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THE BLUE ECONOMY





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Photo: Fiona Hunt, CC, Flickr.com

ABOVE: *Arktos Developments personnel drive an amphibious craft onto an ice floe during a demonstration for the U.S. Coast Guard.*

Barrow, Alaska, Aug. 13, 2012.

Photo: Petty Officer 3rd Class Grant DeVuyst, U.S. Coast Guard/Released

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Getting it right

THE ARCTIC IS DEFINED by its marine space, its countries and many of its people clustered around a central ocean. It's a space in flux as an ocean of ice becomes increasingly liquid. Every inch the Arctic sea ice retreats, new economic opportunities open up. The *Blue Economy* concept provides us with a useful lens to understand the importance and value of the marine economy and how industrial activities, transportation, livelihoods, food security, recreational activities and ecosystems are linked. In this edition, Judith Kildow writes about the importance of defining blue economy in the Arctic. The topic is timely. Interest in developing the Blue Economy is growing enormously, and related policies and conferences are multiplying as the concepts of Blue Growth and the Blue Economy gain ground as a means of talking about the importance of the maritime economy and the immense economic opportunities it represents.

Today marine based activities constitute a significant part of most Arctic economies, as noted in the ECONOR report referenced in this edition. The economies that make up the Arctic are as varied as the cultures living there, and the Arctic Blue Economy is similarly varied: the roles of fishing, shipping, marine and coastal tourism, and mineral or energy extraction are distinct and different in the Arctic regions of Alaska, Canada, Greenland, Norway, and Russia — the five countries that have Arctic coastlines. To some Arctic nations, the ocean is core to the economy: in Greenland fisheries constitute more than 90% of exports and provide a large part of the population with jobs and food. That vital connection to the sea is well understood by Greenlanders, as Jakob Strøm writes, while the future of Arctic fisheries is examined by Vicky Lam.

The Blue Economy attracts attention in the Arctic perhaps more than anywhere else because a new ocean is literally opening up as sea ice retreats. The

dramatic warming of the Arctic potentially allows for new shipping routes, new fishing grounds and cruise tourism opportunities. Investor interest in the Arctic is also driven by the potential of the Blue Economy with new opportunities in shipping, oil and gas exploration, mining, fisheries and tourism. With growing investment in infrastructure across the Arctic coastline an increase in industrial activity and shipping seems inevitable, which drives new risks of accidents, oil spills and disturbances of marine ecosystems. Steven Sawhill examines that risk from an insurance perspective.

By applying the lens of the Blue Economy concept we can start the discussion of how we extract value from the ocean and how we ensure that value for future generations. A Blue Economy must be sustainable and live up to three core cri-

teria: it should provide social and economic benefits for current and future generations; it should aim to restore, protect and maintain marine ecosystems and finally, it should be based on clean technologies, renewable energy and circular material flows. As Ásmundur Guðjónsson writes, extracting full value from resources taken from the ocean could be part of this picture.

The principles for a sustainable Blue Economy are relevant everywhere. WWF has commissioned reports on the Blue Economy in various regions of the world, and in May 2017 they will be joined by another, with a focus on the Arctic. In the meantime, we offer these perspectives on an Arctic Blue Economy. ○



**ANNE METTE
ERLANDSSON
CHRISTIANSEN.**

Lead Specialist, Arctic
Responsible Development

AS ARCTIC SEA ICE RETREATS, NEW ECONOMIC OPPORTUNITIES OPEN UP

US, Canada take major steps on Arctic conservation

THE CANADIAN AND US

governments have jointly announced important measures for conservation, sustainable development, and regulation of industrial activities in the Arctic. The US has designated the vast majority of US waters in the Chukchi and Beaufort Seas as indefinitely off limits to offshore oil and gas leasing, while Arctic Canadian waters are indefinitely off limits to future offshore Arctic oil and gas licensing, to be reviewed every five years.

The two countries have also taken action on shipping, launching processes to identify sustainable shipping lanes throughout their connected Arctic waters, while committing to decreasing the use of highly polluting heavy fuel oils in Arctic waters.



Photo: Kelley Elliott, The Hidden Ocean, Arctic 2005 Exploration, NOAA/OAR/OER

A safer future for the polar bears in Beaufort Sea.

In addition, US President Barack Obama and Canadian Prime Minister Justin Trudeau announced several measures to improve the sustainability of Arctic com-

munities. Canada is also committing to explore how to support and protect the future of the Arctic Ocean's 'last ice area' where summer sea ice remains each year.

this task easier: "Arctic foxes have a habit of building dens where their ancestors did, and they remain identifiable even after decades of disuse," Tolvanen says.

Fund to help Indigenous Peoples' Arctic work

ÁLGU IN THE SÁMI language means "beginning" and 2017 will mark a new beginning in improving the participation of Indigenous peoples' organizations at the Arctic Council. Funding has been a perennial issue for the Permanent Participants since the Arctic Council was created in 1996. The Álgú Fund, independent of, but alongside the Arctic Council, will provide predictable and reliable funding. This will be distributed on an equal basis to the six Permanent Participant organizations: the Aleut International Association; Arctic Athabaskan Council; Gwich'in Council International; Inuit Circumpolar Council; the Russian Association of Indigenous Persons of the North (RAIPON) and Sámi Council. The fund will ensure increased access to research, capacity for community engagement and ability to collaborate on projects. The Álgú Fund is now actively soliciting support.

