distribution of Risks and Limits to Adaptation

In the current Loss and Damage debate of the UNFCCC, the global North is considered to have high responsibility and liability for dealing with climate-related risks affecting vulnerable communities in the South. In general, countries in the global North are considered to have high adaptive capacity, due to national and regional financial and technological resources that should also support sustainable transformation of societies. But as the case in many southern regions too, neither are climate-related risks distributed equally among the population and geographically in the northern circumpolar region, nor do those in need necessarily have access to these resources (Larsen et al. 2014). Also, considering unforeseen future conditions, Arctic ecosystems cannot adapt to climate change naturally, and this hampers the provision of ecosystem services, which provide the basis for traditional livelihoods (White et al. 2007; Larsen et al. 2014). Climate change forces people to make choices and face situations that lead to radical, but not necessarily sustainable transformations of society (Sejersen 2012). Marino (2012) has pointed out that federal, state and local authorities in the US identify today nearly all 200 Alaskan native villages as being “under threat” or “immanent threat” due to erosion and/or flooding. To tackle these kinds of challenges Arctic communities would need decision-making power, access to information and financial resources. One example is relocation actions, which are costly and require careful planning in order to lead to positive outcomes (Lopez-Carr and Marter-Kenyon 2015). Especially Arctic populations in remote locations need institutional and financial support and assistance in adaptation planning (Ford 2009; Dengler et al. 2014) to be able to successfully implement adaptation actions that should end up with positive outcomes—forced or poorly planned relocation actions cannot be considered as such.

18.3 Review of the Impacts of Climate Change and Vulnerability in the Arctic

We conducted a systematic literature review of Arctic scientific studies found mainly in *Scopus* database. Out of 3,473 Arctic studies we found 164 studies addressing issues related to risks and impacts of climate change that relate to losses and damages more broadly. Categories of these can be found in Table 18.1. We could also identify examples that fit the narrow definition of Loss and Damage, while providing examples of climate risks and impacts that are ‘beyond adaptation.’ Instead of trying to identify all examples that belong to the “narrow” category, we selected examples from the literature that have been found particularly relevant for the global South and developing countries, and are also discussed in the international Loss and Damage debate: relocation and outmigration. For instance, climate-induced migration is explicitly covered in the United Nations Climate Change Convention (UNFCCC) conferences, the Conference of the Parties (COP), and the Executive Committee on the Warsaw International Mechanism on Loss and Damage (WIM), which has a mandate to establish a migration facility.

Based on the literature review, the impacts of climate change can be divided into a number of different types from ecological to socio-cultural and economic, whereby joint impacts can also reinforce each other. For example, there are biophysical impacts when changes in climate affect the biogeochemical cycles in the Arctic and change the prevailing conditions in the region, which in turn affects the ability of Arctic communities to engage in economic, social and cultural activities. Alternatively, there are socio-economic developments that can amplify ecological impacts through new migration patterns or use of natural resources, for example. Impacts can also be described as local, regional or global, with the first two being climate change impacts happening in the Arctic and the third impacts that occur elsewhere but have consequences in the Arctic and vice versa.

Table 18.1 Categories of Arctic studies focusing on risks and impacts of climate change (N=164). Especially the climate-induced relocation and migration studies provide indications of Arctic Loss and Damage

Categories	Number of studies
Dangerous climate change: risks, hazards, disasters, extreme events	13
Infrastructure impacts and costs	6
Climate-induced relocation and migration	18
Vulnerability, resilience, impacts, adaptation	70
Human rights, equity, climate justice, gender issues, generations	8
Research tools and methods: monitoring, assessments, use of traditional knowledge in research	27
Human health impacts	22
Total	164

Research on socio-economic impacts has also shown that biophysical changes are impacting anthropogenic activities in the Arctic directly, but also indirectly through increased economic interests, such as in mineral exploitation and other industrial developments, affecting traditional land use and causing pollution. There are number of strands in the impacts and vulnerability literature and many of these categories touch upon the topics included in the international Loss and Damage debate, which we place in seven loosely defined categories (Table 18.1). The classification is based on the main focus of the studies as indicated by title, abstract and keywords. Studies modelling the changes or impacts of climate change focus on the Arctic as a whole. Smaller scale ecological or biological studies tend to be site-specific with varying considerations given to their generalisability across areas. The majority of studies that address socio-economic aspects, either through vulnerability or adaptation, tend to consider a specific community or country. As part of these studies, North American analyses were very well represented whereas there were fewer studies from the Nordic Arctic (Finland, Sweden, Norway) and Siberia (Russia).

