

CLIMATE AND CULTURE

Multidisciplinary Perspectives on a Warming World

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At the Frontline or Very Close
*Living with Climate Change on St. Lawrence Island,
Alaska, 1999–2017*

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8.1 Introduction

As the planet's climate keeps changing and triggers rapid transition in many terrestrial and marine habitats, some places are visibly altering faster than others. The Arctic, the world's northern polar region, is one such place where the pace of environmental change is twice the global average (Larsen *et al.* 2014; Richter-Menge *et al.* 2016; Taylor *et al.* 2017). Since the 1990s, the Arctic has often been called the 'canary in the coalmine' of global warming and, together with certain other habitats, such as low-lying tropical islands and high mountain areas, has received a high level of scholarly and public attention (Orlove *et al.* 2014). And yet, even across the Arctic, some areas are known as 'frontlines' for their exposure to particularly visible impacts of climate change, such as coastal erosion, flooding, sea ice retreat and permafrost loss.

Alaska, the only Arctic state of the United States, is one of these climate change 'frontlines'. During the past fifty to sixty years, it has warmed more than twice as quickly as the rest of the US territory (Chapin *et al.* 2014:516). Changes to the Alaskan environment are highly visible as the ongoing warming of the land surface and rising ocean temperatures have diminished sea ice and extended the ice-free season, increased the incidence of storms and summer fires, pushed the northward advance of tree and shrub vegetation and brought about shifts in ranges of terrestrial and marine species (Shulski and Wendler 2007; Wood *et al.* 2015; Druckenmiller *et al.* 2017; EPA 2017; Taylor *et al.* 2017). Yet even within the State of Alaska, certain locations are particularly vulnerable to the impacts of warming. For example, a recent US Army Corps of Engineers (2009) study identified twenty-six Alaskan communities that should be considered for immediate action to mitigate the negative effects of climate change.

The notion of increased climate vulnerability is commonly attributed to small communities in the Arctic and elsewhere that are short of economic and financial resources and developed infrastructure (Ford and Smit 2004; Hovelsrud and Smit 2010; Himes-Carnell and Kasperski 2015; McDowell *et al.* 2016; Ristrophe 2017). Many of these communities are situated along the western and northern Alaskan shorelines, where exposure to the progressively ice-free ocean, severe storms and floods and coastal erosion threatens local economy and daily life. This chapter tells the story of what it means to live in a small Alaskan community ‘at the frontline’ of climate change, for two decades and counting. It is based on data collected in two Native villages, Savoonga and Gambell, on the remote St. Lawrence Island in the northern Bering Sea during 1999–2017. The research started when Arctic climate change was still a novelty anxiously debated by local residents (Huntington 2000; Krupnik 2000), yet cautiously approached by climate scientists, who were uncertain about the warming trend (Serreze 2008/2009). Since then, the perspectives of both climate scholars and Native Alaskans have transitioned from initial puzzlement to widespread agreement on the rapid pace of change and to acceptance of a ‘new normal’ (Sheffield Guy *et al.* 2016) in both natural and social domains.

My early research on St. Lawrence Island in 1999 was a collaborative study of its indigenous history and heritage (Krupnik *et al.* 2002). Shortly after it started, a local man suggested that I switch its focus when he stated, ‘Don’t you see that we have other things that bother us more than your “grandfathers” stories?’ When asked what really bothered local people he responded that ‘Something strange is happening to our environment.’ Soon after, we launched a collaborative effort to document local knowledge about the changing ice and weather conditions on the island (Krupnik 2002; Oozeva *et al.* 2004). That pilot study produced a starting baseline to assess how people observed and internalised rapid environmental change in the late 1990s, when it was already a matter of concern in many places across the Arctic (McDonald *et al.* 1997; Ford N. 2000; Fox 2002; Jolly *et al.* 2002; Krupnik 2000; Krupnik and Jolly 2002; Nickels *et al.* 2002).

Throughout the 2000s we kept documenting local response to sea ice and weather change on the island (Krupnik 2009; Krupnik *et al.* 2010). Other scientists working on scores of collaborative studies of people’s environmental knowledge, climate observations and the use of subsistence resources confirmed that climate change remained high on local agendas (Noongwook *et al.* 2007; Huntington *et al.* 2013; Gadamus and Raymond-Yakoubian 2015; Rosales and Chapman 2015). Hence, a recent visit to the island in February 2017 offered a chance to record several interviews with local residents and to assess how Arctic warming, now in its third decade, has affected people’s activities and their sense of belonging.

