Future Opportunities and Challenges for the Nordic Arctic Region

Astrid E. J. Ogilvie
astrid.ogilvie@svs.is
Stefansson Arctic Institute, Akureyri, Iceland

Open Seminar: Opportunities and Challenges for Future Regional Development
University of Akureyri
12 September 2019

WHAT ARE THE MAJOR CHALLENGES?

- RAPID CHANGE:

- Both in terms of Climate and Social Ecological/Economic Change

Arctic Communities are under growing stress in the face of cumulative impacts:

- Changes in climate
- Increasing exploitation of northern resources and
- New governance systems

- **Surface air temperatures** in the Arctic continued to warm at twice the rate relative to the rest of the globe.

Arctic air temperatures for the past five years (2014-18) have exceeded all previous records since 1900.

- In the **terrestrial system**, atmospheric warming continued to drive broad, long-term trends in declining terrestrial **snow cover**, melting of the **Greenland Ice Sheet** and **lake ice**, increasing summertime Arctic **river discharge**, and the expansion and greening of Arctic tundra **vegetation** including the melting of permafrost

- Despite increase of vegetation available for grazing, herd populations of **caribou and wild reindeer** across the Arctic tundra have declined by nearly 50% over the last two decades.

- **Microplastic contamination** is on the rise in the Arctic, posing a threat to seabirds and marine life that can ingest debris.
Effects on humans are not yet entirely known.

- Warming Arctic Ocean conditions are also coinciding with an expansion of **harmful toxic algal blooms** in the Arctic Ocean and threatening food sources.

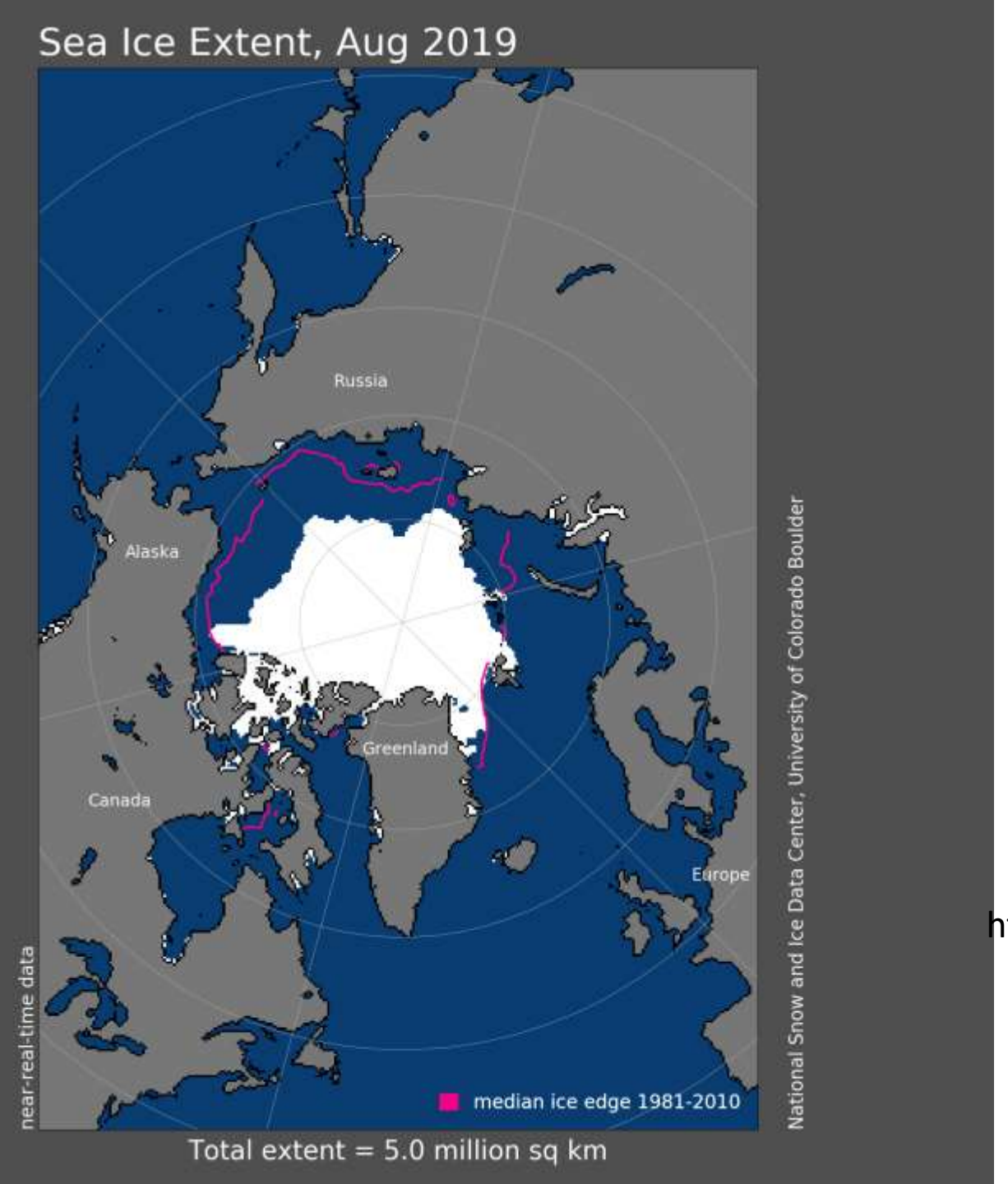
Spatial patterns of late summer **sea-surface temperatures** are linked to regional variability in sea-ice retreat, regional air temperature, and advection of waters from the Pacific and Atlantic oceans.

- Pan-Arctic observations suggest a long-term decline in **coastal landfast sea ice** since measurements began in the 1970s, affecting this important platform for hunting, travelling, and coastal protection for local communities.

In 2018 Arctic **sea ice** remained younger, thinner, and covered less area than in the past. The 12 lowest extents in the satellite record have occurred in the last 12 years.

Source:

https://arctic.noaa.gov/Report-Card/Report-Card-2018



"By August 14, extent was tracking above levels observed in 2012, resulting in the second lowest August extent in the satellite record. Although Arctic air temperatures are now falling below freezing, sea ice loss will likely continue for several weeks as heat stored in the ocean melts the underside of sea ice. Winds can also compress the pack further reducing sea-ice extent.
As of this post, the rate of sea ice loss has sped up again."

https://nsidc.org/arcticseaicenews/

SOCIAL ECOLOGICAL CHALLENGES

In the Arctic, loss of sea ice is particularly relevant ….

Sea ice has a direct and immediate effect on Arctic communities:

- Through increased shipping (and attendant risks) both commercial and tourism-related

- Complex issues involved in Arctic oil and gas exploration

- Effects on fisheries and marine mammals

STRATEGIC SIGNIFICANCE OF ARCTIC REGIONS

- Political factors – strategic importance of the Arctic (also related to melting sea ice)

Non-climate related factors

- Governance systems, especially fisheries governance systems, some negative impacts

- Social difficulties, e.g., young women are leaving communities, men left behind …

I work all the time- he just waits for the animals to come back

- New industries not always favourable to locals

- A particular focus of the **Nordic Council of Ministers** concerns the opportunities and challenges in all areas related to sustainable development.