Figure 18.1 presents these Arctic studies as a “keyword mining” visualisation made by means of VOSviewer software. The term map is based on a text corpus option to visualise the main topics found in the articles. The figure shows the essential keywords most frequently encountered terms related to Arctic climate impacts and risks topic, extracted from the article titles and abstracts. 83 terms that met the threshold of appearance 10 times were selected. The size of the circles indicates frequencies of keywords. Circle colours indicate close relatedness of the terms (substance-wise). The terms marked with the same colour form a cluster of related terms that can be seen as a topic. Lines express co-occurrence of the terms between the clusters either in the article title, or abstract, or both.

As can be seen from the terms that emerged, much focus has been placed on research into impacts related to infrastructure and vulnerability. Both of these have implications for the debate on Loss and Damage, even though the debate itself has largely been ignored in the context of the Arctic. Studies have centred on identifying the impacts of climate change on Arctic societies in terms of both infrastructure and socio-economic conditions, and their ability to adapt. These analyses can be used to identify to what extent communities are able to adapt or whether they will experience losses and damages arising from impacts that they are not able to adapt to.

18.3.1 Biophysical Impacts

Since the publication of the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), it has been recently estimated that the decrease of Arctic sea ice is more rapid than according to previous estimations (Hare et al. 2011) and the Arctic melting will significantly affect sea level rise globally (AMAP 2017). Climate change effects on sea ice-based ecosystems are likely to have significant consequences, including possible extinction of some species (Johannessen and Miles 2011). Another significant long-term trend in the Arctic areas is the thaw of the

permafrost, which contributes to the slow release of carbon in the atmosphere (Schuur and Abbott 2011), resulting in global consequences.

It is worth noting that not all biophysical impacts are uniform and that the Arctic covers many different types of landscapes and societies. There is a shift from tundra to continental climate in Alaska, Canada and North-Eastern Russia and a shift from continental to temperate climate in North America: these are examples of a global decrease in cold areas and in Alaska and Siberia, which are on top facing the risk of desertification (Spinoni et al. 2015). Other Arctic areas, such as western Siberia, are facing hydrological risks and permafrost thaw causing floods and mudflows and increasing the risks to industry and urban centres (Zemtsov et al. 2014).

There are slow-onset events, such as tundra decline, tundra shrubification, permafrost thaw, tree line advance, deforestation, loss of palsa mires in Nordic Arctic; the Arctic region is also facing albedo changes and diminishing sea ice, soil and coastal erosion, sea-level rise, and desertification. Further direct impacts are extreme events, such as storms and wildfires, floods, and landslides. It is estimated that increases in precipitation will affect snow events in Alaska and increase the likelihood of avalanches and landslides in the mountainous areas (Hansen et al. 2014). All these biophysical impacts can be disruptive to wildlife and ecosystems, and the provision of ecosystem services, and cause serious damage to people and critical infrastructure also, as well as emergency preparedness systems and monitoring systems (Crowley 2011). They can also cause impacts on (traditional) food and water security (White et al. 2007), but also tourism (Lemelin et al. 2012). Arctic livelihoods and lifestyles are closely connected to the environment, and dependent on the prevailing conditions of ecosystem services. For example, risks associated with loss of sea ice and its consequences on practicing traditional activities, such as seal hunting and ice fishing, are increasing and local communities have to adapt to these changes (Giles et al. 2013), and if adaptation is not possible, try to move away.

18.3.2 Socio-economic Impacts

Further reading of the literature reveals that there are studies that focus on understanding and mapping socio-economic vulnerability of Arctic communities, societies, culture and lifestyles. Among these are studies that approach vulnerability within a specific sector and focus on modeling or providing cost estimates related to climate change impacts and adaptation. We also found several studies indicating health impacts driven by climate change. For example, hydrological cycle changes are an example of emergent changes that cause lack of ice for long periods of time in Russia. This has health consequences because the people cannot access health services and also the “social fabric” is being affected, according to Amstislavski et al. (2013).

