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THE CIRCLE

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WHAT'S NEXT FOR THE ARCTIC?

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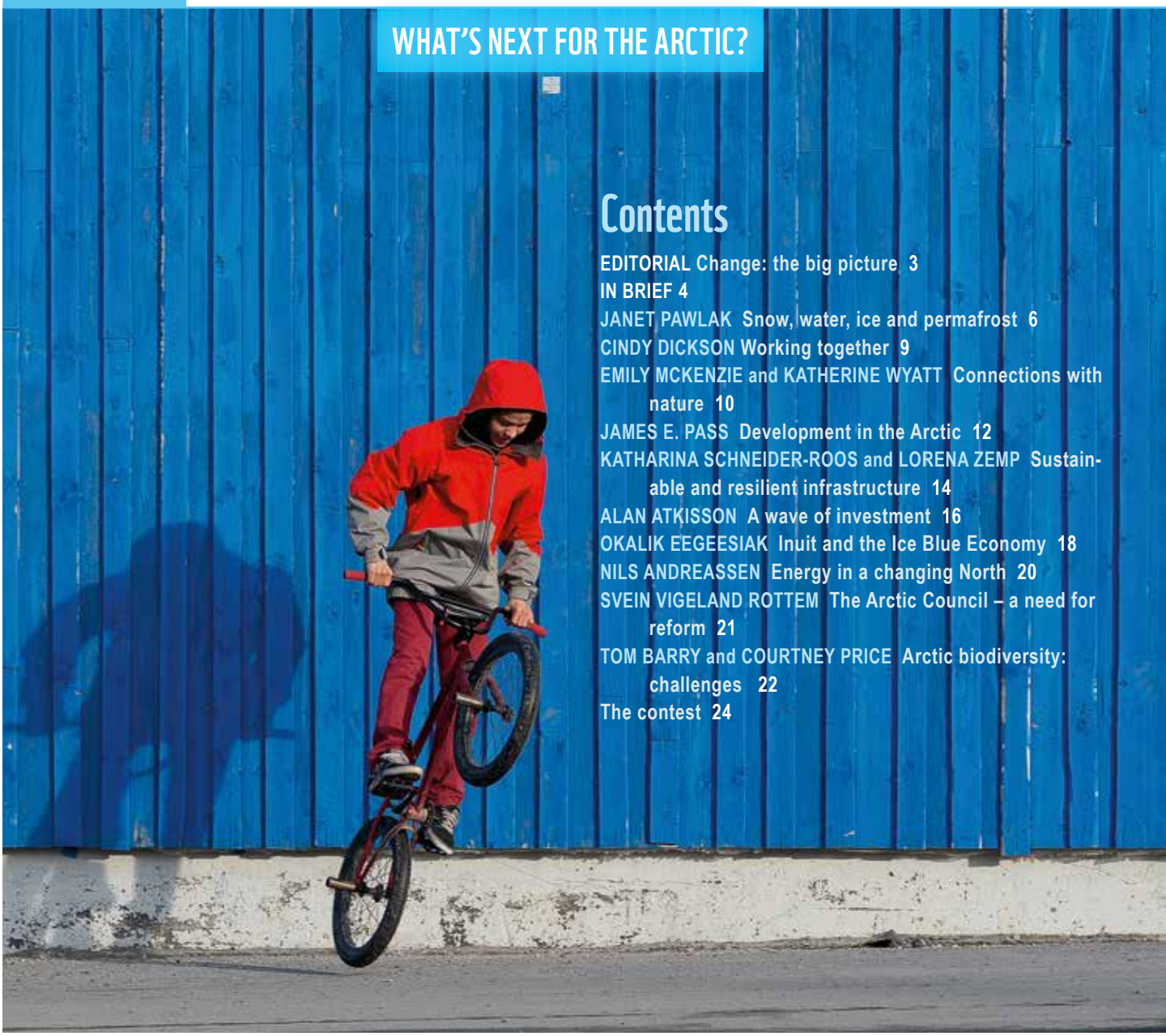

Contents

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COVER: Snow mobile travel over sea ice in Uummannaq, Greenland

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ABOVE: Boy on bicycle, Nuuk, Greenland.

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Change: the big picture

IN THE PAST 25 YEARS WWF has witnessed a lot of change in the Arctic, but the change now taking place in this unique ecosystem is unprecedented in modern history. In this edition of *The Circle*, our contributing writers take a big picture look at what's next for the Arctic and suggest what needs to be done to best prepare for the environmental and social transformations already underway.