- Environmentally, the focus is on achieving global climate goals by reducing CO^2 emissions and through the transition to a greener economy.

- A key focus area for further work on urban sustainability is the growing towns of the Arctic regions.

- "Many cities and towns in the Arctic are undergoing huge transformation and represent good examples of urban transformation and interesting processes in urban development" (Nordic Council of Ministers, 2017, p. 24).

SPECIFIC EXAMPLES

ILULISSAT/DISKO ISLAND (QEQERTARSUAQ) REGION GREENLAND

THE HÚSAVÍK REGION, ICELAND

Arctic Climate Predictions: Pathways to Resilient, Sustainable Societies (ARCPATH)

A Nordic Centre of Excellence

Leader: Yongqi Gao (NERSC)

CO-Leader: Astrid E.J. Ogilvie (SAI)

THE MAIN OBJECTIVE OF ARCPATH

To supply new knowledge on Arctic "pathways to action" by combining improved regional climate predictions with enhanced understanding of environmental, societal, and economic interactions.

HÚSAVÍK

- Fisheries
- Tourism
- Whale watching
- Industry

Húsavík has traditionally had an economy focused primarily on fisheries

In the past 25 years whale watching has become a major industry


Húsavík has come to be called the
“Whale Watching Capital of the World”

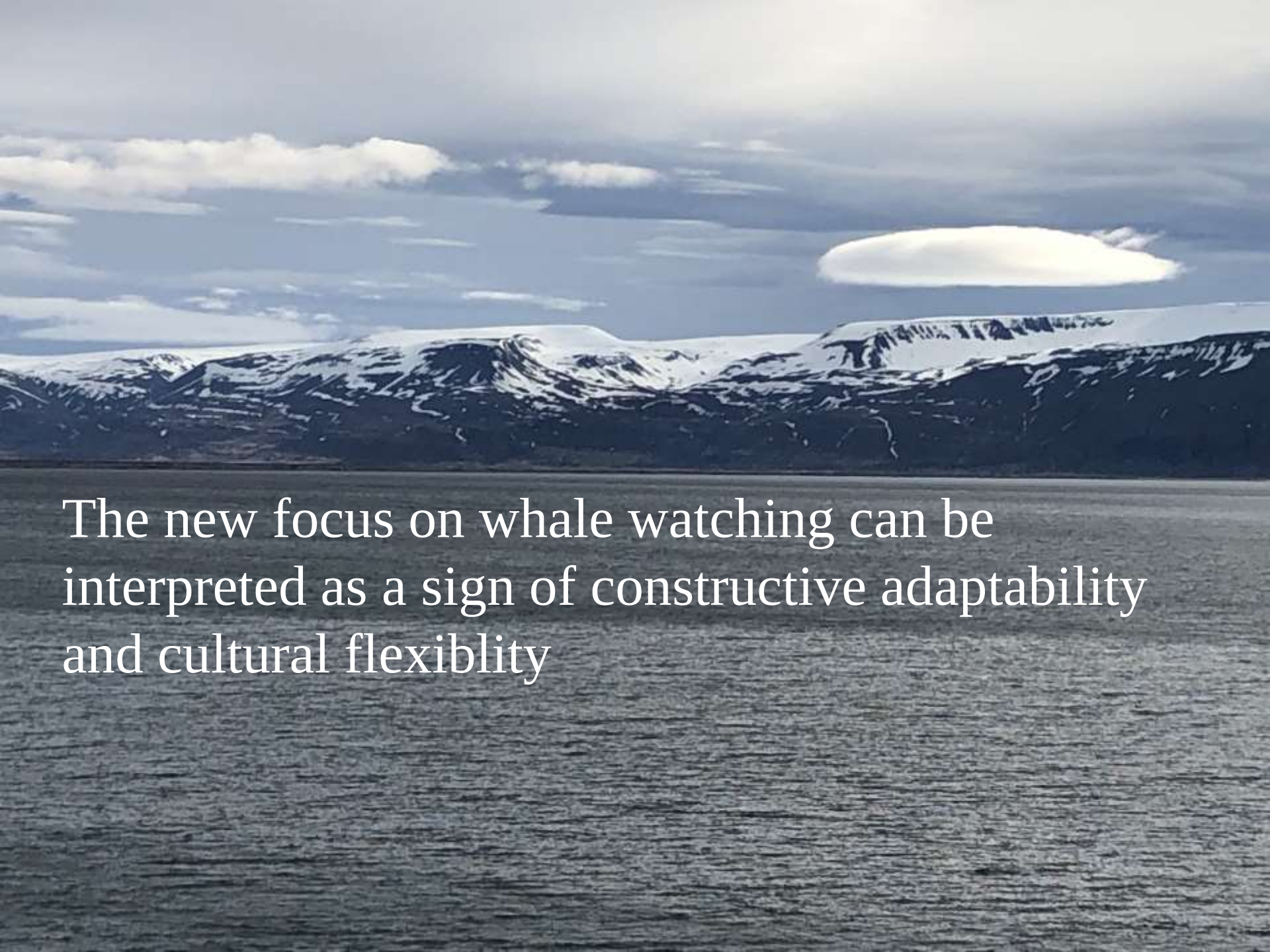

one of the
whale-watching vessels
of the Norður sigling company

Four whale-watching companies are currently running from Húsavík and there are 50 daily departures of whale-watching vessels in the peak season.