The literature also shows evidence of socio-cultural consequences of climate change in the case of relocation and climate-induced migration. These studies indicate that across the Arctic regions, and especially in the coastal areas, climate change increases the vulnerability of local and indigenous communities. It has already led to outmigration (“climigration”) and related cultural loss and demographic changes in the region. The interest in studying the Arctic from the perspectives of climate justice, intra- and intergenerational issues has been growing, particularly in terms of relocations and human rights. As outmigration and relocation can have multiple negative consequences, the question remains whether these actions should be considered as adaptation, or whether they are rather ‘beyond adaptation,’ i.e. related to Loss and Damage given that currently outmigration and relocation are key issues of the international Loss and Damage debate.

18.3.3 Economic Models and Impact Analyses

Economic models and impact studies place emphasis on estimating potential local impacts and costs (or costs and benefits) associated with climate change, mainly in the context of Alaska, although there are some Nordic studies as well. These studies focus on a variety impacts, such as coastal erosion (Radosavljevic et al. 2015) and temperature changes (Chinowsky et al. 2010). Many of the studies model the impacts on infrastructure, for which the costs of climate change are likely to increase significantly as conditions change (Instanes 2006; Larsen et al. 2008; Hatcher and Forbes 2015). Arctic infrastructure is already tailored to specific conditions and now maintenance and replacement costs under any adaptation scenario is likely to increase about 10% (Chinowsky et al. 2010), so adaptation might technically be possible, but it is too expensive. A number of economic studies estimates potential damages either through modeling or by analysing historical events and its costs. It is argued that there is a continuous need to monitor and develop responses through emergency management (Brunner et al. 2004). Immediate impacts and related costs due to damage on critical public infrastructure have been estimated and modeled with an economic point of view towards losses and damages (e.g. Instanes 2006; Larsen et al. 2008; Ford and Pearce 2010; Chinowsky et al. 2010; Karvetski et al. 2011; Radosavljevic et al. 2015). So, it is very simple to understand that if costs are exceedingly high and financial resources not available, adaptation is not possible; the residual risks and impacts remain ‘beyond adaptation,’ and thus belong under the narrow definition of Loss and Damage.

18.3.4 Societal Impacts

We also found studies that focus on understanding the socio-economic and cultural vulnerabilities of Arctic communities in-depth. These studies provide a socio-cultural angle on climate impacts, and include non-monetary impacts, such as loss of culture and tradition. These are often case studies of specific communities undertaken with ethnographic methods (e.g. Carothers et al. 2014). Many contributions in this field focus on the role that traditional/indigenous knowledge has played in adaptation of Arctic peoples in the past, yet find that the knowledge now is eroding, and affecting their culture and traditions. We also found a strand of literature that takes a more critical view on conceptualising vulnerability by stressing the historical background, which reinforces current vulnerability and places barriers to adaptation in the future. For example, due to a multitude of changes in the past and currently, traditional knowledge has had to make place for wages, hunting regulations, for example, due to colonialism in the past and due to ongoing industrial developments today (Cameron 2012).

However, studies which take into account traditional knowledge now seem to have gained more importance in research to better understand Arctic change and adaptation to it (e.g. Riedlinger and Berkes 2001; Maynard et al. 2010; Douglas et al. 2014; Cuerrier et al. 2015; Vinyeta and Lynn 2013; Golden et al. 2015). Also, special attention in this literature has been placed on recognising the impacts to indigenous communities and institutional frameworks related to strategies to deal with the impacts, such as community-based adaptation strategies and participatory planning (Tremblay et al. 2008; Hovelsrud and Smit 2010; Pearce et al. 2012; Champalle et al. 2015). As a matter of fact, the resources of indigenous communities to increase adaptive capacity have been diminishing due to reduced possibilities to make decisions and practice traditional ways of living (Roberts and Andrei 2015) and consequently, studies on outmigration (or “climigration”) and (forced) relocations have started to emerge (Table 1).