Janet Pawlak from the Arctic Monitoring and Assessment Programme Secretariat explains how much irreversible environmental change scientists expect in the Arctic in coming years due to climate change. There are accompanying changes expected in the Arctic's biodiversity outlined by Tom Barry and Courtney Price from the Arctic Council's Working Group on the Conservation of Arctic Flora and Fauna.

Human beings are part of the Arctic ecosystem and are also responding to the changes taking place. Cindy Dickson, Executive Director of the Arctic Athabaskan Council in Canada gives a first-person account of how her life, and the lives of her children, have changed. She believes greater collaboration is needed between industry, environmentalists and governments with First Nations to prevent and mitigate for the inevitable changes brought about by development.

Several authors give their perspectives on development in the Arctic, from the importance of the Blue Economy from Alan AtKisson and Okalik Eegeesiak to the emergence of clean energy from Nils Andreassen. How to finance and ensure sustainable infrastructure in the Arctic is explored by James E. Press from Guggenheim Partners; while Emily McKenzie, Katherine Wyatt and Katharina Schneider-Roos discuss the importance of shifting our perspective to include the value nature provides into future development.

Svein Vigeland Rottem, a senior research fellow at the Fridtjof Nansen Institute has suggestions on how the Arctic Council can better provide the leadership needed in the face of coming change.

While the Arctic is transforming, so is *The Circle*. We plan to expand our storytelling to go beyond the printed word to include online content that will help bring the sights and sounds of the Arctic to you in ways we hope will inform and inspire. Part of this transformation will be driven by you. **Please take five minutes to fill out our online survey to tell us what you love about *The Circle*, and ideas you have for how it can be improved.**

WHAT NEEDS TO BE DONE TO BEST PREPARE FOR THE ENVIRONMENTAL AND SOCIAL TRANSFORMATIONS ALREADY UNDERWAY

LEANNE CLARE is senior manager, communications, for the WWF Arctic Programme

For the past seven years our managing editor, Becky Rynor spent countless hours helping contributors refine their articles to share the importance of the Arctic to the wider world. This is Becky's last edition of *The Circle* and we wish her all the best in her future endeavors.

Finally, the director of WWF's Arctic Programme, Alexandre Shestakov, leaves this month for new challenges at the United Nation's Convention on Biological Diversity. His many years of experience in the Arctic and wealth of insight and experience will be missed. We wish him all the best and look forward to hearing from him as a future contributor to this magazine. ○

Plastic waste found in stomachs of Arctic seabirds

Photo: Avenue, CC, Wikimedia Commons

Plastic waste 'building up' in Arctic

SCIENTISTS SAY plastic waste is a growing concern in the supposedly pristine wilderness of the Norwegian Arctic. They are particularly worried about huge concentrations of microplastic fragments in sea ice and report finding plastic litter almost everywhere in the Arctic they looked. Most of the large plastic waste comes from discarded fishing gear. Boat owners admit it will take hundreds of years to overcome a few reckless decades of using the sea as a dump. Research shows up to 234 particles concentrated into just one litre of melted Arctic sea ice – much higher than in the open ocean. Researchers say that's because sea ice forms from the top. Plastic particles float at the surface and become bonded into the ice as it freezes. Geir Wing Gabrielsen, one of the paper's authors, told BBC News that at the end of the 1970s they found very little plastic in the stomachs of the Arctic seabird, the fulmar. "In 2013 when we last investigated, some had more than 200 pieces of plastic in their stomachs." He says other species such as reindeer become entangled in nets washed up on beaches. "Some die because they can't release their antlers." He says in southern Norway 80% of plastic pollution comes from fishing activities.

Photo: Buzz, CC, Flickr.com

China's new Arctic policy

THE CHINESE GOVERNMENT unveiled its intentions in the Arctic in a rare, publicly-released paper in January. Canada's *National Post* newspaper reported that the policy outlines plans to develop shipping routes, expand its research programs, pursue environmental protection and develop resources across the Arctic. In addition, China promises to create a "Polar Silk Road" on Canada's northernmost fringes. "It is interesting they put out something official," said Heather Exner-Pirot, the managing editor of the Arctic Yearbook. "China's strategy since 2008 was to remain low-key and avoid triggering the inevitable alarmism." The document lays out the country's ambitions to become a major shipping power through an ice-free Arctic, stating, "China attaches great importance to navigation security in the Arctic shipping routes." Notable for its apparent overtures to woo liberal Arctic powers such as Norway, Canada and the United States, there are repeated references to sustainability, Indigenous rights, wildlife protections and the respect of international law. A spokesman for the Canadian Global Affairs Institute, Joël Plouffe, says the document is "heavy on politeness because it is attempting to frame China as a responsible player in a region where it has no actual sovereignty." However, he adds, with the paper short on specifics, "it is more intentions and hopes than an actual strategy."