Photo: Marianne Rasmussen

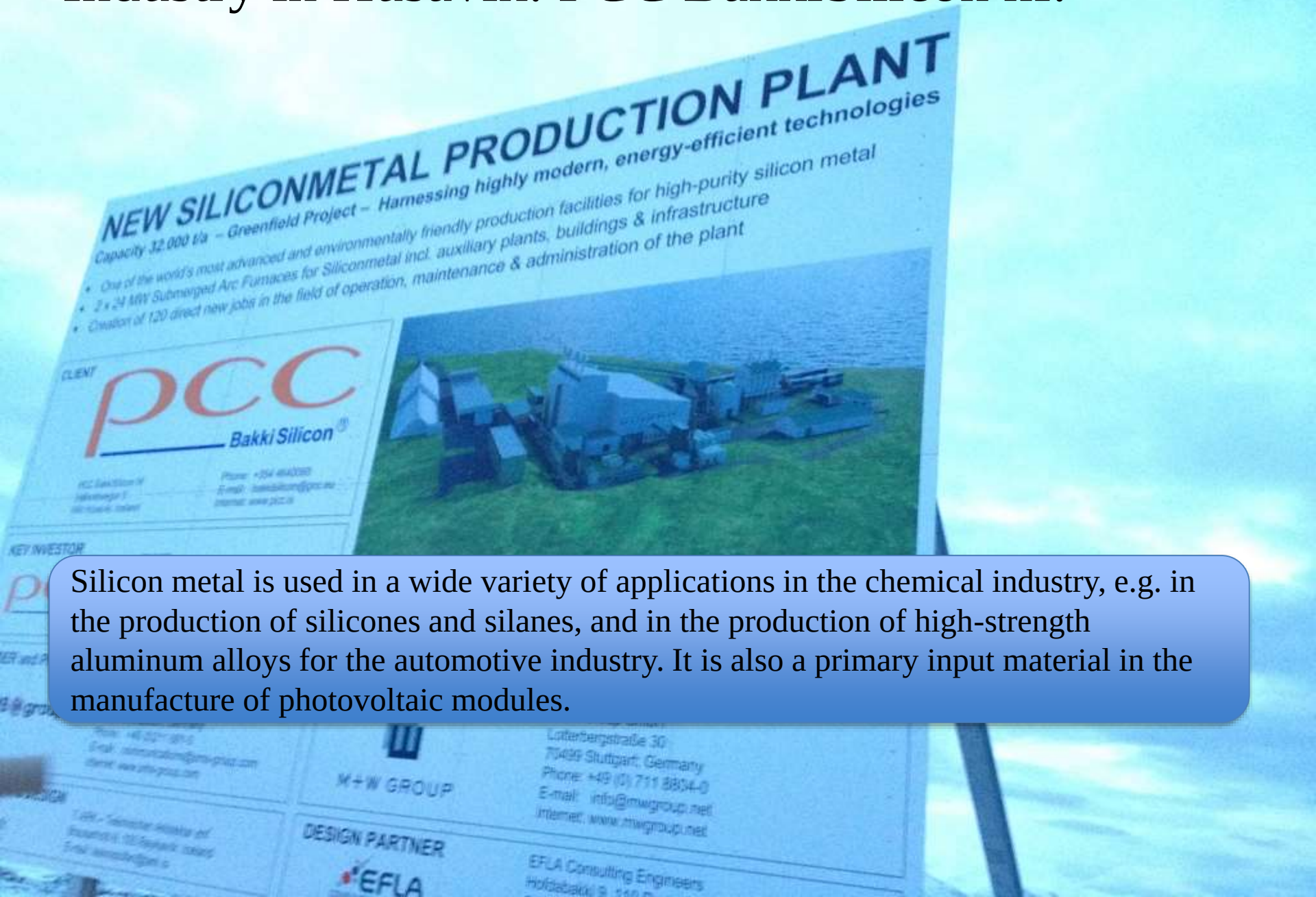

Part of the ARCPATH project has focused on marine mammal migration including the blue whales who come into Skjálfandi Bay in June
Photo: Marianne Rasmussen

Photo: Marianne Rasmussen

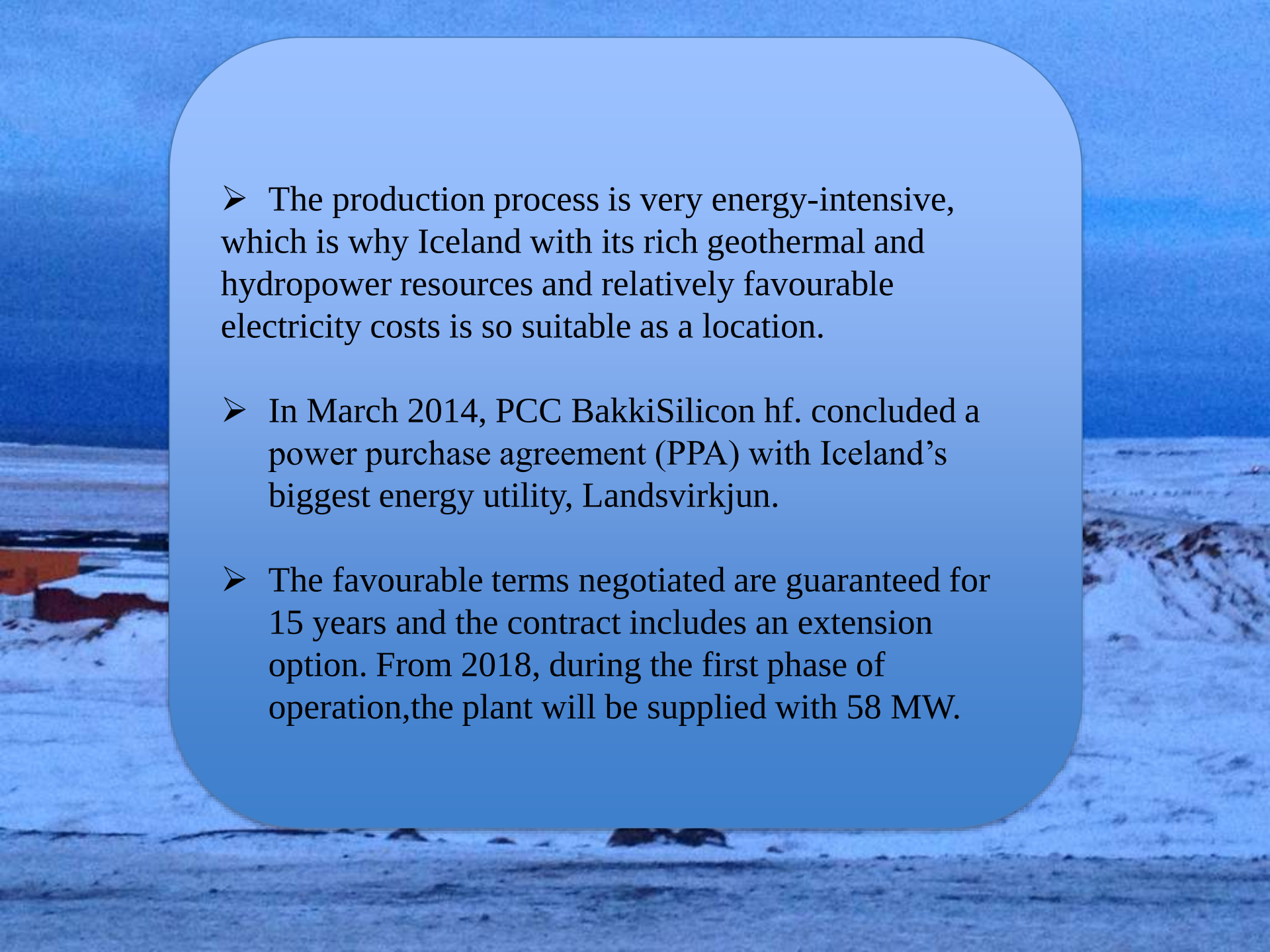


The new focus on whale watching can be interpreted as a sign of constructive adaptability and cultural flexiblity

Industry in Húsavík: PCC BakkiSilicon hf.



Silicon metal is used in a wide variety of applications in the chemical industry, e.g. in the production of silicones and silanes, and in the production of high-strength aluminum alloys for the automotive industry. It is also a primary input material in the manufacture of photovoltaic modules.



- The production process is very energy-intensive, which is why Iceland with its rich geothermal and hydropower resources and relatively favourable electricity costs is so suitable as a location.