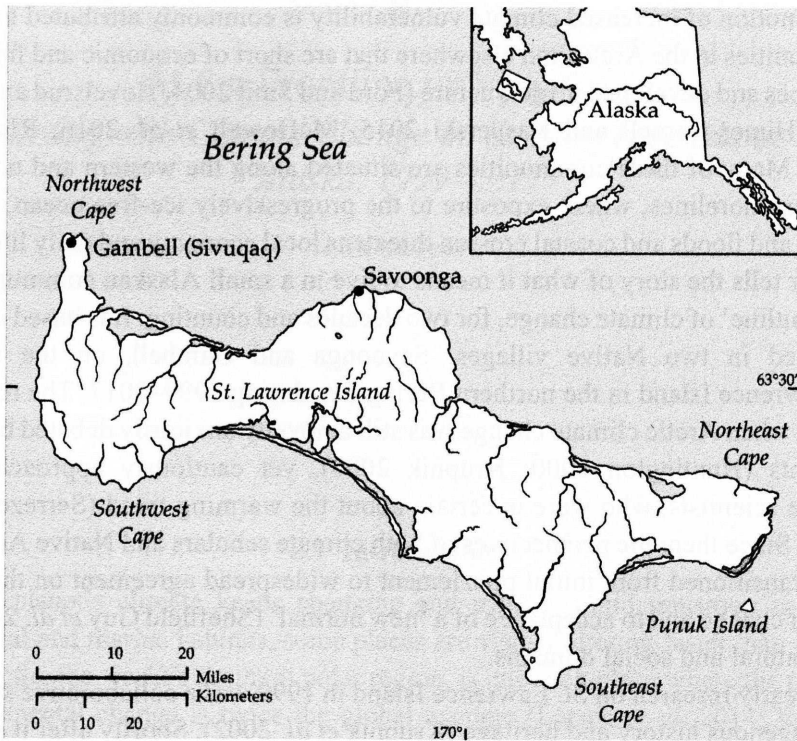


Figure 8.1 Map of St. Lawrence Island and the Bering Strait area (produced by Marcia Bakry, Smithsonian Institution)

8.2 Savoonga: A Story of Change, 1999–2017

The native village of Savoonga (*Sivungaaq*, in St. Lawrence Yupik) is a small town of 700+ residents located on the northern shore of St. Lawrence Island facing the Bering Sea. It takes an hour-long flight by small plane to cross the 200 miles separating Savoonga from the mainland hub of Nome (Figure 8.1) (population 3,800; 2016), which has most of the economic, institutional and administrative facilities serving the larger northern Bering Sea-Bering Strait region. A twenty-minute flight connects Savoonga to Gambell (Yupik name, *Sivuqaq*), a sister community of the same size at the north-western edge of St. Lawrence Island facing the Russian Chukotka Peninsula 58 km (36 mi) away. In both Savoonga and Gambell, 95 per cent of residents belong to a group called the St. Lawrence Island Yupik, with deep historical ties to the Yupik people on the Asian side (Krupnik and Chlenov 2013). The two towns are closely related and share the same language and identity. About 400–500 Yupik people with their roots in Gambell or Savoonga now reside in Nome, Anchorage, elsewhere in Alaska and across the continental United States.



Figure 8.2 New public buildings in Savoonga, with the recently erected wind turbines in the background. Photo by Igor Krupnik, February 2017

Stepping off the plane in February 2017, it was hard to miss how profoundly Savoonga had changed in the eighteen years since my first visit. It is now a bustling town with signs of a construction boom – a new large high-school, a new well-stocked village store, rows of modern family homes and administrative buildings with several offices, recently erected wind turbines at the edge of town and many other structures (Figure 8.2). It looks as if Savoonga has gradually moved away from its historical centre of gravity built in the 1930s along the ocean front (Figure 8.3) to higher ground about half a mile inland. Because of that, its vulnerability to the forces of the ocean, such as floods, large waves brought by powerful storms and the crushing impacts of the piling ice, has diminished. However, that slow migration farther inland took place not as a thought-through adaptation, but rather because it was the only direction in which the town could expand. Savoonga leaders talk about the next round of construction farther away from the beach, where a few aging private houses still remain.

Savoonga is intense, crowded and friendly – as it has always been in people’s memories. Much of the personal interaction takes place in the street, where on a cold winter’s day residents move around on four-wheelers and snow machines. This creates an atmosphere of one big family, which rests well with the history of the community formed a century ago by a tightly related network of nomadic reindeer herders’ camps (Krupnik *et al.* 2002). In that sense, Savoonga has preserved its social core, despite its increasingly modern face.



Figure 8.3 Savoonga ‘traffic jam’. People’s four-wheelers parked next to the public building during community meeting. Photo by Igor Krupnik, February 2017

8.3 Northern Bering Sea Record: 2000–2017

Since the people of St. Lawrence Island first reported changes in their home environment in the late 1990s (Krupnik 2000, 2002; Pungowiyi 2000), the habitats of the northern Bering Sea have been visibly transformed by the forces of Arctic warming. The change has affected all seasons but it is most pronounced from October until May each year, a period that has historically featured temperatures well below freezing and extensive, if not always persistent, sea ice cover (Oozeva *et al.* 2004; Krupnik *et al.* 2010; Ray *et al.* 2016). Today, the fall freeze-up takes place almost two months later and the spring breakup occurs a full month earlier than in the 1980s and 1990s. Since the start of the era of the satellite observations in 1979, the number of days without *any* sea ice in the northern Bering Sea has increased by eighteen days per decade, adding almost three and a half months of open water (Frey *et al.* 2015; Wood *et al.* 2015; Druckenmiller *et al.* 2017).