The focus on vulnerability due to climate impacts has indeed drawn some critique for its narrow view. Many studies are considered to ignore the colonial legacy in the Arctic and its effects in terms of inducing social change with negative implications (Cameron 2012; Whyte 2016). So, there are also new social, political and economic settings emerging and “blocking” the traditional ways to adapt to changes, as traditional livelihoods are now being regulated from “outside,” such as changes in governance of resource use, land use, and land ownership. It has been proposed that more public participation, co-management and self-governance of local communities is needed in decision-making and planning, and new (participatory) governance mechanisms to tackle the transformation of the Arctic region (Nuttal 2007; Bronen and Chapin III 2013). Ford et al. (2007) have argued that without financial support provided by larger-scale actors, such as the UNFCCC, for example Inuit communities and regions cannot successfully adapt. Indigenous peoples often have limited decision-making power, and both environmental and social changes are more rapid than they have been before. Integrated understanding of science, people, and cross-

scale information networks to increase Arctic resilience is needed to respond to the rapid changes (Carmack et al. 2012) and identify what remains beyond adaptation, i.e. Loss and Damage, and why.

In summary, this reviewed literature shows that many kinds of risks and impacts on societies can already be seen in the Arctic, and some of them fall under the “narrow” category of Loss and Damage, in the literature typically defined as the “residual, adverse impacts of climate change beyond what is addressed by mitigation and adaptation” (see Huggel et al. 2015: 454). Climatic changes affect societies that are already much more vulnerable than the general population in these developed countries. Arctic societies need to find options to tackle drivers of environmental, economic, social and cultural transformation, but at the same time they also have to find ways to deal with the residual losses and damages that are ‘beyond adaptation’ to climate change. In the next section we delve deeper into these ways by providing examples.

18.4 Loss and Damage in the Context of the Arctic

Throughout the history, Arctic ecosystems and dependent local and indigenous communities with varying needs, perceptions and values, have been adapting to climate variability. However, due to rapid climate change and global change, limits to adaptation have started to emerge. The Arctic literature show limits to adaptation due to institutional, political, organisational and jurisdictional factors hindering implementation of adaptation to climate impacts, leading to Loss and Damage. The threshold of adaptation also depends on current socio-economic, cultural and political settings. A schematic depiction is shown in Fig. 18.2. The Arctic examples of relocation and migration show very well that due to negative societal and cultural impacts related to these actions, they can be considered as being ‘beyond adaptation,’ i.e. Loss and Damage.

Inadequate institutional and financial frameworks to deal with Loss and Damage are considered to imply important challenges (Lopez-Carr and Marten-Kenyon 2015). This becomes clear throughout the Arctic examples, albeit mainly from North America (Alaska) that highlight the need for new governance mechanisms and institutional frameworks to tackle climate change. One problem is, that sometimes not all types of impacts are included in jurisdictional frameworks. For example, in case of (climate change related) disaster mitigation, Bronen and Chapin III (2013) think that one factor considering gaps in post-disaster and hazard mitigation statutory framework is erosion. Even though it is one of the most significant climate change related hazards in the region, it is not included in the official lists of major disasters, such as in the Stafford Act in the US. Shearer (2012) studied climate adaptation assistance in Kivalina, Alaska and found that indigenous communities face intra-national inequalities while not receiving adaptation assistance, which is only available to formal state actors. Another problem is insufficient allocation and availability of financial resources. Bronen and Chapin III (2013) also found that resources are allo-

cated for rebuilding homes as part of the post-disaster recovery measures only in their current location, not in a new location. This creates a problem if the land is lost for good, such as in the case of coastal erosion or sea level rise (see also Bronen 2015). Full integration of hazard mitigation planning into comprehensive risk assessments is considered expensive, and time intensive. Also, allocation of funding is based on cost-benefit ratios which means that for example Alaskan communities, such as in Newtok cannot compete for hazard mitigation funds due to their remote location and low population density, which equals to high costs and low benefits (Bronen and Chapin III 2013). These kinds of barriers (more examples in Table 18.2) represent drivers of Loss and Damage because they hinder implementation of adaptation.

They act as limits to adaptation and can thus lead to Loss and Damage because they prevent communities from taking action. Interpreted in this way, Loss and Damage can arise not only from climate impacts per se, but also from the socio-economic constraints that hinder adaptation of local communities.