- In March 2014, PCC BakkiSilicon hf. concluded a power purchase agreement (PPA) with Iceland's biggest energy utility, Landsvirkjun.

- The favourable terms negotiated are guaranteed for 15 years and the contract includes an extension option. From 2018, during the first phase of operation,the plant will be supplied with 58 MW.

- Landsvirkjun developed a new geothermal energy source close to Húsavík and constructed a 90 MW power plant serving the entire new industrial area.

- The ensuing logistical costs for delivery of the raw materials to Iceland and shipment of the silicon metal to customers abroad

are more than outweighed by the advantages in electricity procurement – both from an economic and an ecological point of view.

Silicon metal is extracted from quartzite, aided by the addition of wood chip and coal, in electric arc furnaces at temperatures of around 2,000 degrees Celsius. The new plant obtains its key raw material quartzite primarily from PCC's own quarry in Zagórze, Poland.

The silicon metal to be produced in Iceland has already been extensively earmarked for customers in German industry through long-term contracts. PCC is thus making an important contribution to securing supplies of silicon metal as an input material for value-adding production activities in Germany.

In a report from the Icelandic Environment Association, the NGO stated that “on the basis of Iceland’s total emissions in 2015, excluding land use, land-use change, and forestry, (LULUCF), the silica plant will increase Iceland’s levels of carbon dioxide emissions by up to 8%.”

It has been calculated that the factory will need about 66 tonnes of coal a year to support the production.

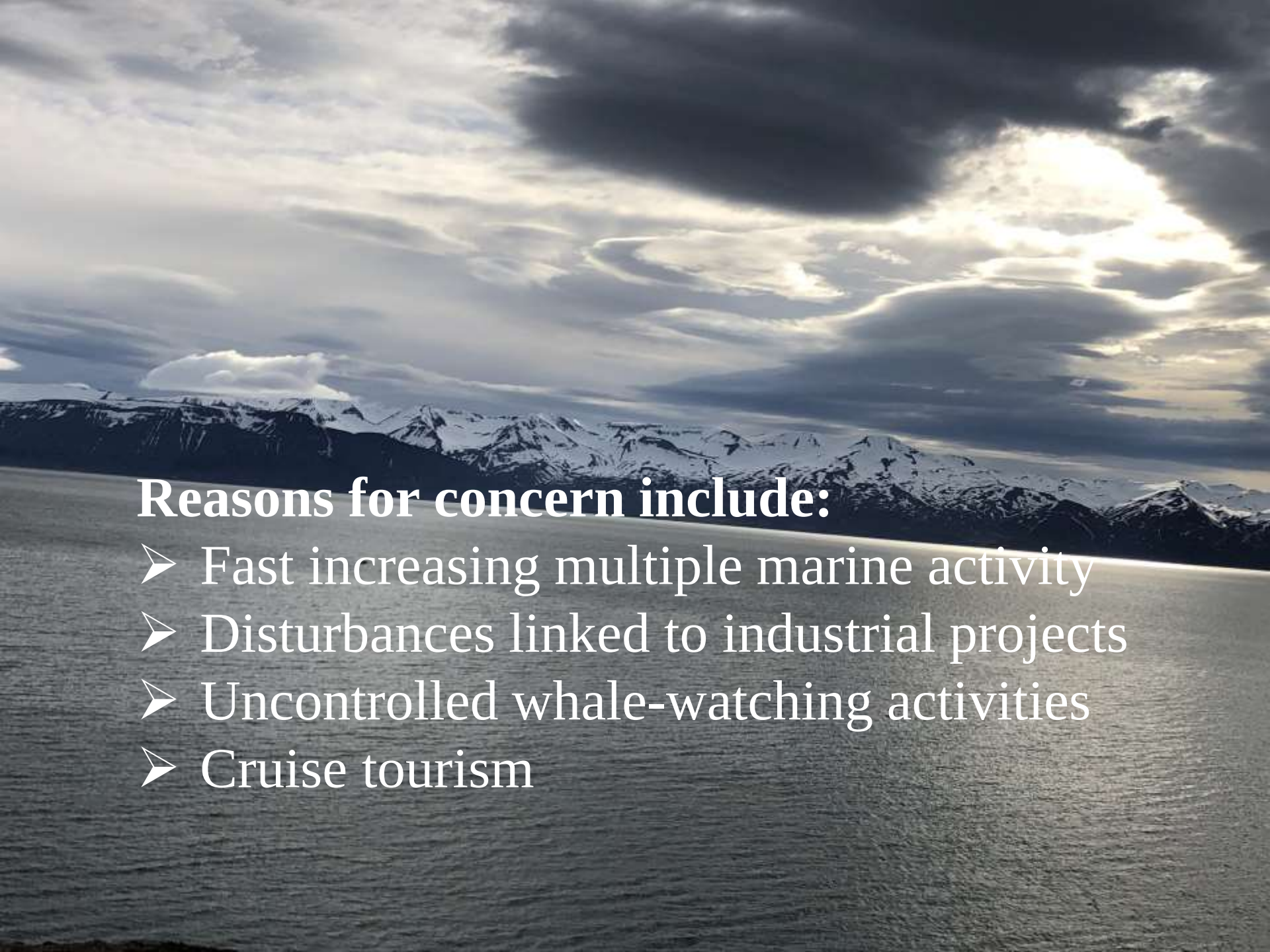
The factory itself is owned mostly by German Company PCC SE, while the remaining 14% of the shares are in the hands of a local company called Bakkastakkur. Fifteen different Icelandic pension funds, as well as bank Íslandsbanki, have invested in Bakkastakkur.