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Arctic foxes denning in Finland after long absence

CAMERAS HAVE revealed that Arctic foxes attempted to breed in Finland this summer, the first recorded attempt since 1996. The species has only been seen sporadically in Finland. The camera traps were supported

by WWF-Finland and maintained by Metsähallitus, the Finnish state forest enterprise.

Arctic foxes are found around the circumpolar north, and are still abundant in North America and Russia. In the Nordic countries, however, the species is in danger of disappearing. The red fox is moving north – likely due to climate change – and out-competing and sometimes killing its smaller cousin. Voles and lemmings have also been scarcer in Finland

and Scandinavia in recent years.

"The camera recorded hundreds of daily images of two Arctic foxes – one white and one dark-furred. The two were seen playing together, and because the breeding season was close, we could infer that they were attempting to breed," said Petteri Tolvanen, Programme Manager for WWF-Finland. WWF is now helping Metsähallitus train volunteers to search for potential denning places. A genetic quirk of the fox makes

Giant life-forms in High Arctic

A GERMAN RESEARCH

expedition into the high Arctic has returned with stunning pictures of life beneath the high Arctic ice. The Polarstern Expedition surveyed the Karasik seamount, rising from a depth of 5000 m to 650 m at above 86 degrees north between Greenland and Siberia in the central Arctic. The area is mostly assumed to be empty of life because the waters are so deep and low in nutrients in the water. Where seamounts rise up in more southerly locations, there is generally more life.

“With the first pictures of the summit of the Kara-

sik seamount we did not believe our eyes,” said chief scientist Dr. Antje Boetius from the Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research (AWI). “It is overgrown with huge globular sponges. Between the sponges lie centimetre-thick mats of needles and worm-burrows. We were able to observe different species of fish which were not expected here, and caught a glimpse of the northernmost corals discovered so far. There are huge white starfish, blue snails, red crabs and white and brown clams between the sponges.” The giant



Starfish eating sponge

sponges are up to a metre in size, hundreds of years old and seem to be able to move on their needles, and are a home for many other animals, according to an Institute news release.



Record low sea ice extent at both poles

SCIENTISTS at the National Snow and Ice Data Center (NSIDC) say both the Arctic and Antarctic experienced record lows in sea ice extent in November, with scientists astonished to see Arctic ice retreating at a time when the region enters the cold darkness of winter. Warm temperatures and winds drove record declines in sea ice at both polar regions in November compared to the 38-year satellite record of ice extent

for the month. 2016 is on track to be the warmest year on record globally. The loss of reflective sea ice amplifies the warming process by exposing the dark sea, which soaks up more heat which in turn melts more ice.

Shrinking Arctic reindeer

SCIENTISTS SAY reindeer on Svalbard, a chain of islands north of Norway, are getting smaller because climate change is depleting the animals' food. The average weight of adult reindeer on Svalbard fell from 55kg



Reindeer, Alkhorner on the west coast of Spitsbergen, Svalbard, Norway.

(121lb) to 48kg (106lb) in the 1990s as temperatures rose.

Researchers found that warmer winters mean snow is more likely to fall as rain which can freeze into sheets

of ice, making it harder for the herbivores to reach plant food. Some reindeer starve and females often give birth to stunted young.

Defining 'The Arctic Blue



Economy'

The Blue Economy is an emerging movement involving nations, corporations, and civil society. JUDITH KILDOW says it could also be an important tool in promoting a sustainable Arctic economy. But it needs to be clearly defined. ➤



Tourists on Jökulsárlón Ice Beach, Iceland.

IN 2012 at the Rio+20 United Nations Conference on Sustainability, the description began as a land based version of sustainability, but shifted to a focus on the ocean and coasts. This was encouraged by island and developing coastal nations with concerns about the fate of their shorelines and coastal oceans, expanding the blue aspect of the green (land) economy.

In parts of the world where nations are

JUDITH T. KILDOW is founder and Director of the National Ocean Economics Program (NOEP)



just discovering the benefits of offshore economies, governments interpret the Blue Economy as the “Ocean Economy,”

embracing all

ocean-dependent activities, sustainable or not.

Regardless, the term Sustainable Blue Economy has only recently gained wide

THE VALUE THAT A PROTECTED BEACH PROVIDES AGAINST COASTAL EROSION OR THE OCEAN’S CAPACITY TO SEQUESTER CARBON DIOXIDE IS LITTLE UNDERSTOOD

usage by economists, corporations and governments in developed nations.

A core component of this Blue Economy in Rio was the principle of equity, ensuring that developing countries optimized benefits received from development of marine environments such as fisheries and other offshore production activities. More recently such concepts as gender equality and generation of inclu-

sive growth with jobs for all have gained importance as well. Equity takes on a wider importance in the Arctic, because sustainable local economies of Indigenous peoples are acutely affected by changes underway.

