Environmental Science and Policy 85 (2018) 90–100

Contents lists available at ScienceDirect

Environmental Science and Policy

journal homepage: www.elsevier.com/locate/envsci

Climate-related displacements of coastal communities in the Arctic: Engaging traditional knowledge in adaptation strategies and policies

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ARTICLE INFO

Keywords:
Arctic
Climate change
Climate migration
Displacement
Traditional knowledge

ABSTRACT

Climate change impacts lead to alterations in migration patterns and the displacement of exposed native communities and peoples in the Arctic region, forcing them to leave their homes and traditional ways of life as a result of rapid local ecological changes. This paper illustrates climate-related displacements and subsequent relocation as extremely complex processes, and proposes traditional knowledge as a relevant source of knowledge both at local level and policy making spheres.

The main conclusions are that the representation of indigenous peoples in international governance structures does not guarantee that traditional knowledge is entirely engaged in evidence-based policy making and that traditional knowledge is not always valued as an equal source of knowledge by some relevant scientific bodies. In this context, changing the approach towards a knowledge-systems-based framework would contribute to the development of more concrete policies and strategies for adaptation of Arctic native communities.

1. Introduction

While global consciousness of the effects of climate change is increasing within the general public, the impacts on small communities at the local level remain less well known. Among these impacts, the displacement phenomenon is one of the consequences of rapid ecological changes. This paper analyses studies of the vulnerability of traditional coastal communities under risk of displacement in the Arctic region. It aims at identifying opportunities and pathways to engage local native communities in policy-making processes, and assessing the potential of traditional knowledge to mitigate those impacts.

The Arctic region is not homogeneous; there is a large variety of cultural, historical, and economic backgrounds among the groups and local communities (Koivurova et al., 2008), and although natural and human environments in the region have their own specificity, they share a common circumstance: a potential vulnerability condition, but also a significant resilience capacity. The effects of climate change threaten biodiversity, local economies, and social and cultural systems of the region, posing serious challenges to their sustainability.

Throughout human history, migration and displacement have been recurrent phenomena and have periodically occurred around the globe due to several factors (Kelman and Næss, 2013), such as colonisation (Armstrong, 1978), conflicts (Park, 1928; Wood, 1994; Ibáñez and Vélez, 2008; Czaika and Kis-Katos, 2009), sovereignty claims (Dauvergne, 2004), and development projects (Stanley, 2004; Vandergeest et al., 2010; Penz et al., 2011), among others. Migration refers to the geographical movement of people in order to improve quality of life (Benson and O'reilly, 2009; Castles et al., 2013), while displacement has been defined in varying ways. Displacement is forced, involuntary, and highly adverse to affected peoples (Cernea, 2003), including physical, economic, and social exclusion (Cernea, 2005). Other authors consider displacement a phenomenon conceptually and morally distinct from the loss of economic or resource use rights (Agrawal and Redford, 2007); But as Mascia and Claus (2009) point out, in order to understand the full empirical and ethical dimensions of the displacement phenomenon, it is critical to consider the disempowerment of peoples and groups who lose rights and the empowered ones who gain rights. In practical terms, when severe impacts to individuals and communitites' lives are inevitable and irreversible, affected communities are forced to abandon their homes and ways of life.

According to Terminski (2012, p. 39) it is fair to distinguish the general category of *environmental migrants* from the more specific and subordinate category of environmentally displaced people. Environmental migrants are "persons making a short-lived, cyclical, or longer-

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https://doi.org/10.1016/j.envsci.2018.04.007
Received 7 March 2018; Received in revised form 6 April 2018; Accepted 7 April 2018

term change of residence, of a voluntary or forced character, due to specific environmental factors". Environmentally induced displacement is applied to "persons compelled to spontaneous, short-lived, cyclical, or longer-term changes of residence due to rapid or gradually-worsening changes in environmental dynamics critical to their subsistence, which may be of either a short-term or irreversible character".

These definitions provide a general framing of the causes of climate-related migration and displacements. They seem to suggest that whilst environmental changes may lead to important impacts on local communities, forcing them to abandon their homes, displacement phenomena are also influenced by governance and social issues related to policy and decision-making processes. In the reminding of this paper, we will first examine climate related displacements in Arctic as depicted in literature, the engagement of communities potential to address those displacements, and the level of integration of traditional knowledge into scientific and policy processes; finally, based on this literature review, we offer a set of recommendations and proposals which encourage the value of this body of knowledge.

2. Climate-related displacements in the Arctic

Environmental hazards and chronic environmental degradation due to climate change are potential sources of displacement and migration (Swain, 1996; Raleigh et al., 2008), particularly in territories of high social and ecological vulnerability, such as island territories (Kelman, 2018) and remote regions, including the Arctic.