Arctic states urged to improve polar bear conservation

Photo: Arthur T. LaBar, CC, Flickr.com

Mama polar bear takes one on the nose. Barter Island, Beaufort Sea, Alaska.

A NEW REPORT by WWF's Arctic Programme shows the five countries responsible for the conservation of polar bears have completed 5 per cent of their 10-year plan. WWF's first *Scorecard on the Circumpolar Action Plan for the Conservation of Polar Bears* (CAP) shows that Canada, the Kingdom of Denmark, Norway, the Russian Federation and the United States are lagging in polar bear conservation and won't meet their 10-year target without more cooperation.

"It is imperative that Range States show true leadership, unite and push themselves to achieve their goals by 2025," says Melanie Lancaster, WWF senior specialist, Arctic species and lead author of the report. "Industrial development, habitat loss and conflicts with people are all serious and increasing threats to polar bear survival." CAP began in 2015 to address the threat of climate change to polar bears' primary habitat – sea ice. It is the only international mechanism that brings all five Range States together to work on the survival of polar bears. Without urgent action to reduce greenhouse gas emissions, scientists predict a third of the world's polar bears will be gone by 2050 or within three polar bear generations.

Download the WWF Polar Bear CAP Scorecard: panda.org/polarbear

Ponds in High Arctic possible source of carbon emissions

NUNATSIAQ NEWS reports a new Canadian study has found that carbon released by some ponds in the High Arctic could be a hidden source of greenhouse gas emissions. Arctic permafrost is thawing at an accelerated rate due to climate change. The study looked at how dissolved organic carbon (DOC) stored in permafrost is being released into Arctic watersheds. "These ponds seem to be hotspots for DOC degradation," says Myrna Simpson, professor of environmental science and co-author of the research. "Very little consideration has been given to what's happening with DOC in these ponds that are all over the Arctic. It could potentially be a source of CO_2 emissions released into the atmosphere with these disturbances." DOC is essentially decomposed plant or animal material and can be found everywhere – in lakes, oceans and soil. In the High Arctic, DOC becomes mobile by entering watersheds, which is happening at an accelerated rate due to rapid permafrost thaw. When DOC settles into ponds, it can be biodegraded by microbes more easily than in rivers, which means more carbon is released into the atmosphere. Arctic permafrost stores a lot of carbon because it generally remains frozen and locked into place for a long time. Rapid thawing is changing that, Simpson notes. By using radiocarbon dating, researchers found DOC more than 5,000 years old being degraded.

Snow, water, ice and permafrost

The Arctic is warming faster than any other region on Earth and rapidly becoming a wetter, more variable environment. Over the past 50 years, the Arctic's temperature has risen at a rate more than twice the global average. JANET PAWLAK says these changes affect the Arctic's role as a regulator of global temperature and its influence on Northern Hemisphere weather; its contribution to sea-level rise; the lifestyles and livelihoods of those who live and work in the Arctic; Arctic marine and terrestrial ecosystems and the habitats of Arctic species. ➤

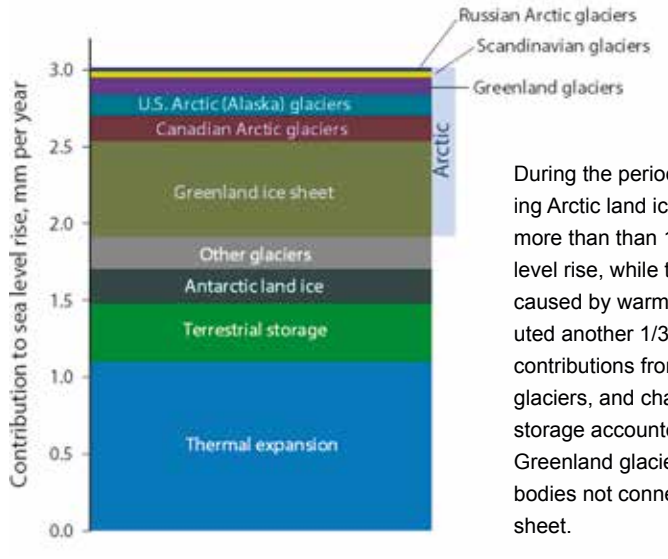
Melting iceberg, Svalbard, Norway.