The information on Bakki Silicon
comes from their website http://www.pcc.is/

Geothermal plant at Þeistareykir

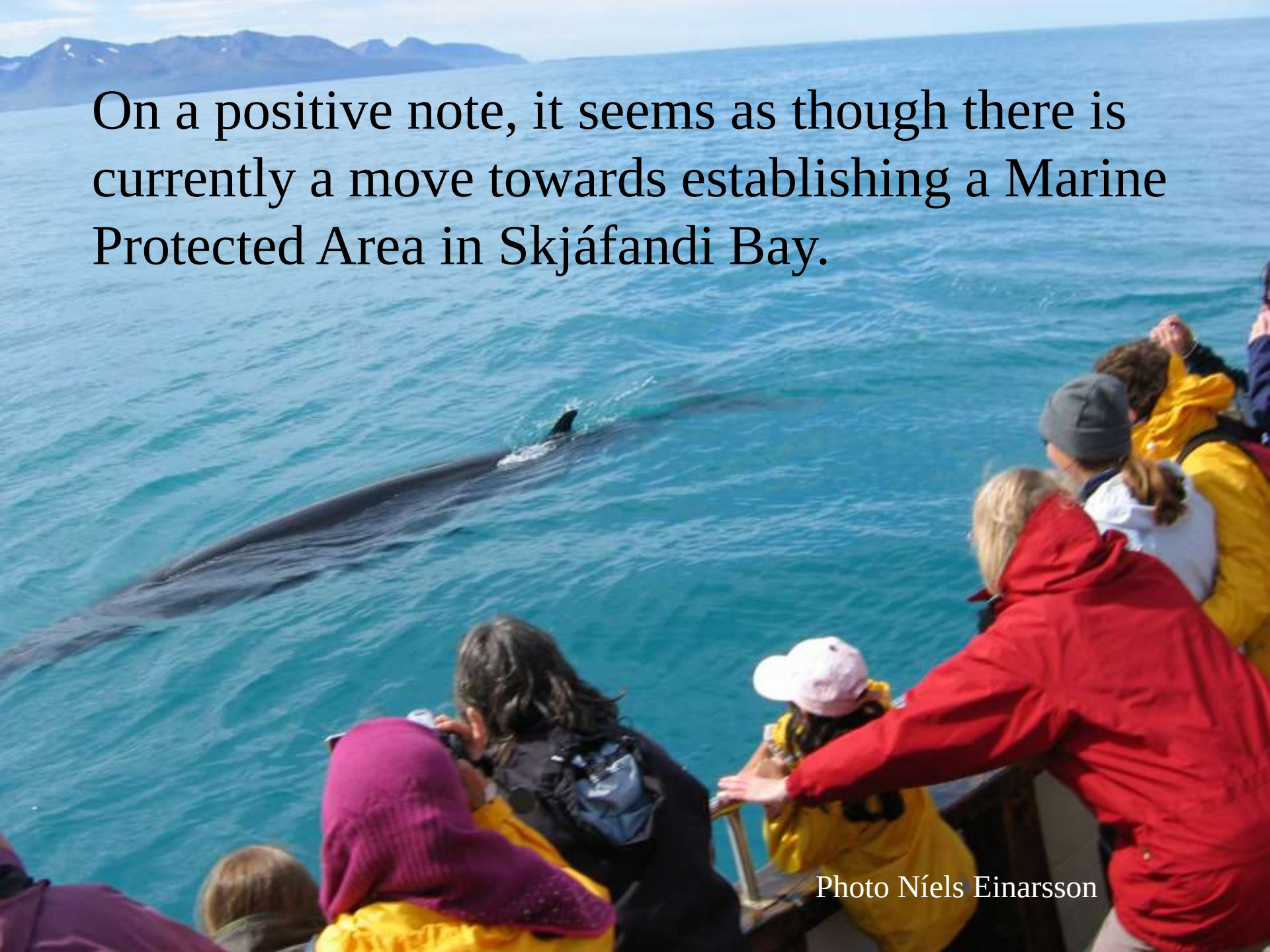

Geothermal plant at Þeistareykir

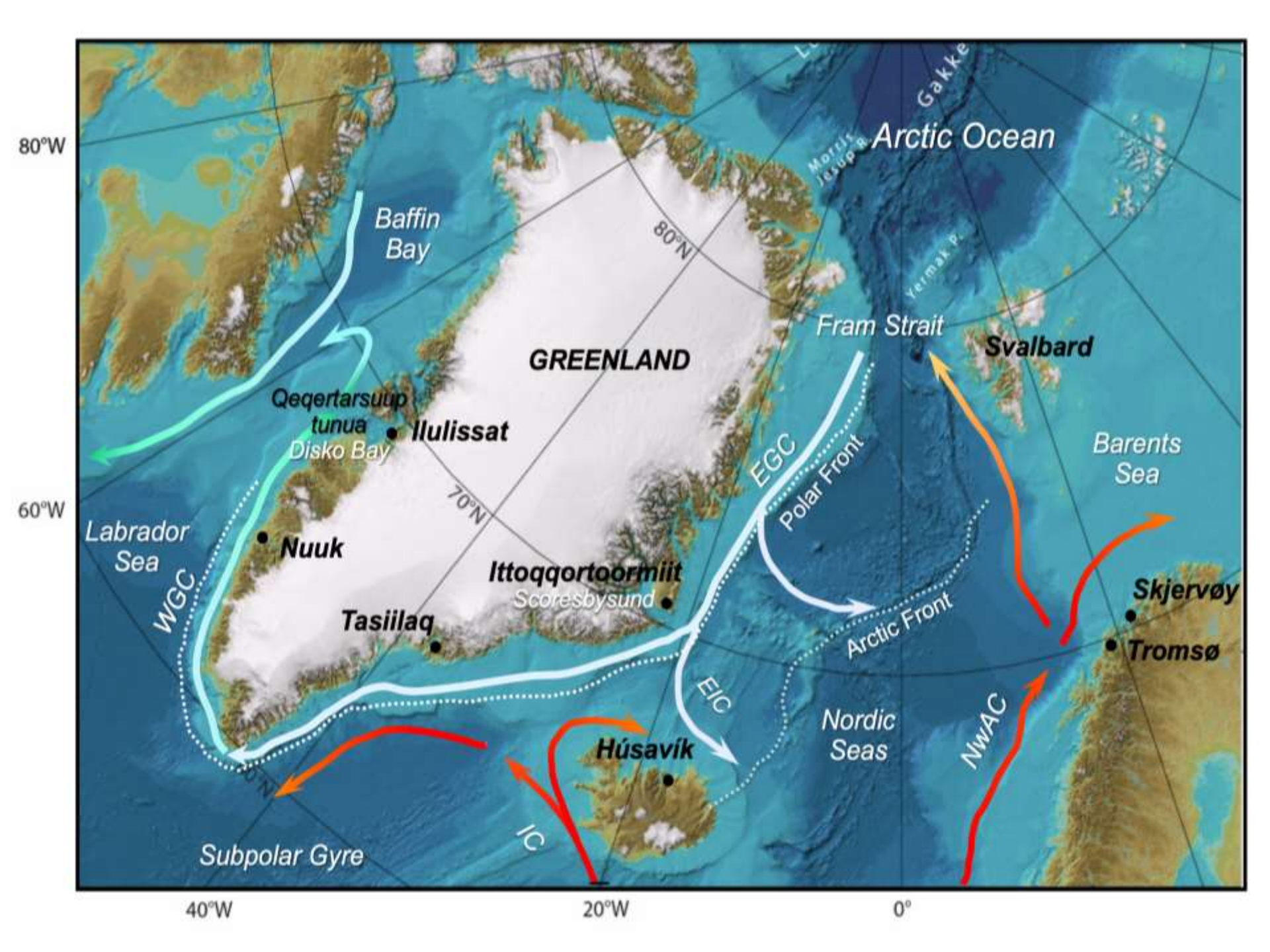
In some ways, Húsavík seems a success story in terms of how to adapt new economic activities to traditional cultural and economic structures.