This discussion of the Blue Economy focuses on sustainability that leaves the ocean a better place, not taking too much good stuff out, or putting in too much bad stuff. Breaking it down further, the Blue Economy includes such green technologies as new materials, renewable energy, emissions controls, safe and efficient robotics. A top priority is to employ sound strategies for sustainability, utilizing the best science and technology for monitoring and analyses.

The Blue Economy also includes inter-generational considerations, which means long term economic valuation to ensure that nature’s non-market values are considered alongside traditional metrics of the market economy which tend to have short term revenue goals, often at the cost of long term environmental health.

For past decades, the health of our coasts and oceans has been compromised by assaults from land, sea, and air in ways that are socially and economically costly. In the Arctic, these forces have impacts that are much stronger than in other places on earth, due to a fragile natural environment changing at a rapid pace. As melting ice opens more of the Arctic Ocean to economic use, corporations from many countries are investing and planning. Already there are more than 800 known proposals for infrastructure projects in the Arctic ranging from roads to ports to mining to tourism. It is essential to chart a course that balances opportunities for commerce and industry, jobs and revenue, against ecological impacts on the fragile Arctic.

Therefore, the term Sustainable Blue Economy takes on greater significance and urgency in the Arctic than in other regions. The opening of a “new ocean” where relatively little development has occurred offers an opportunity to exercise the political will to implement a strategy to sustain the Arctic ocean and coastal areas in perpetuity. The Blue Economy



Photo: Timothy Tamargo, U.S. Coast Guard

A U.S. Coast Guard fire team, Arctic Shield 2012. Arctic Shield is a U.S. Coast Guard-directed exercise designed to test oil spill response and strengthen law enforcement and search-and-rescue capabilities in the Arctic regions of Alaska.



Photo: Bo Eide, CC Flickr.com

A fishing boat west of Tromsø, Norway hauls in a seine net full of herring.

could be the driving force.

As the definition of the Sustainable Blue Economy continues to unfold, the elements that it will encompass will change over time. Sustaining a Blue Economy in the Arctic must acknowledge that the rapid pace of change demands more urgent attention to sustainable principles. Climate change and development impacts threaten Indigenous populations that have relied for generations on natural resources for their survival.

Equity is integral if the potentials of the Arctic are to materialize, as is consensus on sustainable practices among the inhabitants, governments, and developers. At least eight Arctic and subarctic nations have crucial interests in the evolving and uncertain future of this area, so consensus must be reached soon on a definition of the Sustainable Blue Economy, metrics

for measuring it, and its principles for implementation. As a bonus, principles established for a truly sustainable Blue Economy framework created for the Arctic might be transferable to other coastal regions.

The promise for blue growth suffers from the absence of sound measurement. Not all countries calculate their ocean-related Gross Domestic Products (GDP) in the same way. Comparing findings is complicated by differing measurement systems and often-blurred definitions of coastal and ocean activity. Estimating the true size of the flow of goods and services in the global ocean economy is difficult. WWF in 2015 placed the world's annual "gross marine product" at \$2.5 trillion.

Less is known about nonmarket goods and services. The value that a protected beach or estuary provides against storm

surges and coastal erosion, or the ocean's capacity to sequester carbon dioxide, is little understood. How much this natural capital is eroded by human activity, and how much benefit is derived from it requires serious consideration for effective decision-making.

Threats to the seas from climate change, sea, air and land-based pollution and over-fishing will persist. In much of the world, the Blue Economy remains "a nascent aspiration, a distraction more 'economy' than 'blue'" (Economist, 2016). The Arctic doesn't have the luxury to delay while agreeing on terms. A working definition that includes "do no harm to the oceans" would suffice, protecting the fragile Arctic environment while providing justice for Indigenous peoples who depend on its resources. ○

The big picture

A report published in January, 2017 by the ECONOR Project provides an overall snapshot of the current Arctic economy. In this preliminary look at the findings, authors **IULIE ASLAKSEN**, **SOLVEIG GLOMSRØD** and **LARS LINDHOLT** discuss the importance of the blue economy to the Arctic.

THE GOAL OF the ECONOR projects is to describe the circumpolar economy in terms of macroeconomic development, socio-economic conditions, extractive and renewable natural resources, and

studies of the relationship between the market and subsistence activities of Indigenous peoples, as a basis for livelihood and culture.

The ECONOR report, *The Economy*

of the North 2015, published in January 2017, shows that the most important Arctic economic sectors are extraction of natural resources and the public sector. Petroleum and fish are the most important natural resources of the Arctic. For oil and gas extraction, the analysis in the ECONOR report gives future trends to 2050 under a climate policy scenario. For other economic sectors, the ECONOR report does not give future trends, but the present overview and time series form a consistent point of departure for describing scenarios and assessing trends of the economy. Arctic economic trends are highly globalized, driven by global resource demand. To a less extent Arctic econom-

Oil platform and oil tanker in Pechora Sea, Nenets Autonomous Okrug, operated by Gazprom Neft.



ic development is regionally driven, but the global resource demand as well as climate change impacts have significant consequences for the regional and local economies. Declining petroleum and mineral prices in recent years have had large impacts on the Arctic economy.