A longer ice-free season means warmer air and ocean temperatures, more unstable weather, stronger waves and winds and fewer of the quiet cold days that are favoured by hunters. In 2008, a local hunter explained that it was now ‘not cold enough’ in the winter to build good-quality, solid ice. In the early 2000s, hunters started to complain that the ice was not safe anymore, that it had become ‘flimsy’, and was not good for animals to use and hunters to walk on (Oozeva *et al.*

2004; Krupnik *et al.* 2010). Since then, several independent studies have confirmed that the ice, wind and weather regime around St. Lawrence Island and, more widely, in the northern Bering and southern Chukchi Sea has been profoundly altered since the early 2000s, corroborating local observations (Kapsch *et al.* 2010; Huntington *et al.* 2013; Frey *et al.* 2015; Wood *et al.* 2015; Ray *et al.* 2016; Huntington *et al.* 2017).

Overall, change in the northern Bering Sea environment over the past two decades has been visible, massive and indisputable. Climate and ocean warming, a novelty in the late 1990s, is now a fact of people's lives that they have to cope with. They hardly question the general forces that have caused this environmental shift, and there are no climate change 'deniers' on the island, at least none that I met in 2017.

8.4 Talking Change in Savoonga

The winter of 2017 has been, again, a remarkable season in a string of several remarkable seasons and years, one after the other. The sea ice did not form in front of Savoonga until mid-to-late January, at least a full month later than in the early 2000s. The thin sliver of shore ice was visible by mid-February but was considered to be unstable and constantly shifting. The new ice that formed in February 2017 was what people call 'local ice', as this was built up by the freezing of local slush ice rather than the winter pack ice, which never arrived from the North. In fact, the winter pack ice stopped coming in the early 2000s. This local ice was barely 5 cm thick, and it was dangerous to walk on it. In Gambell, the town had very little shore-fast ice by mid-February, something that people are now well familiar with.

There was also little snow by mid-February, not including the packed cover within town limits. Snow covered the ground very late that year, perhaps a full month later than in the 2000s. When the ice finally formed off Savoonga by the end of January 2017, it was to stay for less than three to four months before breaking up in late April or May the following year. Thus, it was neither 'cold enough', as in the 2000s, nor 'long enough' to build solid winter ice that people and animals rely on.

In many focused and spontaneous talks with people in Savoonga and Gambell in winter 2017, change was on everyone's mind, but more as a matter of curiosity, often of bewilderment. It looked as if everybody could speak about the warming climate at a moment's notice, yet often with the kind of amusement that might mask people's true concerns:

The ice condition [this winter] is very troubling. We didn't have any ice here till late January, almost till early February. Then it finally piled up, but this ice is thin, not good. It is also moving and keeps piling up. It is no good for hunting or ice fishing. And it is built very late in the season; so, it doesn't have much time to grow to get thicker.



Figure 8.4 Gambell beach zone showing little snow and almost no ice in the middle of winter. It has become a typical condition in the past few years. Photo by Igor Krupnik, February 2017

People keep saying that there is no good ice around the island and it scares me. Hunters killed two walrus lately, right in front of the village and they couldn't butcher them on ice, like normally, because the ice kept breaking. So, they had to pull them all the way to the shore and butcher them onshore, which is kind of strange to us in the middle of the winter. (Savoonga, February 14, 2017)¹

Savoonga residents were well aware that the ice in front of their town was perhaps the *only* ice around and that open water or loose floating ice surrounded their island on all sides. This meant there was no place to go for good winter hunting. None of the usual groups of winter male walrus, *angleghaq*, that live on dense solid ice and that people relied on in the olden days were spotted. The two walrus killed off Savoonga in early February were 'stranders', animals separated from the main group that remained beyond hunters' reach. Instead, Savoonga residents woke up one morning in January to find a stranded sea lion on the beach. It was trapped by the forming ice and had nowhere to go; it was eventually killed despite people's

¹ To preserve speakers' anonymity, only the date and the town where the interview was recorded are listed henceforth.

effort to chase it back into the water. Sea lions are familiar to St. Lawrence Islanders, but they are usually present in October and leave by November or early December, before the arrival of the moving ice from the North. Seeing a sea lion in mid-January – and no walrus – was another sign of Mother Nature going ‘wild’.

With walrus nowhere to be found, bowhead whales are now abundant off the island in mid-winter, when they are supposed to be hundreds of miles south, closer to the southern edge of the pack ice in the Bering Sea. Island residents believe that, because of weaker ice and more open water, bowhead whales stopped going south to their usual habitat:

With bowhead whales, . . . they are being seen in increasing numbers and many are now overwintering here . . . There is plenty of open water for them. The ice is thin now and they can break it easily.