Reasons for concern include:

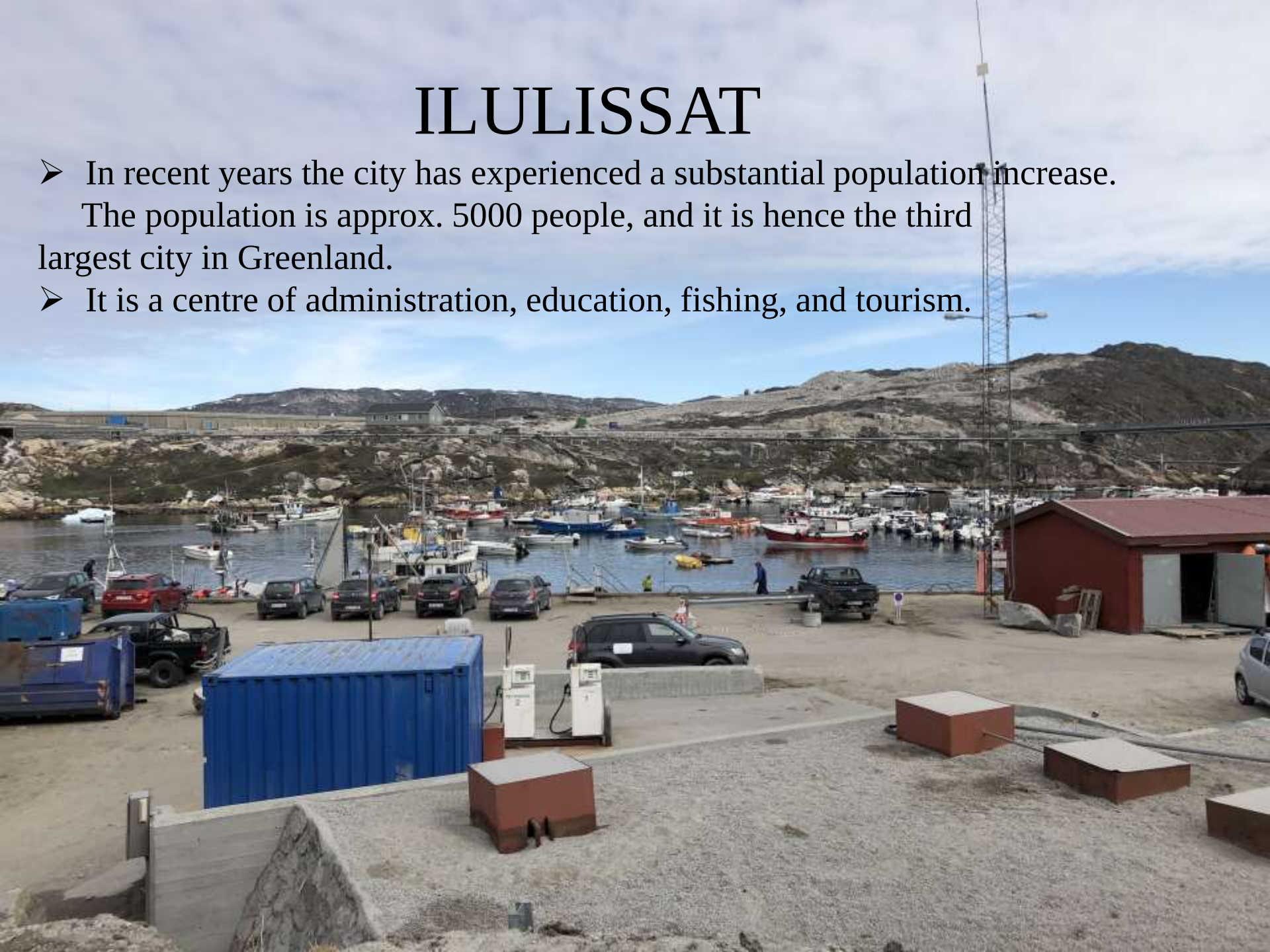
- Fast increasing multiple marine activity
- Disturbances linked to industrial projects
- Uncontrolled whale-watching activities
- Cruise tourism


On a positive note, it seems as though there is currently a move towards establishing a Marine Protected Area in Skjáfandi Bay.
Photo Níels Einarsson