Photo: Christopher Michel, CC, Flickr.com

Lars Witting/ARC-PIC.COM

THESE ARE some of the conclusions of the 2017 assessment of climate and the cryosphere in the Arctic by the Arctic Monitoring and Assessment Programme (AMAP) in Snow, Water, Ice and Permafrost in the Arctic (SWIPA) 2017, the fourth climate report by AMAP since 1998. Key findings of the report show:

Melting ice, rising sea level



During the period 2004–2010, melting Arctic land ice accounted for more than than 1/3 of global sea level rise, while thermal expansion caused by warming water contributed another 1/3. The sea level contributions from Antarctica, other glaciers, and changes in terrestrial storage accounted for less than 1/3. Greenland glaciers are those ice bodies not connected to the inland sheet.

Graphic: AMAP/SWIPA Fact Sheet

■ The Arctic's climate is shifting to a new state

Rising concentrations of greenhouse gases are driving widespread changes in the Arctic's sensitive climate, hydrological and ecological systems. Downward trends continue in the extent and thickness of sea ice, land ice volume, and spring snow cover extent and duration while near-surface permafrost continues to warm.

■ Climate change in the Arctic has continued at a rapid pace

Arctic air temperatures are rising faster than the global average. Sea temperatures are increasing. The frequency of extreme events is changing, with fewer days of extreme cold in both winter and summer and increases in extreme warm periods in some areas. Sea-ice thickness has decreased and older ice that has survived multiple summers is rapidly disappearing. The decline in sea-ice extent and thickness and the timing of ice melt are affecting marine ecosystems and biodiversity with an increase in the occurrence of algal blooms. These changes influence diet among marine mammals and alter predator-prey relationships and habitat uses. The occurrence of rain-on-snow events and winter thaw/refreezing affects grazing animals such as caribou, reindeer and muskox by creating an ice barrier over lichens and mosses.

JANET PAWLAK is deputy executive secretary to the Arctic Monitoring and Assessment Programme (AMAP) Secretariat

■ Changes will continue through at least mid-century, due to warming already locked into the climate system

Warming trends will continue because increases are locked into the climate system by past emissions and ocean heat storage. These will still occur even if the world makes drastic cuts in emissions. Declines in snow and permafrost will continue. The Arctic Ocean could be largely free of sea ice in summer as early as the late 2030s. The melting of land ice, particularly from the Greenland ice sheet, will contribute significantly to sea-level rise. Many of the smallest glaciers in the Arctic will disappear by mid-century. The Arctic water cycle will intensify, with model-projected increases in cold season precipitation of 30-50% over the Arctic Ocean toward the end of this century; a greater proportion will fall as rain instead of snow.

THE ARCTIC IN THE NEAR FUTURE WILL BE A SUBSTANTIALLY DIFFERENT ENVIRONMENT FROM THAT OF TODAY

There will be significant stresses on ecosystems. Changes in sea ice can be expected to affect populations of polar bears, ice-dependent species of seals and, in some areas, walrus which rely on sea ice for survival and reproduction. There will also be losses of ice-associated algae. An increasing frequency of wildfire and abrupt thawing of permafrost could accelerate ecological shifts, such as the expansion of tall shrubs and trees into tundra.

■ Substantial cuts in global greenhouse gas emissions now can stabilize impacts after mid-century

While the changes under way in the Arctic are expected to continue through to at least mid-century, substantial global reductions in net greenhouse gas emissions can begin to stabilize some trends, such as snow and permafrost loss, after that. Efforts to control greenhouse gas emissions would also reduce end-of-century sea-level rise. However, the Arctic of the near future will be a substantially different environment from that of today.

■ Adaptation policies can reduce vulnerabilities

There is an urgent need for local and

regional adaptation strategies that can reduce vulnerabilities and build resilience, given the inevitability of accelerating impacts in the Arctic and globally.

Effective mitigation and adaptation policies require a solid understanding of Arctic climate change
Better knowledge is needed to predict the course and effects of climate change in the Arctic and improve our ability to respond to current and future changes. Coordination across monitoring efforts, modeling studies and international assessments can facilitate information sharing and avoid duplication of effort.