2.1. Impacts on small coastal communities

The impacts of climate change on Arctic coastal zones could have potentially both positive or negative effects (see Table 1). For instance, the reduction of sea ice thickness might facilitate access to marine resources, as well as, increase coastal erosion affecting stability of infrastructures and cultural heritage sites (Couture et al., 2002). In fact, the alteration of terrestrial and marine ecosystems may imply changes in marine resource availability, and since scientific assessment methods for data collection in fisheries science are not fully certain, there is a high level of uncertainty in, among other areas, further stock assessment actions.

Effects of climate change include socio-environmental impacts such as the increase of risks on food security due to uncertain changes in species distribution and availability; impacts on infrastructure, including schools, hospitals, various types of buildings and structures; and facilities, such as roads, railways, airports, pipelines, harbours, power stations, and power, water, and sewage lines (ACIA, 2005). Residents of many Arctic communities commonly drink untreated water directly from a variety of natural sources, including lakes, streams, and rivers in summer, and from lake ice, icebergs, snow, and multi-year sea ice in winter (Nickels et al., 2005; Martin et al., 2007; Daley et al., 2015).

These environmental changes have impacts on the social system. In other regions, displacement and loss of access to common natural resources are closely associated with social disarticulation, landlessness, loss of identity, increased morbidity and mortality, and marginalisation (Cernea and Schmidt-Soltau, 2003).

For instance, the loss of permafrost due to climate warming has already caused impacts in ecosystems and communities through collapse of roads and buildings as the ground becomes unstable (Schaefer et al., 2012). Millions of people live in the permafrost area, including in three large cities built on continuous permafrost (see Fig. 1). These cities would most likely transition to the discontinuous permafrost zone with 2 °C of warming (Chadburn et al., 2017), putting their infrastructure at risk of collapse in the coming decades as the ground becomes weaker.

When these impacts are highly intense and irreversible, relocation becomes a critical consequence and a vital decision for affected local communities. Relocation has been defined by Bronen (2010) as a process whereby livelihoods, housing, and public infrastructure are reconstructed in another location and may be the best adaptation response for communities whose current locations become uninhabitable or vulnerable to future climate-induced threats. Therefore, changes in the ecological system seriously affect the sustainability of these communities inducing displacements (Ferris, 2013), and if these impacts are not correctly mitigated, complex processes of relocating entire communities might become a reality in many Arctic coastal areas.

2.2. Relocation events: an overview of the case of Alaska native villages

According to Petz (2015), planned relocation occurred in the context of three types of situations:

I In anticipation of disasters, environmental change, and/or the effects of climate change;
II As a response to disasters, environmental change, and/or the effects of climate change; and
III As a consequence of measures related to climate change adaptation or disaster risk reduction measures.

Including islands, Alaska has 33,904 miles of shoreline; from these, approximately 6600 miles – 19.5% of the total coastline area – and many low-lying areas along the state's rivers are subject to severe flooding and erosion. Most of Alaska's native villages are located on the coast or on riverbanks. In 2003, the US Government Accountability Office (GAO) reported that flooding and erosion affects 184 out of 213, or 86.4 percent, of Alaska native villages to some extent (GAO, 2003).

Rising temperatures in recent years have led to widespread thawing of permafrost, causing village shorelines and riverbanks to slump and erode, threatening homes and infrastructure. Rising temperatures also affect the thickness, extent, and duration of sea ice that forms along the western and northern coasts. The loss of sea ice leaves shorelines more vulnerable to waves and storm surges and, coupled with the thawing permafrost along the coasts, accelerates the erosion threatening the villages. In addition, the loss of sea ice changes the habitat and accessibility of many of the marine mammals that Alaska natives depend upon for subsistence (Mittal, 2009).

The US Government Accountability Office reported that 31 communities were severely threatened by flooding and erosion, and 12 of them were identified as "at imminent risk" (GAO, 2003) and decided to relocate – in part or entirely – or to explore relocation options (Fig. 2). The villages of Kivalina, Newtok, Shaktoolik, and Shishmaref face the most imminent threat (GAO, 2003; Bronen, 2008). In these cases, survival in and of the settlements is unlikely, and residents have begun to actively seeking the opportunity to relocate (GAO, 2009).

According to Mittal (2009), limited progress has been made on relocating the 12 villages severely threatened by flooding and erosion since only one, Newtok, has made significant progress. For several of these communities, there is limited comprehensive information about climate-related threats to community habitability and the options to prevent community displacement (Ferris, 2013).

Relocation is a complex issue since it implies several impacts, different actors, and high levels of uncertainty. Forced relocation and inadequate governance mechanisms and budgets to address climate change and support adaptation strategies may cause loss of community and culture, health impacts, and economic decline (Maldonado et al., 2013). While these communities are weighing relocation options, the environmental impacts continue putting in risk their livelihoods.

Following the report made by the US Government Accountability Office (GAO, 2009), relocation efforts have not achieved the expected results due to several complications. For instance, the economic cost estimates for relocating Kivalina range from $100 million to over $400 million (GAO, 2003), and governance deficiencies are highlighted by the difficulty in reaching consensus to relocate when exploring options