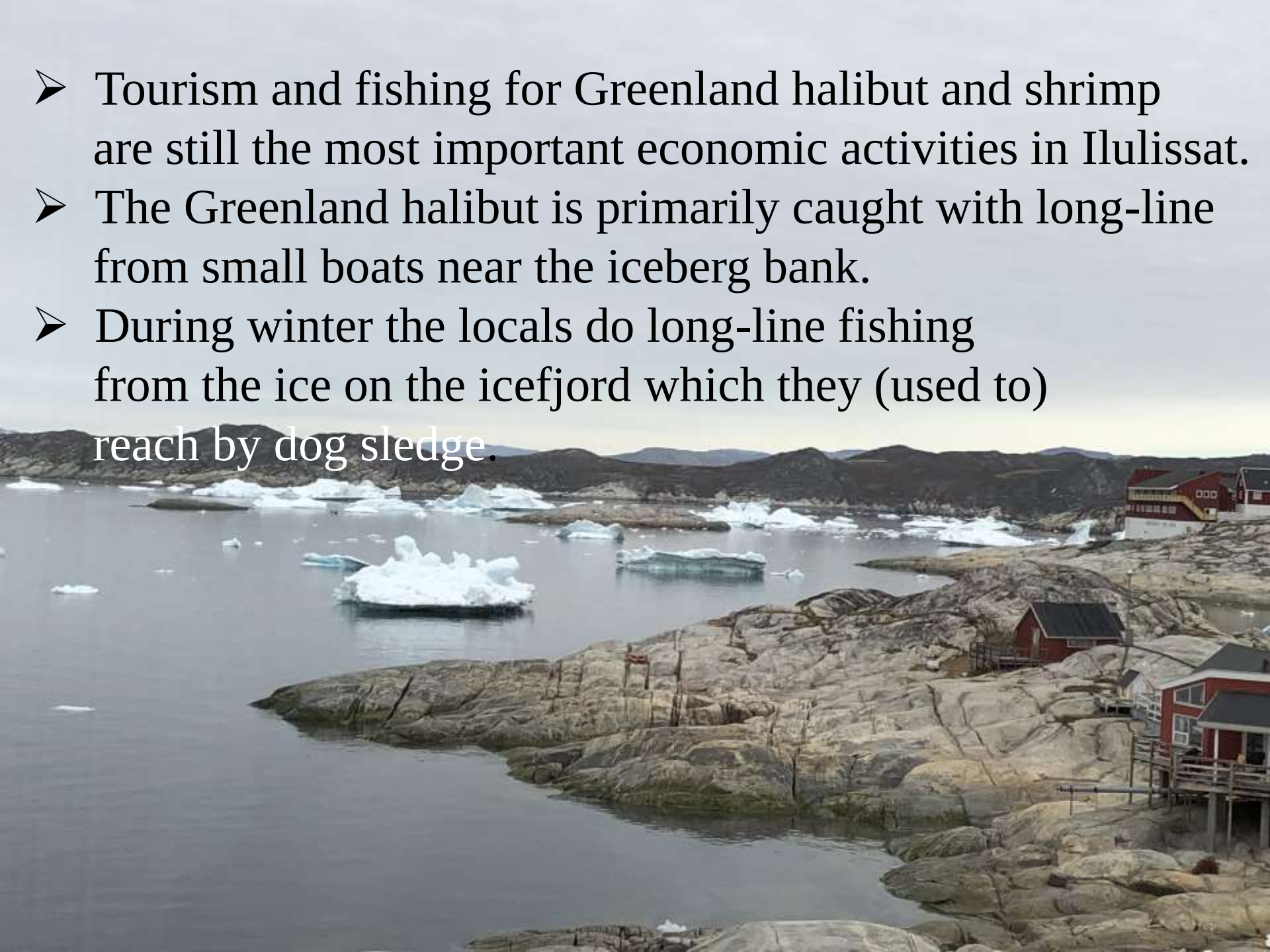

80°W
60°W
40°W
20°W
0°
80°N
70°N
60°N
Arctic Ocean
Baffin Bay
GREENLAND
Fram Strait
Svalbard
Barents Sea
Labrador Sea
Nordic Seas
Subpolar Gyre
Qeqertarsuup tunua
Disko Bay
Ilulissat
Nuuk
Ittoqqortoormiit
Scoresbysund
Tasiilaq
Húsavík
Skjervøy
Tromsø
WGC
EGC
EIC
IC
NwAC
Polar Front
Arctic Front
Morris Jesup R.
Yermak P.
Gakkel

ILULISSAT

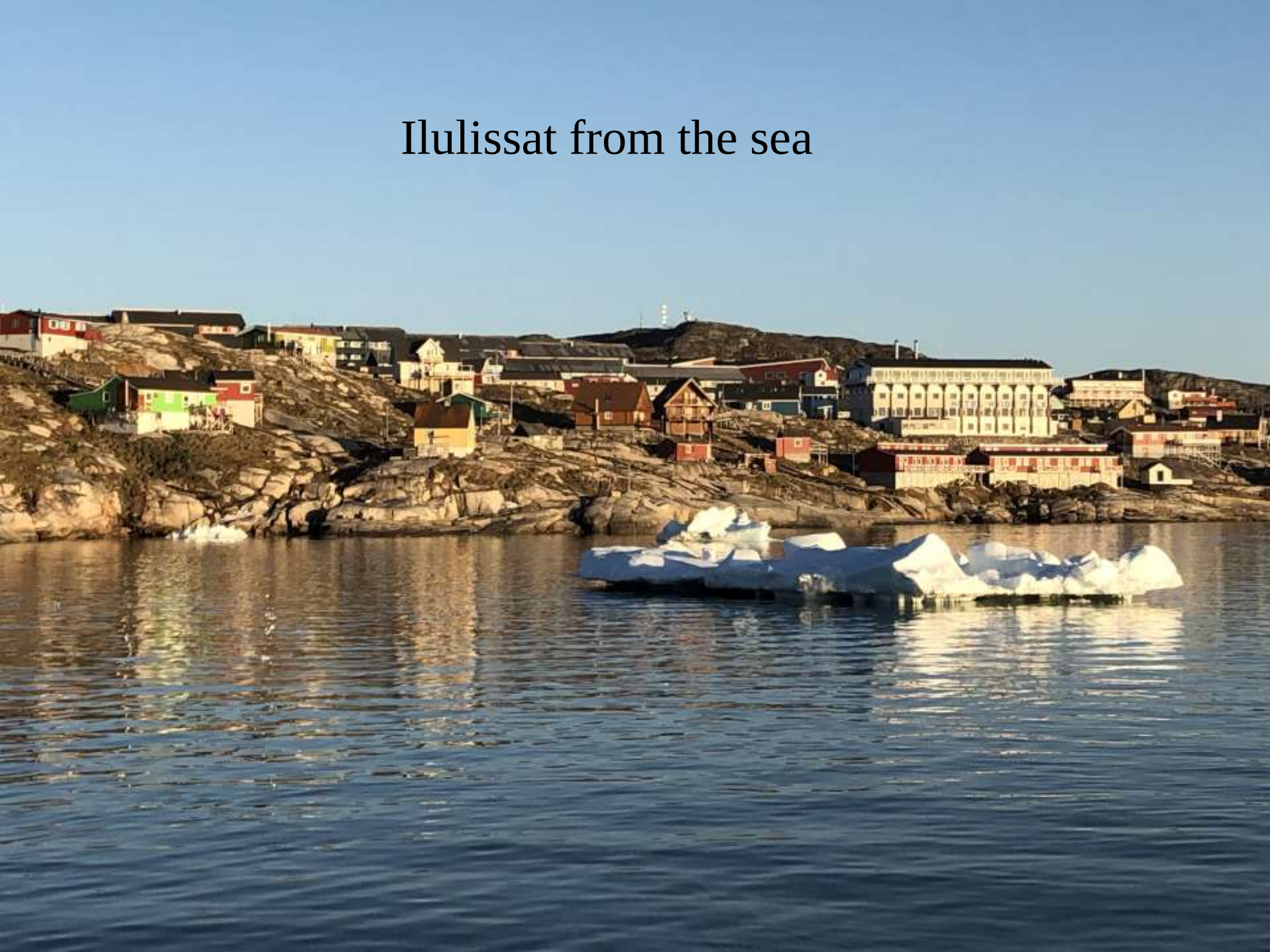
- In recent years the city has experienced a substantial population increase. The population is approx. 5000 people, and it is hence the third largest city in Greenland.
- It is a centre of administration, education, fishing, and tourism.



- Tourism and fishing for Greenland halibut and shrimp are still the most important economic activities in Ilulissat.
- The Greenland halibut is primarily caught with long-line from small boats near the iceberg bank.
- During winter the locals do long-line fishing from the ice on the icefjord which they (used to) reach by dog sledge.



Ilulissat from the sea




Sermeq Kujalleq – Southern Glacier
Jakobshavn Glacier

- 2019 was one of the warmest springs on record for the region.
- Temperatures are usually around 0 degrees Celsius in May.
- In June the average temperature is 5.6 degrees.
- The temperature was near 10 degrees most days and up to 16 on two days of our time there.

- Sea ice was vastly reduced from its normal coverage in the area. Weeks ahead of the usual time, fishermen were out in boats, laying long lines to catch halibut.
- The fishermen have observed that the halibut caught are smaller in recent years.
- This is possibly due to overfishing.

- Rather than a small number of fish being caught in the spring, thousands of tonnes are now taken as the long line fishing is a far more effective way to catch fish than through the ice.

- The longer the sea is free of ice, the more fish are caught here.

- The Greenlandic fishermen we talked to were happy about this. They make more money to buy things like bigger boats, snowmobiles and televisions. They can buy food in the winter and so are less concerned with the loss of caribou and muskoxen than people in more remote parts of the Arctic who depend on these animals for food all winter.

By boat to Disko Island/Qeqertarsuaq

Plenty of icebergs calving from the glacier!

QEQERTARSUAQ/DISKO ISLAND

(Formerly *Godhavn* and important centre for Royal Greenlandic Whaling Company from 1774-1916)

Disko island has very different geology and vegetation from mainland Greenland …

THE ARCTIC STATION

Founded in 1906 by botanist Morten Petersen Porsild
and supported by leading explorers of the day

- On Disko island, the story is somewhat different than on the mainland.
  The halibut population has declined there.
  But the men are catching far more cod.