In the next subsection, we present examples of relocation and outmigration in the Arctic showing examples when adaptation in situ is not possible and leads to (forced) relocation and outmigration and can cause societal and cultural Loss and Damage. These examples provide evidence that with insufficient institutional, organisational and jurisdictional support relocation and migration actions cannot be considered as adaptation.

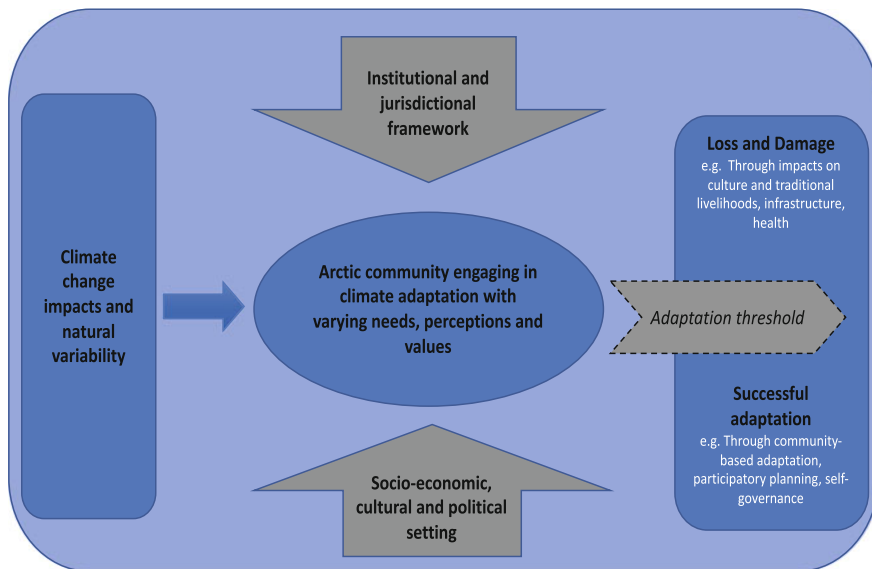


Fig. 18.2 Institutional and jurisdictional framework, as well as socio-economic, cultural and political settings affect adaptation threshold of Arctic communities, and can be drivers of Loss and Damage

Table 18.2 Examples limiting Arctic communities to adapt to climate change

Examples preventing adaptation or leading to negative consequences of adaptation actions	Author (publication year)
Inadequate institutional and financing mechanisms such as federal funding procedures for disaster prevention and recovery	Bronen (2015)
Disabilities to determine and evaluate when preventive actions needed	Bronen (2015)
Slow implementation of actions or statutory and institutional barriers in implementation	Bronen (2015)
Lacking governance framework for the evaluation of risks and impacts	Bronen (2015)
Government funding does not reach Arctic communities	Lopez-Carr and Marten-Kenyon (2015)
Inequity and injustice related to current actions	Kingston and Marino (2010)
Mis- and under-representation of local voices in political arenas	Marino (2012)
Lack of adaptation assistance when only available for formal state actors	Shearer (2012)
Inadequate accommodation of climate change scenarios into disaster risk protocols	Marino (2012)
Unclear responsibilities of government or lacking government body to implement actions	Shearer (2012)
Lack of preventive disaster programs and funds	Shearer (2012)
Missing international support regarding capacity building for adaptation actions	Marino (2012), Shearer (2012)
Traditional and indigenous knowledge not considered in planning actions	Shearer (2012)
Lacking networks of multiple and diverse organisations to build adaptive capacity and balance between different interest groups	Bronen (2015)
Migration strategies not considered in disaster risk reduction and adaptation programs	Dengler et al. (2014)
Difficulties to monetise loss of health and social cohesion	Dengler et al. (2014)
Unclear or inadequate allocation of funding for disaster mitigation (for example, erosion not included, although it can be one of the most significant hazards in some regions)	Bronen and Chapin III (2013)
Full integration of hazard mitigation planning into comprehensive risk assessments is considered too expensive and time intensive	Bronen and Chapin III (2013)
Allocation of funding often based on cost-benefit ratios which leaves out remote communities with low population densities (seen as high costs and low benefits)	Bronen and Chapin III (2013)