In an example of how climate change can substantially affect the economy of a country, the catch of deep sea prawns in Greenland after 2011 has declined. However, climate change has introduced the mackerel as a new resource in Greenland waters and was seen for the first time in Greenland waters in 2011. In 2014 mackerel made up more than 20 per cent of the total Greenland export income, compensating to some

PETROLEUM AND FISH ARE THE MOST IMPORTANT NATURAL RESOURCES OF THE ARCTIC.

extent the decline in the important shrimp export.

In Alaska, the petroleum industry is the backbone of the economy. But incomes from oil and gas extraction have declined in the last 10 years. In Arctic Russia, petroleum extraction is the largest sector of the economy. The first Russian Arctic offshore oil field, Prirazlomnoye oil field at only 20

meters depth in the Pechora Sea, started production in 2013. Meanwhile, the Yamal LNG plant currently under construction is to start production in 2017 for export to Asia along the Northern sea route and to Europe.

The ECONOR report presents a study of future climate policy impacts on the future potential for petroleum supply from the Arctic regions, based on a global petroleum model. It is assumed a climate policy scenario sufficient to reach the '2 degrees C' scenario, denoted the 450 parts per ➤



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► million (ppm) scenario. The climate policy is represented by a global CO₂-price, initially leading to reduced demand for fossil fuels. The CO₂-price has far stronger effect on coal as it is more carbon-intensive than both oil and gas. The main result of the calculations is that the Arctic may not lose petroleum revenues from a global climate agreement. The reason is firstly that a CO₂ price may increase the demand for gas. This can lead to increased gas prices for the Arctic producers. At the same time we find that oil prices do not fall as much as one could expect. The reason is that OPEC may find it profitable to reduce its production to ensure roughly the same price of oil one would have without a climate treaty.

ECONOR contributes to policy-relevant knowledge through its comprehensive knowledge basis for the economy, encompassing the entire economy by presenting macro-economic and socio-economic data, analysis of petroleum, and knowledge on the local economies and subsistence activities of Indigenous peoples and other local people. The knowledge base is useful for describing policy trade-offs between economic and environmental goals, and identifies needs for enhanced regulatory frameworks for resource use. Resource conflicts emerge between petroleum and fisheries, and wild fish stocks and aquaculture. *The Economy of the North 2015* brings attention to impacts on the rich blue economy and the challenges involved in securing sustainable use of the resources of the blue economy.

THE ECONOMY OF THE NORTH 2015

The ECONOR III report is produced for the Arctic Council Sustainable Development Working Group (SDWG) and is funded by the Norwegian Ministry of Foreign Affairs and Nordic Council of Ministers, and with financial support from participating institutions and the Arctic Monitoring and Assessment Program (AMAP). ○

The blue economy in Arctic communities

From childhood Greenlanders are taught that if they don't take care of the waters, the fish and mammals living in them, Arnacquassaaq – the Mother of the Sea – will wreak her vengeance by withholding her precious, life-giving resources. The legend says Arnacquassaaq's hair will become dirty and tangled, trapping the sea animals to prevent hunters from catching any food. JAKOB STRØM says the legend continues to underscore how the sea and its bounty remains essential to Greenland's economy.

NO MATTER where you go in Greenland, one sight prevails – the fisher or hunter, dressed in his “uniform” of blue coveralls and rubber boots setting out to sea each morning. In the afternoon, he returns with the day's harvest and sells it at “Brættet” – the local market for fresh catch – or he delivers it to the fish factory where quite likely his wife, mother, brother or another close relative earns their daily living.

You will see huge trawlers unloading boxes of cooked shrimp into containers, then heading for Japan, the UK or other seafood-hungry destinations thousands of miles away.

Attempting to describe the ocean's importance to Greenland is like trying to assess the importance of water to the human body. It cannot be overstated. The ocean is our source of food and income; it is our most important infrastructure and where we spend a great deal of our leisure time. It is our life.

Imagine a future where 85 percent of your country's export disappeared and the remaining 15 percent couldn't get out of the country. Or a future where



The sculpture of “the Mother of the Sea” in Nuuk.

**TAKE CARE OF
ARNAQUASSAAQ - THE
MOTHER OF THE SEA - AND
SHE WILL TAKE CARE OF US**

scarcely any goods come in from the outside world while those that do are too expensive for the general population. Imagine a future where the livelihood for the most – and the favorite pastime for even more – is obliterated. That would be Greenland's future without the ocean.

Fourteen per cent of this country's active labor force works in the hunting or fishing industry. Exports from these industries account for more than 25% of the economy.

The same hunter described earlier, along with his family, might visit relatives in nearby settlements on the weekends. Or he might sail into the fjord to hunt caribou or birds near the shores. The civil servant who regulates the quotas on fish and the doctor who treats him at the hospital are also likely to be out on the water.

There is no official figure, but many families supplement their incomes by bartering the results of hunting and fishing either out of necessity or as a hobby. In one way or another, we all depend on the sea.

But the ocean itself is in transition. Some changes are due to investments in new and bigger vessels and in infrastructure – ports – to better benefit plying the ocean. And substantial changes in the seagoing transportation of goods will take place over the next decade. For well over 200 years goods to and from Greenland have gone through Denmark. With a new port in Nuuk that will change, and the Greenlandic infrastructure will open to direct import and export on major international shipping lanes. These new ports will be accompanied by new opportunities in tourism, mining and Arctic shipping due to declining sea ice. The route through the North-West Passage goes right by Greenland.