Also, between here [Gambell – IK] and Russia there is a large polynya, called *kelligh-eneq* in our language. It used to be only seasonal, usually in the month of May, but nowadays it is a permanent fixture. . . . That is where the whales are wintering now, especially the young ones. But the older ones with very young [females with newborns] still like to go down south. (Gambell, February 17, 2017)

This view has been confirmed by scientists studying bowhead whales’ changing distribution due to decreased winter ice in the Bering and Chukchi Seas (Druckenmiller *et al.* 2017).

Another common theme is the early *spring break up* that now happens at least two to three weeks earlier than fifteen to twenty years ago. In many places on the island, like off Gambell, hardly any shore-fast ice forms during the wintertime. The Savoonga spring whaling camp at Pughughileq, on the southern shore, used to have solid shore-fast ice, onto which hunters pulled their boats and butchered the whales that they killed in the moving ice. But that does not happen anymore, as the ice is usually gone by early-to-mid April, and all hunting and butchering now proceeds on open water or on the shore.

The early spring break up and unstable weather in April and May coincide with the main walrus hunting season. Since 2013, hunting in both Savoonga and Gambell has been very poor and the overall walrus catch has dropped to a third of what it used to be ten to twenty years ago (Krupnik and Benter 2016). People are quick to make the connection between these changes, to acknowledge uncertainty and to point to increased risk to their livelihoods and sources of income:

Poor ice affects our walrus hunting. If we don’t have good ice here in spring, we won’t have enough walrus on the northern side that we normally hunt, like in May or June. People are already moving to the east side [of the island], so that they could catch walrus calves and

females in spring. It also scares me, because it means a lot of traveling, hauling boats to the eastern side and then hauling walrus we kill there back to the village. It will be after we finish whaling at Pughughileq in April and we are getting very little snow to last long enough to keep the trails . . .

The ice condition is affecting our walrus hunting in the past few years and we are getting very few walruses, so very few. In my old days, when I worked in the village store [in the 1990s], we always purchased raw ivory and some aged ivory from hunters . . . But today the store is not buying any ivory at all and people do not sell it, because they keep it for themselves. They have very little from hunting these days. (Savoonga, February 13, 2017)

People can talk for hours, mulling over the 'strange things' brought by unusual weather, ice and climate. Some residents, reportedly, have observed birds in the middle of winter, including snow buntings (*Plectrophenax nivalis*) that are not supposed to be seen before April. Snow buntings are the first birds to arrive in spring and are viewed as the sign of a new season. A common explanation is that the buntings now do not depart at all and are overwintering on the island on patches of open ground. 'We used to have only ravens here during the wintertime', one man said. 'Now we see these buntings, also gulls, like never before.'

Another hunter referred to shooting seals from shore blinds in the fall, a common practice. 'Guess what – these seals are supposed to float (on water surface) when killed. Now they most often sink and even when we retrieve some, they have a very thin layer of blubber. They just won't float.' Hunters agreed that this was happening because of the layer of lower-salinity water on top of the sea. 'Normally we have [dense] salt water on top, in which they [seals] remain floating. So, something is wrong with the seals and top water as well.'

The increased occurrence of very strong winds is another noticeable change, particularly in late fall and winter, with strong winds now coming from the south instead of the north, as in the olden days. These winds now present a threat to local infrastructure. The winter storm of December 2010 was exceptionally damaging in Savoonga, as winds of up to 50 mph and sub-zero temperatures contributed to a salt spray freeze on all electrical equipment. The wind knocked off town electric lines and nearly three-quarters of residents lost power for six days and more. Many homes experience burst pipes and flooding, and gusting winds prevented the authorities in Nome from shipping in food, supplies and repairmen. As one resident recalled:

We had that bad storm in 2010, when over 25 houses were left without power and water and we had to set a rescue area (shelter) at school. The school housed almost 200 people for several days. We had it again this year, though not like in 2010. We do not recall such heavy winds in the past; this is new to our memory. Perhaps not new to the Elders, but the infrastructure is very different today and it could easily knock us off for many days. (Savoonga, February 13, 2017)

Melting permafrost is a growing concern in Savoonga, akin to what happens in many other Alaskan communities, though new to the island. Many houses built on once solid ground are affected. Some places closer to the ocean front act like sinkholes and have destroyed older homes:

We lost one house recently – complete collapse; we had to tear it apart and start new construction. It is also happening along the shore, cliffs are falling down.

Our emergency ‘shelter’ area is at [the village] school. We used the old school building near the shore [as shelter] before that. But it is not functional anymore. It also suffered from erosion [permafrost melting], because it started curving down. Same with the old store building near the shore. It may fall down any time and make trouble to many houses nearby, particularly if it happens under gusty winds. (Savoonga, February 13, 2017)

The list of ‘strange’ things that people associate with climate change is remarkably diverse and it keeps growing (Krupnik *et al.* 2010; Rosales and Chapman 2015). Yet it is primarily the weak and unsafe winter ice, not the warming temperatures, that is on everyone’s mind as a major development introduced by climate change.