18.4.1 Relocation and Outmigration as Adaptation or Part of Loss and Damage?

At the moment, it is yet unclear to whether relocation is considered to be an adaptation measure and thus it would be integrated in states' adaptation strategies, or whether it is something that needs to be undertaken separately when impacts are beyond adaptation, i.e. part of the Loss and Damage agenda. As can be seen from above, many Arctic regions are highly vulnerable to climate change and there are places where adaptation is not possible for local communities. However, they are forced to abandon their livelihoods and traditional residential areas due to increased risks and lack of governance mechanisms and resources to manage risks. Bronen (2015) argues that nation states are required to protect vulnerable populations from climate change impacts within its jurisdiction. But the literature reveals that nation states have often failed to do so: relocation is considered a massive challenge for governments. Our review shows that both perspectives on relocation can be found in the literature. Relocations due to colonisation and natural disasters have been experienced in the Arctic throughout the history, but now climate change also plays a more intense role as a driver of relocations and outmigration. Several studies have found that independent of the drivers of change, relocations will have effects on culture, and maintenance of tradition. We illustrate the challenges of relocation by presenting an example from the Alaskan village *Kivalina*, see Box 18.1.

Similar issues have been experienced in the other Alaskan regions *King Island* and *Shishmaref*, that are also at risk of climate change and need to consider relocation. Relocation can also lead to a sense of loss of place and have emotional impacts as found in the study based on King Islanders' experiences (Kingston and Marino 2010). In the case of Shishmaref, Marino (2012) found that colonial history and historical inequity is linked to contemporary exposure to hazards and vulnerability of climate change. The author also identified mis- and under-representation of local voices in political arenas to discuss relocation planning. According to Bronen (2015), permanent relocation can be considered as one adaptation strategy only if culture and traditions can be secured in the long-term, so the implementation of it requires new governance tools. Currently existing institutional mechanisms are often considered inadequate and unable to determine when preventive relocation is needed and how it should be organised (Bronen 2015; see Box 18.1). Some disaster risk reduction and adaptation programs do not necessarily consider migration strategies at all (Dengler et al. 2014). Given that it appears that existing mechanisms, i.e. adaptation, is insufficient, one could label this as part of Loss and Damage.

Box 18.1 Why is community relocation so challenging: Example from Kivalina, Alaska

Kivalina is a village in the Northwest Arctic Borough in Alaska, the United States. It has about 400 inhabitants (mostly Inupiat) that are now being forced to relocate due to risks of rising sea levels and coastal erosion and also impacts of permafrost thaw and heavy snowstorms (Gregg 2010; Washington Post 2015; NOAA 2017).

The village has been planning relocations for 20 years already, detailed in the Kivalina Relocation Master Plan published in 2006. Despite this, potential relocation options have not been considered suitable, due to high costs, social and cultural objections or because the sites under discussion are geotechnically inappropriate (Gregg 2010). Efforts to respond to climate impacts through adaptation have been made: such as building a rock revetment to postpone the relocation in 2010. The decision on relocation is to be made in the upcoming decade (NOAA 2017). Difficulties in financing relocation is a common problem. In Kivalina, relocation has been estimated to cost between 95 and 125 million US dollars (IAW 2009 cited in Lynn and Donoghue 2011).

The Alaskan ecosystem services-based communities have been able to adapt to changing conditions in the past, but institutional, financial and political barriers have hindered local communities to participate in decision-making—examples of these are lacking government agency in charge of relocation, and funding allocated to disasters (e.g. for rebuilding) but not for relocation (ADN 2016).

Forced relocation can lead to cultural damage, such as loss of traditional livelihoods (Lynn and Donoghue 2011). It is hard to put a price to cultural loss, but efforts have been made to maintain the culture and traditions of Kivalina residents, despite relocation. This is done, for example, by creating projects that enable the communities to share thoughts about local ways of life and locate, connect and educate new relocation partners and networking with global community to shape the discourse on climate displacement (see: www.relocate-ak.org).