Anything that alters the seas alters our lives and climate change is definitely a major game changer. In the far north, sea ice is a highway for hunters and fishers plying their trade via dogsled. As sea ice diminishes, they will have to adjust, possibly investing in a dinghy



Photo: Pål Hermanson

A fisherman brings his catch to the fish factory.

and engine. Meanwhile, skills honed throughout a lifetime are no longer useful in this new scenario. What was already a challenging life becomes even harder economically and culturally.

But warmer waters also bring new possibilities: the cod is back, and the outlook for the pelagic fishery – those fish that live neither close to the ocean bed nor near the shore – is very positive with the potential to harvest popular fish species that net higher revenues and possibly new jobs.

The future of the Arctic Ocean

demands a responsible and sustainable approach to reap the benefits of a blue Arctic economy, for Greenland as well as for the rest of the world.

It demands co-dependence: we cannot treat the Arctic Sea as a museum. Nor can we carelessly exploit it. Only one thing is certain: if we take care of “the Mother of the Sea”, she will take care of us. ○



JAKOB STRØM
works in Nuuk,
Greenland in
growth and
sustainability
for the municipality



Photo: Jakob Strøm

The new port in Nuuk will be finished in a few months.

Fishing in a warmer Arctic

This year is the hottest on record with the global average temperature hitting a recorded high for two consecutive years. While this anomalously high temperature has been anticipated by climate scientists **VICKY LAM** writes it still raises grave concerns.

The rate of warming is faster in the Arctic than the global average and triggers multiple stresses on the Arctic Ocean ecosystem including an increase of invasive species, a rise in ocean acidity and increased human activity brought about by the expansion of commercial fishing fleets as sea ice cover decreases. These changes are resulting in fluctuations in the quantity, quality and predictability of catches, all of which have direct implications for the economics of fisheries in the Arctic.

Fisheries are not only crucial income for fishers, but also important food and nutritional security in the Arctic region. The annual catch in the circumpolar region is about 2.5 million tonnes. Almost 99% of that total catch is by commercial and artisanal fishers. The

remaining 1% belongs to both subsistence fisheries for personal consumption and recreational fisheries. This provided annual revenues of US \$2 billion from 2001 to 2010. Although the total revenue from the fisheries sector only contributes a small proportion of the gross domestic product (GDP) of each country, the revenue from fishing is very important to small-scale fishers. Fish also contributes significantly to the nutritional health of Arctic communities, where fishing feeds families. In 15 Arctic Alaskan coastal communities, around half of their total catch is used for subsistence purposes.

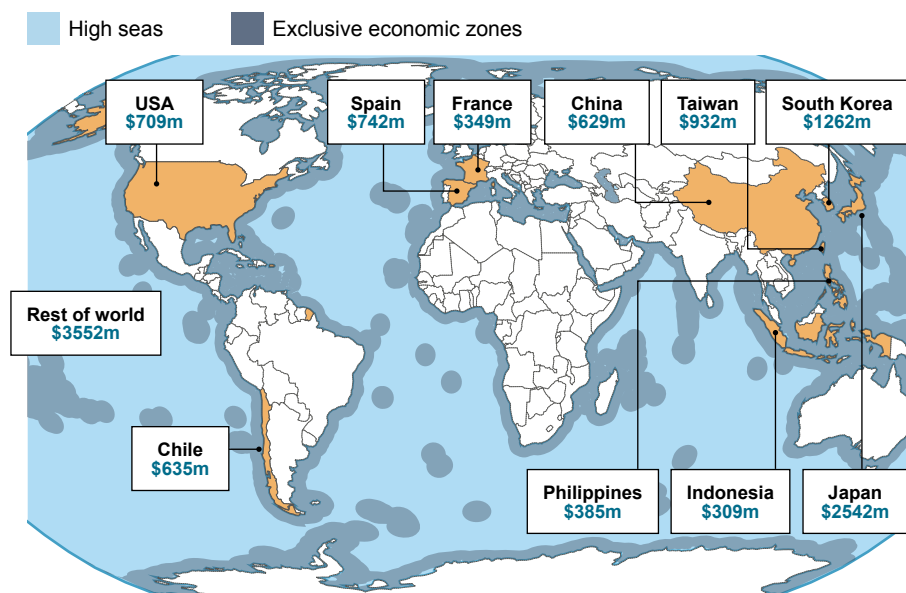
Warming and loss of sea ice in the Arctic may lead to increased opportunities in the fisheries. Fish may migrate to the polar region as suitable habitats

emerge. However, the increasing atmospheric carbon dioxide concentration from the burning of fossil fuels, exacerbated by the melting sea ice, increases the acidity of the Arctic Ocean. The pH (potential of hydrogen), which is a numeric scale for measuring the acidity of the Arctic Ocean, is projected to decrease more rapidly than other parts of the global oceans. Low pH poses a threat to the survival of marine organisms especially shell-forming invertebrates. This therefore may counteract the positive effects in fisheries production related to the projected increase in ocean temperature and ocean life.

