PAME I-2020 – MPA Expert Group Pre-meeting
Agenda item 4.1.2

Food security in the Arctic - implications of a changing ocean

DRAFT TEXT FOR REVIEW

Purpose (Front Cover)

This fact sheet summarizes how climate change affects Arctic Indigenous food systems, in particular food, culture, and health are tied to **ocean resources**, and highlights examples of adaptive marine management responses.

Introduction (Page 1)

Rapid social and environmental change in the Arctic – including climate change – affect the health and wellbeing of millions of people and animals that call the Arctic home[1]. To understand and manage these risks effectively, one needs to look at the ecosystem as a whole for a healthy environment, healthy humans, and healthy animals[1]– a conceptual framework often referred to as One Health.

Food security can be an important indicator of ecosystem health[2] and a major determinant of health among Indigenous peoples[3]. Indigenous communities rely on plants and animals from their environment (often termed “traditional” or “country” food), supplemented by imported store food. This use of natural resources is a central part of Indigenous cultures. However, rapid climate change is drastically changing the physical dynamics of the environment, and, consequently threatening traditional food acquisition.

Major environmental changes are linked to the warming Arctic, with rapid deterioration of the Arctic sea ice ecosystem among the most drastic effects. Such changes are altering the availability and accessibility of traditionally harvested species, with consequences to health and cultural wellbeing. The number and types of species harvested, as well as the methods by which various species are hunted and food is stored, vary by region, culture, and community[4]. Understanding these differences is important for determining the potential consequences of climate change for different groups and considering the adaptation needs of each community[4], though several common themes also emerge.

Arctic Indigenous Peoples and Example Harvested Species (Page 2, Map)

[Examples of important harvested species for various communities will be added to the map.**]**

Disclaimer text: The species listed are intended to serve as an example of the diversity of species harvested by Indigenous communities and the shared nature of these stocks. It is not intended to be interpreted as a comprehensive representation.

Impacts of Climate Change on Availability and Accessibility (Pages 3-5)

Quote to set the stage:

"*The two most important parts of our food security were the availability of the animals and the hunter's ability to hunt. Over the past hundred years, this has changed. … Pollution and climate change have had an impact on wildlife.*" -Maggie Emudluk, Vice-President, Kativik Regional Government, Canada[5]

Chapeau

Climate change is leading to range expansions of some species, contractions of others, loss of habitats, and a wide range of other impacts on the Arctic's interconnected ecosystems and the services they provide[8], with implications for food availability. Thinner ice, late ice freeze-up, early ice break-up, more variable snowfall, unpredictable weather, warmer temperatures, and more frequent and intense storms have direct impacts on access to traditional foods[7]. The restructuring of Indigenous cultures in response to changes in species composition and the availability of subsistence food resources appears to be inevitable[8]. It is important to note, however, that adaptation has its limits, both in the rate and the amplitude of change that can be accommodated[7].

Note: Confidence ratings were applied as available in the cited source literature. they do not necessarily imply the view or consensus of PAME, the arctic council, or the contributors to this fact sheet.

Sea Ice Loss

Driver:
Sea ice extent has shown decreasing trends in all months and virtually all regions of the Arctic (*Very likely*)[9,10]. Arctic sea ice extent will continue to decline in all months of the year (*High confidence*)[9].

Availability:
The decline of sea ice in the Arctic appears to be linked to a loss of biodiversity in sea ice habitats, although observations also show that some species are expanding their ranges or are present during a longer portion of the year[11]. Current trends indicate that species reliant on sea ice for reproduction, resting or foraging will experience range reductions as sea ice retreat occurs earlier and the open water season is prolonged[12].

Accessibility:
Sea ice is becoming more mobile as its extent and thickness decrease, increasing ice-related hazards[6]. Some northern communities have found it harder to obtain wild sources of food due to the shorter snow cover season, which affects travel to hunting grounds as well as animal habitat. The thinning of sea ice and the lengthening melt season also affect access to resources[6].

For example, communities have reported that the spring hunt of walrus in Qaanaaq (northwest Greenland) used to be mainly over the sea ice at the edge of the North Water Polynya. However, with the reduction of sea ice, hunters are increasingly using skiffs to hunt walruses resting on ice floes[13,14]. Over in the Bering-Chukchi-Beaufort region, hunters have reported that autumn open water conditions with high winds, large seas, and low-visibility have become more common and are less in line with longstanding traditional skill sets and patterns[8].