Fig. 18.3 Risk and Indigenous Peoples in Alaska

In the following examples from the literature, insufficient allocation of funding is driving Loss and Damage. Lopez-Carr and Marten-Kenyon (2015) studied management of climate-induced resettlements in the United States' territory of the Arctic and found that although governments have spent considerable amounts of money on erosion control nationally, funding has not reached the Arctic communities. Also in the case of Kivalina, financing coastal erosion protection has failed, and at the same time tens of thousands of people in Alaska's native villages are under threat due to damages to water supply and waste-storage systems that affect food and water security (ibid.). Whether the discussion is about climate refugees or climate migrants, there is a need for an effective institutional framework to reduce bureaucracy to allocate resources, access funding and provide technical assistance at the community level (Dengler et al. 2014).

In countries like the United States, governments have resources for disaster preparedness, insurance payouts and infrastructure repairs, but there is no governance framework to evaluate climate change risks and impacts and the needs for relocation actions (Bronen 2015). Dengler et al. (2014) state that lacking access to finance creates one of the main constraints for communities to take action and leads to inability to take lead on disaster risk responses. For example, building of new infrastructure, which is considered very costly especially in remote locations such as in the Arctic, is difficult. Sometimes resources are being allocated to technical solutions rather than solutions where potential and obstacles for organised relocation, and other measures are considered more holistically and sustainably, as revealed by the literature review.

Other challenges are the difficulties to monetise loss of health or social cohesion, and excluding indigenous knowledge in planning of disaster risk and adaptation schemes. Furthermore, inequity and injustice in climate risk governance characterise Loss and Damage from climate change. This is already known from developing countries experience (see chapters by Wallimann-Helmer and Serdeczny 2018).

18.5 Concluding Remarks

In this chapter, we reviewed the Arctic risk, vulnerability and impacts literature in order to find evidence that losses and damages are distributed across very different geographical areas and affect vulnerable communities in the Arctic as well. The role of the Arctic has changed due to climate change: enormous resources have become available and land and sea transport has become easier due to less ice and snow, and better technology to access the areas and natural resources (oil and gas, and minerals, for instance). The Arctic has become a common good, serving various needs of the global community. But Arctic indigenous communities are among the least responsible for climate change and they are facing harm caused by economic developments, those that are mainly driven by climate change directly, and indirectly by easier access to natural resources at the same time, leading to environmental and social impacts (Maldonado et al. 2013).

Why should we include the Arctic region in the Loss and Damage debate? One answer is that if socio-economic indicators were compared between Inuit regions and Small Island Developing States, also many of the Inuit regions would be considered as “developing” regions and should gain assistance from the UNFCCC for instance in form of an international fund (Ford 2009). In Kivalina, Alaska, the communities are considered as first victims of climate change, facing also migration pressures and displacement, which can lead to political instability, and cultural loss, similar to examples from developing regions such as the Maldives (Wolsko and Marino 2016). Because of direct impacts and relocations, other, indirect impacts have increased, such as post-traumatic disorders affecting health and wellbeing. Even though the people can survive disasters by relocation, there are still differences between individuals regarding how well, if at all, they can adapt, due to differences in health, cultural integrity and sense of place (ibid.) Although sometimes seen as an adaptation strategy, outmigration has caused problems because young generations are “pushed” away from their land, and traditional livelihoods are eroding (Himes-Cornel and Hoelting 2015). In other cases, such as shown in Newtok, Alaska, relocation planning has been going on for so long that one generation has experienced it, but still it has not lead to implementation of relocation actions (Bronen and Chapin III 2013). The case of Kivalina shows clearly that, although the community is located within a developed country, it is vulnerable, but it is not getting the assistance it would need from the state and internationally. There are examples showing that, once relocated, there is no turning back. This is when the land has been literally lost due to sea level rise, for example.