8.5 Discussion: How People Adapt

The stories recorded on St. Lawrence Island over the last two decades (Krupnik 2000, 2002, 2009; Pungowiyi 2000; Oozeva *et al.* 2004; Noongwook *et al.* 2007; Krupnik *et al.* 2010; Rosales and Chapman 2015) portray a vibrant discourse; as many thoughtful local observers, including hunters, community leaders and elders, try to take stock of the alarming pace of transition. People are not passive witnesses of change; instead, they seek explanations and look for connections and solutions. Yet certain factors, whether local and of a more general nature, may increase or lessen the chances of small northern towns, like Savoonga and Gambell, successfully adapting to change.

8.5.1 Preserving the ‘Core’ of Life (and Culture)

Despite the rows of modern houses, brand-new office buildings, snowmobiles and cell phones used by adults and many children, Savoonga and Gambell have successfully sustained their core identity, which is based around subsistence hunting, particularly communal bowhead whaling. Savoonga captures three to four bowhead whales every year from its annual quota of eight ‘strikes’. This supports 28 family whaling crews, about 120 to 150 people altogether, who operate for 4 to 5 weeks each spring out of the town’s whaling camp at Southwest Cape. Gambell has the same number of strikes and operating crews, although its catch is lower, at one to two whales per year. Receding ice and warmer waters have now added a new

whaling season in late fall, particularly in Savoonga, usually in November–December, even in January. Over the past twenty years, twenty-two whales were killed in Savoonga during this late fall season, once unheard of, 38 per cent of the total catch (Nongwook *et al.* 2007; Savoonga Whaling Captains Association 2017). There is a strong cadre of determined young and middle-age hunters eager to keep this vibrant cultural practice alive into the twenty-first century.

Killing, towing, butchering, storing and sharing meat of a 20- to 40-ton whale requires a host of *collective* actions and thus increases community cohesion. The collective identity generated and sustained by whaling and by maritime hunting more generally is a remarkably strong adaptation asset. Hunting of whales and, to a lesser extent, walruses and seals provides a solid base for a shared identity and common response and continues to bind people together. It looks like an unexpected source of strength for twenty-first-century adaptation and so far it is holding.

8.5.2 *New Technology Helps*

On recent visits to Savoonga, Gambell and other Alaskan communities, an unfamiliar element of the local landscape was quite visible, the white towers of new wind turbines (Figure 8.2). Since 2008, under Alaska’s Renewable Energy Program, small rural communities have received wind turbines installed as a source of electricity, the only local alternative to imported gasoline and diesel, for their electric grid and utilities (DeMarban 2016). It is a small operation – two turbines in Savoonga, three in Gambell, two in Wales – but people rightly view it as their first step in ‘energy independence’. It is also the most visible sign of modern-era technology in town (besides the now ubiquitous smart phones, personal computers and the Internet) that may eventually increase people’s options as they attempt to cope with climate change.

Other newly introduced or, often, reintroduced technologies come from the twentieth century. In 1994, Savoonga started its first commercial halibut fishing operation via a regional company, Norton Sound Seafood Products (NSSP – Anonymous 2015). Today, ten to fifteen boats with three-to-four-men crews regularly fish for halibut in the summertime using longline hooks. Some thirty to forty Savoonga men are engaged in commercial fishing and are being paid upon delivery of their catches to a small processing facility that NSSP built in town. The facility supplements their family incomes and keeps people busy in the summer months. Yet Savoonga fisheries are a far cry from the more advanced Native commercial fishing operations elsewhere in Alaska that support village flotillas of mid-size boats with Native owners and crewmen. It could be years before Savoonga arrives at this stage, if ever, and Gambell has no commercial summer fisheries so far.

After 2010, Savoonga, in cooperation with Gambell, has restarted small-scale reindeer herding, once a productive operation on the island. The herd now has about 3,000 animals, which allows a sustainable harvest of 600 to 800 reindeer each year (Caldwell 2016). This enterprise relates well to the early 1900s herding tradition of Savoonga and creates a mixture of pride and amusement among local people. Nonetheless, it relies on technology that belongs to the (early) twentieth century and therefore has little room to expand:

The herd is growing . . . but we have neither a good corral nor a meat packing operation here. They don't sell reindeer meat at the store. They [the village corporation] just sell 'licenses' to individual families if they want to have reindeer, so that they can go and kill it (!). Yeah, they kill it with a rifle, like caribou. They only sell meat to other communities . . . mostly ship them by plane as bulk [carcasses]. It is growing, but we still do not know how to use it as a good economy. (Savoonga, February 13, 2017)

It is unclear whether these or other new and reintroduced activities, such as bird-watching and rapidly growing Arctic cruise tourism via the Northwest or Northeast Passage, may develop into stable components of the island economy. There are neither mining nor suitable anchoring sites on the island to attract the passing boats. But the fact that the two communities are looking to diversify their use of resources is welcoming as it indicates that they are seeking new technologies to help them cope with rapid environmental change.