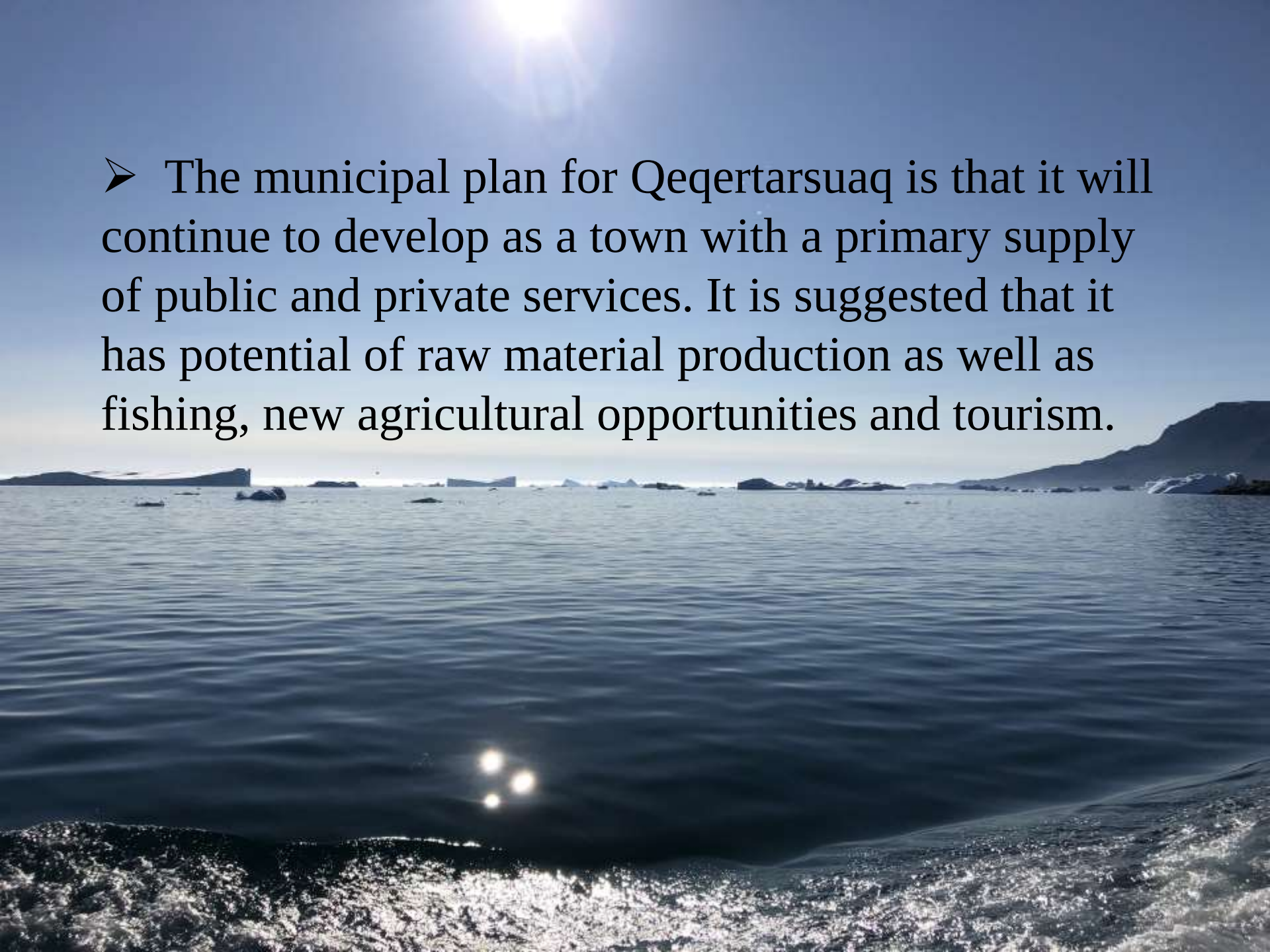
- Cod have moved north as the waters have warmed.
  This may be a temporary bounty as the waters may become too warm so the cod population
  is possibly moving north rather than simply expanding their territory northward.

- The early melt of the sea ice also changes whale migration patterns by allowing them to migrate north earlier in the ice-free ocean.

- In past times people would travel by dog sled all winter to the mainland of Greenland for supplies.
- The sea ice has been too thin and unpredictable to do so for two decades.
- Supplies must be brought in by helicopter all winter to Disko Island, until the ice melts sufficiently that travel by boat is possible.

- Like other Greenlandic towns,
  the community of Qeqertarsuaq is experiencing
  the common twenty-first century experience
  of a rapid transformation from
  scattered settlements based on hunting to
  an urbanizing post industrial economy.

- Seal and other marine-mammal hunting remain an important part of mixed economy subsistence activities, together with growing tourism, including budding whale watching.



- The municipal plan for Qeqertarsuaq is that it will continue to develop as a town with a primary supply of public and private services. It is suggested that it has potential of raw material production as well as fishing, new agricultural opportunities and tourism.

SUMMARY RE. CLIMATE CHALLENGES/OPPORTUNITIES: ICELAND

IT MAY APPEAR THAT A WARMING CLIMATE MAY HAVE POSITIVE BENEFITS, E.G., POSSIBILITY TO GROW CEREAL CROPS, PLEASANTER ENVIRONMENT, **LACK OF SEA ICE!**

BUT IT IS COMPLEX -

A WARMING OCEAN MAY HAVE NEGATIVE IMPACTS ON FISH STOCKS,

ALSO, E.G., UNFORSEEN EFFECTS ON WHALE MIGRATIONS AND IMPLICATIONS FOR WHALE WATCHING TOURISM

SUMMARY RE. CLIMATE CHALLENGES/OPPORTUNITIES: GREENLAND

FOR GREENLAND - A TRUE ARCTIC LOCATION - THE IMPACTS OF A CHANGING CLIMATE ARE MORE EVIDENT, E.G., MELTING SEA ICE AND RETREATING GLACIERS.
THE PROBLEMSASSOCIATED WITH A LACK OF DEPENDABLE SEA ICE HAVE BEEN DESCRIBED IN MANY STUDIES.
AS REGARDS SEEMING OPPORTUNITIES - THE INCREASED FISHING OPPORTUNITIES WITH MELTING ICE NOTED.

HOWEVER, IT REMAINS TO BE SEEN HOW LONG THIS CAN LAST.

INCREASED SHIPPING AND CRUISE SHIP TRAFFIC WHICH IS POSSIBLE DUE TO THE LACKOF ICE HAVE MANY NEGATIVE ASPECTS.

BUT OF COURSE CLIMATE CHANGE IS ṄOT THE ONLY FACTOR INVOLVED IN CURRENT NORDIC ARCTIC CHALLENGES AND OPPORTUNITIES!!


STEFANSSON ARCTIC INSTITUTE
AKUREYRI ICELAND
THANK YOU FOR YOUR ATTENTION!
TAKK FYRIR MIG!
ARCPATH
norden