Ocean Warming

Driver:
Sea surface temperatures are increasing over much of the Arctic Ocean[9,11], largely due to increased absorption of solar radiation as a result of sea ice loss (*Virtually certain*)[9].

Availability:
Many species are shifting northward as the Arctic warms with largely unknown consequences for Arctic species and ecosystems[12], and some impacts are already being observed.

For example, Arctic cod supports an economically important fishery in Norway and may be considered vital to small-scale Indigenous fishermen there[15]. Yet, reports suggest that the Barents Sea Arctic cod stock has declined in recent years due to poor recruitment related to warming and sea ice loss as well as increased competition with northward-expanding Atlantic cod[16].

Accessibility:
Some species, such as belugas in Hudson Bay, have shifted the timing of their migration in response to warming waters, which may affect the ability of people to find and use these resources[12].

In addition, the effects of warming on extreme weather are hard to predict. It is unclear whether warming will lead to more or fewer hazardous storms that bring high winds and waves, and which can disrupt transport and threaten infrastructure and human life[17].

Ocean Acidification

Driver:
The Arctic Ocean is experiencing some of the fastest rates of acidification in the world, due mainly to the higher capacity of colder water to absorb CO2, but also due to dilution by river run-off and ice melt[18]**.**

Availability:
The future effects of ocean acidification will not be uniform across the region, nor can they be reliably predicted[18]. While some marine organisms will respond positively to new conditions associated with ocean acidification, others will be disadvantaged, possibly to

the point of local extinction[18]. Dozens of harvested species of fish, crustaceans, seals, whales, and birds are at medium risk due to effects on their prey[19].

Other Combined Effects

Driver:
Rising temperatures, and the reduction in sea ice (leading to increased evaporation) are forecast to lead to increases in precipitation of up to 50 percent in the Arctic, with more falling as rain as opposed to snow[17].

Accessibility:
Declining coastal sea ice results in greater coastal erosion due to the effects of warmer air and water combined with increasing storm, wave, and tidal activity due to climate change[11]. For coastal communities, changing coastal sea ice regimes, river runoff, and coastal erosion can also impact community provisioning – for example, by blocking food and fuel shipments[8].

Effects and Consequences (Pages 6-7)

Cultural Wellbeing

Identity and Community:

The Arctic has extensive, valuable cultural sites and practices along nearly its entire coastline[20]. Indigenous communities have noted that the value of traditional food is interlinked with self and cultural-identity[21]. Hunting, harvesting of marine mammals, and fishing define a sense of family and community, while reinforcing and celebrating the relationship between Arctic Indigenous Peoples and the environment[4,22].

Sharing of Traditional Knowledge:

Sharing extends beyond the physical harvest. The entire family engages in the activities, contributing to accumulation and inter-generational transfer of traditional knowledge[23]. Obtaining traditional foods has been characterized as a family-oriented activity that builds bridges between generations through the passing of knowledge[21]. Indigenous community members have described how many core values, such as sharing, responsibility, and the inter-generational importance of the foods, are taught through harvesting and preparing foods[24]. Community members have expressed concern that rapid climate change has made traditional knowledge less dependable, affecting predictive knowledge of weather, ice conditions, wildlife migration patterns, and the type, timing, and location of the hunt[25].

Health Impacts

Nutritional and Mental Health:

Traditional knowledge holders emphasize the relationship between food security, health, and quality of life[25]. In addition to providing energy, country foods contain key nutrients and vitamins that contribute to individual health and may lower the risk of disease[5]. Among Inuit communities, for example, narwhal and beluga are an important source of Vitamin C[25]. The people of Chukotka (Russia) depend on a successful autumn hunt of Pacific walrus as a critical source of protein and fat during the long winter[8].

Safe Food Storage and Preservation:

Because traditional foods are often transported and stored outdoors using traditional practices[14], for example in underground chambers cut into permafrost[8], rising temperatures may increase the risk of food-borne disease[14]. Inuit communities have expressed concern that they may be forced to find new ways to store food as a result of permafrost loss and melting of ice cellars, which also play an important social role as family caches and food stores for village feasts[26].

Climate change also presents risks to food security through changes in the effectiveness and safety of traditional food preservation techniques. Indigenous communities are concerned that warmer and wetter weather may cause bacteria build up during traditional preservation processes[22,27].

Adaptive Management Case Studies (Pages 8-10)

Chapeau

In addition to the changes in the marine environment that are affecting food security, the decline of sea ice makes way for new economic activities, particularly for shipping and resource extraction[11]. Oil and gas activities, mining, tourism, shipping, fisheries, economic development, and pollutants are just some of the other stressors faced by the Arctic today[6]. Many of these factors interact with each other[6].