8.5.3 It's the Economy, Stupid!

As the attitudes, outlook and living conditions of northern villages become modernised, the gap between the high cost to support new infrastructure and the meager base of the local economy becomes obvious. In many places, various transfers of cash, equipment and personnel from government, state and district-based bodies constitute the prime, if not the only, way to maintain or improve standards of living. As one thoughtful person in Gambell called it, 'As long as we remain a welfare community we will keep our welfare mentality.' Another local leader in Savoonga offered a dire summary of the town's economic prospects:

Our economy here has two legs only – halibut fishing and ivory carving. Nothing else that we produce and we can sell. So, if we are short of ivory for carving everybody gets hurt. We don't have tourists here, no cruise ships like in Gambell, and very few bird watchers. But even if you have tourists here, particularly from other countries, they cannot purchase our ivory [because of the U.S. Marine Mammal Protection Act]. They just look but don't buy it. So, one of the legs of our economy is really suffering. And the halibut 'plant' is really not a plant; it's just a division of the Norton Sound Sea Food Products with the main processing plant in Nome. They only flense the fish they caught here, mix it with ice and ship it by (small) planes to Nome to the main plant where it gets processed for sale. . . . It's a small

operation, but it helps us a lot, particularly in the summertime, when there is not much employment in town.

... This halibut fishing plant is not going to grow much; so, it is some addition to our economy, but it doesn't keep it running fully. We depend on the money we get from the State (of Alaska), from federal agencies, from Kawerak, from the housing administration. Carving and fishing covers just a small part of what we need. (Savoonga, February 14, 2017)

Scholars of climate change impacts commonly point to the limitations of small-scale rural economies, their lack of resources and high costs of infrastructure improvement as the main impediments to successful adaptation in the Arctic and elsewhere (Henriksen 2007; Morton 2007; Salick and Byg 2007; Hovelsrud and Smit 2010; Williams 2012; Rasmussen *et al.* 2015; Nakashima *et al.* 2018). Community leaders on St. Lawrence Island understand these limitations perfectly well. Economic marginalisation thus becomes a vicious circle that pushes communities on the frontline of climate change into reactive mode rather than fostering proactive thinking to address their future.

8.5.4 *What Else Is on People's Mind?*

Three topics were most prevalent in the interviews, as well as in the spontaneous conversations, phone calls and email communications, with the people of St. Lawrence Island over the past years: whaling, weird weather and recent deaths (or sickness) in the community. Whereas the two former themes are mostly seasonal, death and ill health are ongoing issues that affect every family. Native Alaskan death rates have shrunk or stabilised in the past decades but nonetheless remain substantially higher compared to the overall state population: 1,169.7 versus 736.2 per 100,000 in 2013–2015 (National Center for Health Statistics 2017:118). For the 1,500 people living on the island and additional 500 on the Alaskan mainland and elsewhere, these statistics transform into roughly twenty to twenty-five deaths each year. Passing of family members, old and young, is widely perceived as a loss for the entire community ('a blow to our common body'), which is mourned profoundly and by many people.

To village residents, who essentially belong to clusters of intermarried families, death always has a personal face. Whether coming as the passing of a respected elder, or loss of a young soul to suicide, injury or accident, it generates long grieving and deep personal sadness that clouds almost every conversation. Ill health and prolonged visits to hospitals on the mainland for medical examination or treatment are constant themes and sources of stress, emotional as well as economic. In this regard, the threat of climate change often comes as a distant factor – unless it is pushed to the forefront by yet another natural phenomenon to

cope with, talk about and leave behind. And then the cycle and ranking of people's concerns is restored, until it is interrupted once again.

Many other topics are high on islanders' agenda, often with indirect or distant connections to environmental change, such as skyrocketing gasoline prices, a proposed ban on the sale of walrus ivory (reportedly to protect 'other ivories' from poached African elephants) or a widely discussed attempt to put the Pacific walrus on the Endangered Species list that did not materialise (Anonymous 2017). There are also themes that have *no* relation to climate change whatsoever – like basketball games and other popular sport competitions, youth sub-culture, rampant drug use (Weingarten 2005; cf. Collings 2014) and illegal sales of carved ivories to visiting collectors. It is difficult to cover the complexity of village discourse, even to enumerate its ever-morphing topics. These topics can be artificially dissected for an interview or invited conversation with a visiting scientist or journalist, but are not constant themes when people talk among themselves.

My latest visit to St. Lawrence Island in October 2017 was for a memorial service for a late partner in many years of research on St. Lawrence Island. A day prior, an elderly woman passed away in Gambell; so it was also the funeral service at the local Presbyterian Church. In short encounters in Savoonga and in several longer talks in Gambell, people touched upon many familiar themes – the weak local economy, the prospective ban on the sale of walrus ivory, overcrowded housing conditions, sombre lists of those who passed away – but not on weather or climate change.