Ocean acidification is therefore adding uncertainty to future fisheries production and revenues. Although climate change indicates an increase in fisher-

The biggest catch

Ten countries are responsible for 70 per cent of the landed value of high seas fishing.



Maps: Ketill Berger, www.filmform.no. Source: New Scientist, marineregions.org, Natural Earth.

Open for all

Climate change will make the Arctic high seas accessible for all.



ies revenues in the 2050s in the Arctic under computer modeling analysis, part of this gain, however, is lost when ocean acidification is taken into account. From the analysis, ocean acidification is projected to lead to a 15% reduction in the fisheries revenues (US\$ 112 million/year) relative to a “climate change only” scenario. Finland and Canada are the countries being affected the most with a more than 20% reduction under ocean acidification. These projected changes in fisheries production and revenues will lead to subsequent impacts on fishers’ income and the Arctic economy overall. Although they are projected to increase under climate change, ocean acidification may lessen these projected gains of fishers and the whole Arctic economy by 12% and 16%, respectively. Despite the projected increase in fisheries-related jobs under climate change in the Arctic, ocean acidification may reduce this positive impact with a loss of approximately 3,100 jobs.

Melting sea ice may also draw other non-Arctic countries to fish in the Arctic. Persistent growing global demand for seafood may lead to many countries with distant water fleets to explore

OCEAN ACIDIFICATION IS ADDING UNCERTAINTY TO FUTURE FISHERIES PRODUCTION AND REVENUES

newly open fishing grounds such as the Arctic. According to international law, any country can fish in the high seas and unregulated harvest may lead to over-exploitation in this region. These highly subsidized non-Arctic countries often have more efficient and more powerful fishing fleets and hence may out-compete the Arctic countries’ fleets, which are primarily small-scale based. Last year, five Arctic nations – Canada, Denmark, Norway, Russia and the United States – reached an agreement to regulate fishing in the Arctic Ocean. However, most of the important countries that operate fisheries in this region are not yet participating in this agreement. In 2016, to build on this agreement, 10 nations which are fishing in the Arctic met to further negotiate fishing rights

in the Arctic, but no agreement was reached. The projected positive effects of climate change on fisheries may not benefit the Arctic countries unless all countries that operate fisheries in this region act together to prevent the high seas from being overfished.

With the implementation of the Paris Agreement, about 200 nations have agreed to hold the increase in the global temperature to well below 2°C compared to pre-

industrial times and pursue efforts to limit it to 1.5°C above pre-industrial levels. Ratifying nations are required to achieve this goal by reducing greenhouse gas emissions as soon as possible. The Agreement underscores the importance of research and adaptation plans for all stakeholders in the Arctic. These actions may reduce the impacts of warming in the Arctic and hence provide a glimmer of hope for the adverse impact of warming in the polar region. ○



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An international fisheries agreement

About 2.8 million square kilometers of the Arctic Ocean are beyond national jurisdiction, and outside of any agreement on the use of those waters. The exception is a thin wedge of Arctic Ocean stretching from the Northeast Atlantic covered by the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR). In the absence of open water, this lack of fishing regulation isn’t critical. But with the Arctic projected to become virtually ice free by the middle of the century, it does become potentially problematic. In 2015, the five Arctic coastal nations (Denmark, Norway, Canada, Russia and the United States) reached an agreement to voluntarily declare a moratorium on commercial fishing in international Arctic waters.

But this agreement does not stop any other country from fishing there. The five Arctic coastal states have now expanded the talks on a fishing agreement to include Iceland, China, Japan, South Korea, and the European Union.

After the most recent meetings in December 2016, the US as chair of the meeting reported that all delegations reaffirmed their commitment to prevent unregulated commercial high seas fishing in the central Arctic Ocean. In addition there was “a commitment to promote the conservation and sustainable use of living marine resources and to safeguard healthy marine ecosystems in the central Arctic Ocean.” It was further noted that “most delegations view this as part of

a ‘stepwise’ process in advance of possibly establishing one or more additional regional fisheries management organizations or arrangements for this area.”

Sticking points in the discussions included: the manner in which the agreement addresses exploratory fishing; the conditions under which a decision might be made to commence negotiations on an agreement to establish one or more additional regional fisheries management organizations or arrangements for the central Arctic Ocean; and decision-making procedures.

Another negotiating session involving the same countries is expected to be scheduled for the spring of 2017.

Trends, opportunities and risks:

WWF on the blue economy

CLIMATE CHANGE will open up a new ocean in the Arctic as dramatic changes appear to be accelerating beyond most scientific predictions. With the loss of sea ice and the advance of technology there will be new opportunities for development, but we need to ensure the Arctic's irreplaceable resources will be well stewarded in a sustainable way. Protecting its natural wonders and essential ecosystems, securing food and cultural access for indigenous and

local people is critically important.

One way is to do this is by supporting and nurturing a sustainable blue economy — economic activity based on the oceans and seas. Governments and the private sector have moved swiftly to establish



Tom Arnborn
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new blue economy goals, policies, and incentives for investment. Private investors have also identified large infrastructure investment needs and opportunities in the Arctic over the next 15 years for industries such as fishing, shipping, mining, and extraction of oil and gas. In addition, there is a need for investment in telecom, housing, education and health. Before the rapid up-scaling of these activities begins, we need to ask: what would a sustainable blue economy look like, and how can we get it right before development starts?