Many Indigenous communities are taking action to prepare for and adapt to climate change and working with governments on management solutions. Marine Protected Areas (MPAs) are an example of adaptive management, one in which Indigenous knowledge and western science can combine in innovative ways.

Northwest Alaska Conflict Avoidance Agreement (United States)

The Conflict Avoidance Agreement, between the Alaska Eskimo Whaling Commission and the oil and gas industry along the Northwest Alaskan coast, aims to reduce noise impacts and potential use conflicts in whaling areas. In addition, in accordance with the Marine Mammal Protection Act, federal agencies enter into co-management agreements with Alaska Native Organizations to co-manage marine mammal populations, including monitoring, research and data collection.

Bering Straits Port Access (United States)

As ship traffic increases through the Bering Straits, the U.S. Coast Guard conducted the Port Access Routing Study to plan shipping routes for increased ship traffic. Several tribes submitted comments expressing concerns about potential shipping impacts on subsistence activities, including Diomede Islands, King Island and the western tip of St. Lawrence Island. In addition, Kawerak, a local research organization, worked with multiple tribal communities to map important habitat and subsistence areas to inform the study. After considering all public comments, the United States and Russia submitted a proposal to the International Maritime Organization (IMO) to implement a set of routing measures for safety and environmental protection. In 2018, the IMO's new voluntary routing measures for the Bering Sea and Bering Straits region went into effect. These include a two-way route that would not restrict access for subsistence activities, but provided additional safety measures for increased shipping and three Areas to Be Avoided around St. Lawrence, King and Nunivak Islands.

Tallurutiup Imanga - Lancaster Sound National Marine Conservation Area (Canada)

In 2017, Parks Canada, the Nunavut Government and the Qikiqtani Inuit Association signed a landmark agreement to establish Tallurutiup Imanga. The inclusion of Inuit knowledge in the planning and design of this MPA led to a more ecologically and socially holistic boundary recommendation. The 2019 Inuit Impact and Benefit Agreement that formed the foundation for the MPA noted that ecosystem health and biodiversity of Tallurutiup Imanga NMCA is of fundamental importance to Inuit and Canadians, and that Inuit "views, expertise and understanding should, to the fullest extent possible, be applied to encourage the wise use of

wildlife, on which Inuit depend, and this traditional knowledge and understanding will be imparted to younger generations."

Anguniaqvia niqiqyuam MPA (Canada)
The Anguniaqvia niqiqyuam MPA was established in 2016 with two conservation objectives: to maintain the integrity of the marine environment offshore of the Cape Parry Migratory Bird Sanctuary so that it supports a healthy marine food chain, and to maintain habitat to support populations of key species (such as beluga whales, Arctic char, and ringed and bearded seals). The MPA is located in the Inuvialuit Settlement Region on the northern coast of the Northwest Territories.The second objective was identified based on Inuvialuit knowledge in the region, making this the first MPA in Canada with a conservation objective based solely on traditional knowledge. The MPA helps ensure that important species -- which are also important for subsistence -- and their habitats are protected.

Tarium Niryutait MPA (Canada)
The Tarium Niryutait MPA was established in 2010 to conserve important summering habitat for beluga. The area was chosen using a Beluga Management Plan which identified traditional harvesting/concentration areas of beluga whales in the Beaufort sea. The Tarium Niryutait MPA protects important areas for beluga and from an Inuvialuit cultural and subsistence perspective. The Tarium Niryutait MPA's objective is to conserve and protect beluga whales, other marine species (e.g., anadromous fish, water fowl, and seas birds), their habitats and their supporting ecosystem. Ensuring food security and the continuation of traditional practices are important outcomes of this conservation tool.

Sarvarjuaq/Pikialasorsuaq (Canada and Greenland)
[Pikialasorsuaq means "great upwelling" and for thousands of years, this North Water polynya shared by Canada and Greenland has sustained Inuit subsistence culture. Today it is at risk from the impacts of climate change. In 2016, the Inuit Circumpolar Council created the Pikialasorsuaq Commission to develop recommendations consistent with existing Inuit governance for confronting climate change impacts.The Commission found a desire to rebuild a collective Inuit management regime between Inuit communities in Canada and Greenland to monitor the living resources and the health of communities dependent on those resources in the Pikialasorsuaq region.]

[Placeholder for a Saami Case Study]

NOTE: Additional case studies from other countries are still being sought. Submissions are welcome.

Citations

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