Snow has already covered the ground (which was called 'kind of normal') and Troutman Lake near Gambell was already hardened by a thin crust of newly formed ice, like in the 2000s (Oozeva *et al.* 2004:182–183). There was not a bit of ice in the ocean nor on the beach, again a 'new normal' in this time of warming. In the morning, hunters with rifles were riding their four-wheelers out of town to shoot seals from shore blinds, again, a normal activity for the season. There was nothing unusual anymore in the weather, climate or the lack of sea ice – so nobody talked about it.

8.6 Diverging Discourses of Climate Change

Indigenous Arctic residents and outsiders differ in how they talk about what should be done to address rapid environmental change. The key terms coming out of a myriad of scholarly and agency meetings that discuss climate change include 'adaptation', 'mitigation', 'increased resilience', 'sustainability' of communities and infrastructure, 'relocation costs', and, now increasingly, 'community actions'. When people on St. Lawrence Island talk about what they need to face climate change with, their first call is 'emergency assistance'. Then they go into specific

details on topics related to compensation claims, disaster relief, dedicated shelter areas and the timing of emergency response. In this case, Yupik town leaders in Gambell or Savoonga in 2017 do not differ much from local authorities in other US localities, such as Texas, Florida or Puerto Rico, that have to face the brunt of the changing planetary climate.

With respect to extreme and unusual weather, and emergencies, there are two substantial aspects in which the responses of local leaders in isolated Alaskan communities, like on St. Lawrence Island, vary from those of local authorities elsewhere. First, people in the North have to 'weather in', since there is no place to which they can move or be evacuated to during disasters, except to other buildings within the same community. Second, and more importantly, external state assistance will come only days or weeks *after* the event has occurred, when the damage is already done. This assistance will mostly be in the form of money and equipment to rebuild what has been destroyed. To illustrate, from December 28, 2016, to January 4, 2017, Savoonga was severely affected by a powerful storm. However, the two-person team from the State of Alaska Emergency Response Office did not arrive in the town to examine the damage until a full six weeks after the event has taken place – mostly to take pictures of damaged houses and boats, and to process family claims for state-based disaster compensation. As the local residents explained to me, for the first several weeks they were left to cope with the outcomes of the storm entirely on their own and they took all responsibility for the initial response, damage assessment and community clean-up.

Fortunately, the December 2016 storm was not as destructive as the one in December 2010, when the damage was substantially higher. If the combined, monetary damage from the storm is below a certain level, it is usually covered by compensation from the State of Alaska Disaster Relief Fund, which is made of 75 per cent federal and 25 per cent state monies. If the claimed damage is above a certain threshold, everything is covered by federal money administered by FEMA (Federal Emergency Management Agency) as was the case following major national disasters, such as Hurricane Katrina in 2005, or Hurricanes Harvey and Irma in 2017.

Unfortunately, state and federal agencies generally have few resources and little vision beyond disaster relief, and mostly talk about the relocation of the most affected communities. In places like Savoonga and Gambell, adaptation and disaster mitigation are being left primarily to local leaders to fathom, with hardly any available resources to spare. After twenty years of dramatic changes in the Arctic, and in the absence of any coordinated actions to combat climate change, the least helpful public message is to continue showcasing people's suffering inflicted by climate warming. What people at the 'frontlines' need is a vastly improved emergency response, not a continuous drumbeat of public anxiety and talks of

impending 'climigration'. Therefore, scientists' findings about progressing environmental change bolstered by models with various levels of confidence have little relevance to how people actually face climate change.

8.7 'Climigration': Is It Working?

The term 'climigration' was coined by Alaskan human rights lawyer Robin Bronen to describe the 'forced permanent migration of communities due to climate change' (Bronen 2009:68). 'Climigration' results from ongoing climate-induced environmental change and occurs when a community is no longer sustainable for ecological reasons (Bronen 2009:68). Evidently, climigration means organised or spontaneous relocation. It affects the most vulnerable communities and differs from temporary migration caused by catastrophic environmental events, because it means a permanent displacement with no way back.

If we are to follow this definition literally, then no Alaskan community has yet been subjected to forced 'climigration', although at least four, Kivalina, Newtok, Shaktoolik and Shishmaref, have been living with the threat of pending relocation for the past fifteen to twenty-five years (Marino 2015). Both St. Lawrence Island communities, Savoonga and Gambell, are *not* on this list.

Hamilton *et al.* (2016) applied the paradigm of 'climigration' to test whether there is an evident trend of people moving out of at-risk Alaskan communities to safer destinations (see also Hamilton and Mitiguy 2009). The population data for the last twenty-five years (1990–2014) illustrate that most, though not all, rural Alaskan communities are actually growing. This includes all four of the most climate-affected communities mentioned above where families continue to grow, despite a well-known threat of prospective relocation. It is obvious that people do not want to leave their homes or, at the very least, the number of those staying is growing faster than those who have preferred to leave.