The way forward could include: a new regional fisheries agreement; comprehensive Arctic guidelines for tourism; integrated ocean management; and drawing upon the International Maritime Organization's Polar Code with its existing environmental protocols. These elements could ensure stakeholders are involved in securing sustainable development in the region and serve to decrease — and in some cases avoid — conflict between these sectors.

While the Arctic is unique, it does not stand apart. It is critically interlinked with other global ecosystems. An Arctic blue economy must be part of the global economy and work to advance sustainable development goals that focus on conservation and responsible use of the oceans, seas and marine resources as per WWF's reports *Reviving the Ocean Economy*, *Principles for a Sustainable Blue Economy* and *All Hands on Deck*.

A set of principles for a sustainable blue economy harmonized with sustainable development goals, as well as other global agreements and best practices could shape and inform a successful Arctic blue economy. These principles would serve to steer us toward a future of long-term prosperity, social well being, and ecosystem health in the Arctic while benefitting local and indigenous populations. We have a window of opportunity to get the blue economy right in the Arctic. If we do, we can set the standards for the management of other oceans on the planet. ○

Arctic shipping

Shipping in the Arctic is changing with data showing more ships, longer navigation seasons, and new entrants among ship operators in the region. DNV GL, the world's leading ship and offshore classification society, wants to ensure shipping in the Arctic is safe. But STEVEN SAWHILL asks is the insurance industry prepared to ensure the safety of people, property and the Arctic environment?

A FIRST STEP is to do a temperature check on safety and Arctic risk from key stakeholders in the maritime community, including the community's insurers. In a study sponsored by the Gordon and Betty Moore Foundation (USA), DNV GL asked more than 1000 individuals from the world's leading marine insurers to give us their perspectives on Arctic shipping risk.

Marine insurers are professional risk managers, and insurance is one of several tools in the risk management toolbox. Insurers do not want to lose money by insuring bad risks, thus good underwriting involves a degree of risk assessment to set an insurance policy's conditions. Moreover, insurers' loss prevention activities help their customers to identify safety weaknesses and fix them before they lead to incidents and claims. These practices can promote higher shipping standards.

At the same time, marine insurance operates in a competitive environment. Market conditions and an insurer's competitive position strongly affect the extent to which an insurer can influence

& marine insurance

Key findings on insurers and Arctic risk

FINDINGS	IMPLICATIONS
Safety is a major concern in the maritime industry. But commercial concerns overshadow safety concerns. Human behaviour leads technical safety concerns.	Today's depressed maritime market may lead to cost-cutting. Training is often an early casualty of cost-cutting, which may in turn hurt safety and increase marine incidents and claims.
Insurers see safety excellence as a competitive differentiator among their companies.	Insurers will support loss prevention measures that help both their customers and themselves maintain a competitive edge.
Insurers believe they can take measures to improve safety and remain commercially competitive.	Insurers see themselves as part of the solution.
Insurers believe common rules and regulations are the essential foundation to maritime safety.	Common rules are necessary to maintain a level playing field in a competitive environment.
Insurers view rule makers and enforcers as the driving forces behind maritime safety.	Insurers look to recognized authorities such as the IMO and the classification societies for defining safety standards.
Insurers believe Arctic shipping is riskier than elsewhere. They expect higher incident rates and higher loss rates, especially for third-party liabilities.	Insurers may be conservative in writing policies for the Arctic. Insurers will be receptive to additional risk control measures they and their customers can use.
Insurers don't have enough information to adequately assess Arctic risks.	Insurers will welcome better information on Arctic shipping and its potential risks.
Insurers believe the Polar Code will be effective in managing Arctic shipping risk.	Insurers may want to "wait and see" how the Polar Code performs before taking initiatives themselves.

standards. Today's depressed shipping market has pushed insurance rates to historic lows.

Moreover, the nascent nature of Arctic shipping presents additional challenges to insurers. For new, emerging or developing risks, insurers do not have sufficient historical information to establish an actuarial relation between activity, incident, claims, safety measures, deductibles, premiums and settlement costs.

We learned, not surprisingly, that insurers are very interested in safety. A good safety record is good for business – both for insurers and their customers. They are also keenly aware of the growing interest and activity in the Arctic. Although insurers lack solid risk management information for the Arctic, they

expect incidents in the Arctic will be more costly due to the difficulty of rendering timely and effective assistance to ships in need in this remote region.

Most importantly, we learned that insurers see themselves as part of the solution for safe Arctic shipping. They believe the insurance industry can take additional measures to improve safety. One prominent example is the Arctic Marine Best Practice Information Forum, an initiative of the International

ARCTIC SHIPPING PRESENTS ADDITIONAL CHALLENGES TO INSURERS

Union of Marine Insurers in cooperation with the Arctic Council.

Their positive attitude is important and we at DNV GL want to build on this. We are currently looking for ways to collaborate with marine insurers on implementing the Polar Code, improving our information and methods for Arctic risk assessment, and helping shipowners prevent incidents.