As found in many local studies from the Arctic, the current institutional and financial frameworks are insufficient to tackle the consequences of climate risks and impacts, leading to Loss and Damage. Furthermore, inclusion of local communities in planning and decision-making is lacking (Marino 2012; Lopez-Carr and Marten-Kenyon 2015). It is also problematic that indigenous communities are not always considered as part of nation states and thus, do not enjoy the same rights as the general population, which raises questions around ethical aspects (see Huggel et al. 2015). We found several legitimacy and justice issues that support our argument that Arctic Loss and Damage should be discussed in the international climate policy arena. This includes (re-) interpretation of human rights principles, identification of roles and responsibilities, liability, and compensation mechanisms, as well as a need for international institutional support to reduce limits to adaptation. There is a lack of a proper international institutional framework and lack of local capacity to organise relocation (e.g. Dengler et al. 2014; Maldonado et al. 2013). On the other hand, forced relocation is one consequence of weak risk governance mechanisms, but relocations represent actions that could be supported nationally and internationally to respond to climate risks if guided by international actors and implemented by Arctic communities themselves, who have the local knowledge to reduce negative consequences to culture and society.

Lack of financial resources is one of the main factors why relocation or building new infrastructure cannot be implemented. The costs of relocation or rebuilding and new technology in the Arctic are very high considering the remote location and other

construction-related difficulties. Furthermore, some indigenous communities do not even have cash economies. Although economic losses have been calculated for Arctic villages and cities, and adaptive climate cost models have been created (e.g. Chinowski et al. 2010) regarding damages to physical assets such as infrastructure (e.g. Larsen et al. 2008; Chinowsky et al. 2010), more information on costs of relocations, health impacts and especially non-economic losses is needed (Roberts and Andrei 2015). In addition to financial and technical issues the remaining question is social justice: how to maintain viability of the communities and how viability is actually perceived by different communities (Sejersen 2012).

According to Duyck (2015a, b), the UNFCCC has not yet considered Arctic vulnerability issues in the international debate on Loss and Damage, and this was still the case in 2018. Thus, the responsibility of Arctic states themselves should be clarified: they should make sure the voices of Arctic vulnerable communities will be heard and communicated in international climate policy negotiations. Also, Arctic States and the Arctic Council should clarify and improve their national communications and the statements from ministers at UNFCCC deliberations. So far, Arctic states have not sufficiently considered Arctic Loss and Damage issues, and the Arctic Council has not been represented sufficiently in the Arctic states' documents and statements presented to international bodies (*ibid.*).

Based on the empirical evidence of Arctic literature, we consider that the international Loss and Damage debate should include the Arctic as an example when considering what “vulnerable” and “dangerous climate change” means and what should be taken into account when trying to reduce vulnerability. For example, non-economic losses and ways to measure these are also relevant to the Arctic, such as loss of sense of place and belonging (Roberts and Andrei 2015), and loss of culture and traditions, but they are not adequately considered in the current international Loss and Damage debate. If the international human rights principles lense were to be used to define the vulnerable, then violations of these rights regarding Arctic indigenous communities would be evident, based on the results of our literature review. More in-depth local level studies are needed to examine in detail what is perceived as “dangerous climate change”. According to Sejersen (2012), the ways Arctic societies perceive transformations in society and seek for opportunities to adapt to change are very heterogeneous; this is owing, among others, to different histories of colonialism or different types of livelihoods practiced in the Arctic, but also due to different values and perceptions, as well as cultural backgrounds.

Under the conditions of rapid change in the Arctic, current institutions and government mechanisms are not found sufficient to deal with these multiple challenges and dynamics of change: climate change, deterioration of environment, pressure of new industries and businesses entering the Arctic region, and intra- and inter-generational changes for example when outmigration causes unbalanced age and gender populations in remaining communities. Furthermore, the climate refugee problem can first be seen locally (local responsibility to tackle with), but it will have international consequences (global responsibility) and needs international attention and rethinking of relocation policies.

It has been argued that in order to understand limits to adaptation, the traditional instrumental and management-oriented view of adaptation in social systems should be revisited (Sejersen 2012). Nowadays, climate change is used as a platform to address issues of justice, development and self-determination, which are issues already known from the past, where, however, scales, causations, and agency differed as pointed out by Sejersen (2012). In case of adaptation (whether due to climate change or other changes), the focus is on moving from “how to adapt”, to “who to become” when adapting (ibid:195). One question should be added to this list: what happens ‘beyond adaptation’? But what these changes and impacts of climate change in the Arctic mean globally is still unknown to many. What we know is that more knowledge and resources to deal with climate change impacts faced by vulnerable communities is needed and learning from the Arctic could be a forerunner case for the international debate on Loss and Damage.

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