Both Savoonga and Gambell have experienced dramatic growth since the past twenty-five years. Savoonga population grew from 519 in 1990 to 740 in 2016 (mayor's office data); the number of residents in Gambell increased from 526 to over 700 during the same period. Both towns have high birth rates, so that children and babies are present in almost every household; twenty to twenty-five babies are being born in Savoonga every year, according to the mayor's office. The town has a new K-12 school with 240 students and rows of modern houses now filled to capacity by growing extended families. No one in Savoonga mentioned the possibility of moving en masse to another place; it is clear that the climate is not yet considered to be a push factor. Evidently, the two communities are preparing to stay, and are literally digging in, in terms of their investments in local infrastructure and new housing.

Yet at least one Alaskan community of Diomedes on Little Diomedes Island is seemingly shrinking. Little Diomedes is a tiny island, with almost no place to go or space to expand. Its population was once about 150 to 180 residents but had dropped to 100 people by 2010. In 2015, according to local schoolteachers, the actual population was around eighty and the island school was on the verge of closing if the number of students did not increase. Several former Diomedes residents who recently moved to Nome and Anchorage reported that the main reason for them leaving was the change in sea ice due to the warming climate. It made spring hunting for walrus and connections to the outside world via small ice-landing planes increasingly unreliable. Diomedes, thus, illustrates that at least *some* communities may indeed face population decline due to the pressure of climate change.

8.8 Conclusions: Talking Past Each Other?

The changes imposed by Arctic warming during the past twenty years have been profound and undeniable. Neither scientists nor local residents can now dispute the arrival of the ‘new normal’ (Larsen *et al.* 2014; Richter-Menge *et al.* 2016; Sheffield Guy *et al.* 2016; Taylor *et al.* 2017) which, among other things, means warmer and more unstable weather, stronger winds, a shorter ice season and riskier and more unpredictable sea ice. Whereas scientists primarily point to a dramatic loss of Arctic sea ice, particularly in the summertime (Frey *et al.* 2015), local residents single out how different their ‘weird’ winter weather is to what it used to be twenty to thirty years ago. Their own interpretations – ‘it’s not cold enough’, ‘it’s not long enough’ (for the winter) or even ‘the Earth is faster now’ (Krupnik 2002, 2009) – are not on the scientists’ lexicon.

Locals and scientists also differ in the ways in which they look into the future of the warming Arctic. Local people have learned to live with climate change and they have gradually pushed it into the realm of ‘village talk’, even sombre jokes, so that they can cope with it. They certainly have other issues to worry about. They have no means but to accept the new normal, even if they openly lament the predictability of the cold days, solid ice, large herds of walrus and the stable seasonal round of hunting in the ‘olden days’ which it never was (Krupnik 1993).

I dare to argue that, in this sense, life in Savoonga and Gambell, as well as in other small northern communities at the frontline of climate change, has somehow ‘normalised’. True, the Alaskan town of Kivalina now stands protected solely by rows of sandbags; but so does New Orleans with its levees, and the entire nation of the Netherlands with its system of canals and dikes. The village of Shishmaref, another well-known Alaskan case story of rapid climate change, has been literally falling off the coastal cliff for the past thirty

years (Marino 2015); nevertheless, life goes on. The process of ‘normalisation’ for many of these communities means that concerns about climate change have been woven into the fabrics of people’s lives, in which other matters – health and death, economy, daily sustenance, the monthly pay cheque or lack thereof and the price of gasoline – are as much, if not more, important. Nobody seems scared of climate change and nobody is leaving. It looks as if the ‘love for one’s homeland’, a factor rarely considered in climatologists’ models, keeps people resilient, industrious and often plain stubborn.

I also concur with my several colleagues in the studies of Arctic climate change (Marino and Schweitzer 2008; Tejsner 2013; Collings 2014; Marino 2015) who argue that northern residents, like people in small communities elsewhere, do not like to be viewed as ‘canaries in the coalmine’. It is scientists and, even more commonly, visiting journalists who dramatise people’s precarious existence in remote northern communities and talk about climate change as an existential threat to their lives and cultures (e.g. Albeck-Ripka 2017; Demer 2017a, 2017b; Goode 2016). This by no means implies that local people do not perceive acute threats from a warming climate. Rather, it means that Nature may shift faster than Culture, a conclusion which is at odds with the common view of rapidly changing indigenous cultures and lifeways, and that a strong Culture is often people’s best way to face rapid environmental change (cf. Demer and Lester 2017).

In Gambell and Savoonga, by the end of a second decade of Arctic warming, the towns’ residents have obviously learned how to live with climate change and how to factor it into their plans for the future. It is an open question, however, whether these plans will work if global change progresses in the manner predicted by modern climatological models, or on an even faster track.

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