The box above summarizes key conclusions from our study. The full study will be published in early 2017. ○



STEVEN SAWHILL is Principal Consultant, Arctic Operations & Technology, Maritime Advisory DNV GL, Norway

Growth in the blue bioeconomy

The Nordic Council of Ministers (NCM) has highlighted bioeconomy as a key priority for sustainable development in the region. In the North Atlantic part of the Nordic region, the economy is largely based on the ocean and its marine resources, and as ÁSMUNDUR GUÐJÓNSSON writes, there is an increasing focus on optimising the utilisation of marine resources.

WHEN DENMARK assumed the NCM presidency in 2015 (the presidency rotates between the Nordic countries annually) the Faroese government took responsibility for fisheries and aquaculture and launched the Growth in the Blue Bioeconomy programme. Although the presidency lasted just one year, it implemented three-year programmes to ensure continuity, and some of the projects will continue throughout 2017.

One main project was *Everything Ashore*, a feasibility study exploring how to use the whole catch in the fisheries sector and add the highest possible value to the biomass. Analysing fisheries in the Barents Sea, Faroese and Greenlandic waters, the report used a value chain analysis comprising of: calculating the available biomass; calculating the value chain of the existing landings and discard; and calculating the potential value chain of the discarded biomass.

The study concludes that the potential increase in Gross Value Added from

bringing the entire biomass ashore ranges from DKK 833 million for silage solution (liquefying the biomass using acid) to DKK 1.142 million for sorting the biomass on-board. This represents an increase of 14 % and 20 % respectively.

In terms of technical and economic feasibility, the study concludes that it is feasible for vessels to bring everything ashore in the Barents Sea

and the Faroe Islands, but due to distances and cost of transport, the challenges are greater in Greenland. It also concludes that it is economically feasible to bring everything ashore, but not as profitable as with their current activity. However, since the added value will be created later in the value chain, bringing the entire biomass ashore can enable value creation on land. The greatest Gross Value Added comes from sorting the biomass on-board, which would require time for the fishing vessels to adapt.

Everything Ashore identifies four possible implementation approaches. One is to leave it to the market, which could be insufficient. Another could be vertical integration in the fisheries sector, which has been deemed a key success factor in increasing

USE OF MARINE MATERIALS BY FASHION DESIGNERS COULD BE EXPANDED

The Fish Leather Company

The Fish Leather Company is focused on selling affordable fish leather supplies. Fish leather is made from real fish skin and offers an alternative to exotic leathers that threaten endangered animals. Unlike other fish leather suppliers, we hope to fulfil the needs of individuals, rather than shops, to allow more people to experiment with the material. Fish leather can be used for crafts, from jewellery making to book binding. The look of the fish leather, created by the company, is unique and looks great when applied to objects. [Click here](#) to find out more about the company, the different types of fish leather and where our fish leathers come from.



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the utilisation rate in

Iceland. Removing barriers to integration between fisheries and on-land value chains could help make it more attractive for vessels to bring everything ashore. The third option is providing various incentives, such as increased quotas, tax incentives, and subsidies or funding, to make it more attractive to land the entire biomass. The fourth option is a legal obligation, which was not recommended by the stakeholders during the project, but which some acknowledged might be necessary.

It is clear that bringing everything ashore could provide significant benefits for the economies of the small coastal communities in the Nordic Atlantic, but different stakeholders expressed differing views towards the concept during the stakeholder analysis of the project. Government officials and Research and Development institutions were more enthusiastic about bringing everything ashore than stakeholders in the fisheries industry. The decision to bring everything ashore is a political, ethical and societal one. To get everything ashore, the project report recommends that authorities must set clear goals for the

blue bioeconomy, secure both national and international funding, strengthen industry and research cooperation, and invest in human capital.

FISH AND FASHION

I worked at the Faroese Ministry of Fisheries when the programme launched, before I became director at NORA, a Nordic organisation based in the Faroe Islands. NORA implements the two last projects of the programme on behalf of the Faroese government, based on recommendations from the *Growth in the Blue Bioeconomy* conference held in June 2015. One focuses on blue bioeconomy cooperation between northern small islands and small islands from the Caribbean, the Pacific and Indian oceans etc. A Small Islands forum for sharing practical, policy-oriented experiences in blue bioeconomic growth will be organised together with Commonwealth and the United Nations Food and Agriculture Organization.

The other project, *Fish and Fashion*, focuses on marine resources in the fashion industry. Some marine materials are already being used, but the use of



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marine materials by fashion designers could be expanded. The project will consist of a master class where Nordic designers will be exposed to marine materials such as fish skin, sealskin and textiles made with North Atlantic seaweed. In connection with the master class, there will also be a symposium on sustainable textiles in the fashion industry.

The blue bioeconomy continues to be a priority in the Finnish and Norwegian presidencies, for NORA and for the fisheries and aquaculture sector. These projects and others will help the Nordic Atlantic region optimise the utilisation of its most important resources. ○

THE PICTURE

Blue economy by necessity



Photo: U.S. National Archives and Records Administration/Wikimedia Commons

Six Inuit stand beside a native umiak – an open skin boat – on a sled in Point Barrow, Alaska. The umiak is less well known than the kayak but was equally important to the Inuit, often used for transporting whole families in the summer or for hunting whales.



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