The full scientific assessment report *Snow, Water, Ice and Permafrost in the Arctic (SWIPA) 2017* and its Summary for policy-makers can be obtained from www.amap.no. Information relevant to the development of local and regional adaptation strategies is addressed in three Adaptation Actions for a Changing Arctic (AACA) regional reports, covering the Barents, Baffin Bay/Davis Strait, and Bering/Chukchi/Beaufort regions. ○

■ The Intergovernmental Panel on Climate Change (IPCC) is established by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) in 1988. Its main objective was to assess scientific, technical and socio-economic information relevant to the understanding of human induced climate change, potential impacts of climate change and options for mitigation and adaptation. The IPCC has completed four assessment reports, developed methodology guidelines for national greenhouse gas inventories, special reports and technical papers. For more information on the IPCC, its activities and publications, please see the IPCC homepage: www.ipcc.ch


Cindy Dickson

Working together

CINDY DICKSON, executive director of the Arctic Athabaskan Council (Canada) spoke with THE CIRCLE about the realities and challenges of development in the Arctic.

THE CIRCLE: **What are the modern realities of living in the Arctic?**
CINDY DICKSON: The reality is that the climate is changing. Our old way of life is drastically changing. We can no longer solely survive on the land as a way of life. In a modern world, we need jobs. Our children have similar tastes and want similar choices as other children.

When I was growing up – and I am under 50 – we did not have modern bathrooms with flushing toilettes. We used 'honey buckets' and instead of regular sinks, showers and bathtubs, we used a steel tub and a wash-basin. If we wanted a shower we went to the school. Having a house phone was a luxury and forget about cable. We wore hand-me-downs and were lucky to get out of Old Crow (Yukon) once a year. Nowadays we all have modern bathrooms, cable, cell phones and many of us travel to Mexico to vacation (although I have yet to go!). Our children want their own cell phones, latest fashions and whatever gadget the next kid has. All this convenience and its working parts comes from renewable and non-renewable resources and costs money. A lot of money.

There has been a huge change since my childhood. I don't see the old way of ➤

living anymore. The values and choices are different. To go out on the land is very expensive. Most people use snow machines and fuel is very costly. People can no longer stay out for months and most have to come back for their day jobs. It's not like long ago when everyone used to hunt from March to June. People don't use as many fur products these days so that industry doesn't thrive as it once did.

TC: From an Indigenous perspective, what needs to happen to make development in the Arctic more sustainable?

CD: In my opinion development is not sustainable. There is usually a beginning and an end and some type of impact. Unless, perhaps, you are an organic vegetable farmer. I believe we need to see better communication, education, prevention and mitigative measures developed between government, industry, community and environmentalists. There must be equal responsibility for all these things. For example, if an industry is going to dig a hole, it should be the responsibility of our federal or territorial government to educate the community on why the hole is being dug, what is being dug up, what it is used for and what are the pros and cons and jointly develop plans for prevention and mitigation.

TC: What ways can the various interest groups (industry, environmental, governments) work more effectively with Indigenous people to have a more sustainable Arctic?

CD: Having had the opportunity to work on environmental issues as well as with industry and First Nations, I firmly believe governments should fund First Nations to educate their membership and beneficiaries. People need the capacity to make informed decisions. First Nations governments are extremely busy and wear many hats. It would be very helpful to have dedicated federal or territorial funding so that First Nations hire their own experts to educate and plan. Our communities need the capacity to make the best decisions. Once that happens it would be beneficial for industry, environmentalists and other governments to work collaboratively with First Nations to provide a balanced and proactive approach.

> OUR OLD WAY OF LIFE IS DRASTICALLY CHANGING. WE CAN NO LONGER SOLELY SURVIVE ON THE LAND

TC: What are the barriers to those relationships taking place?

CD: I don't like to see our people divided because of inaccurate information. It's time environmentalists and industry work together. In my experience it's always one against the other and we don't receive all the information to make informed choices. Even our environmental impact assessment processes seem set up to pit us against each other. There isn't a common place where these issues and opportunities can be worked out. Others may disagree but having worked on both the research and environmentalist side, and with the oil and gas industry, I have come to this conclusion.

The reality is we drive our big trucks, own more than one house, wear expensive clothes – many of which are oil-based – and we all want these modern conveniences. To have the best of both worlds I think it's time we embrace the reality that this is where we are, and we should set aside differences to have a better place for our children and grandchildren. ○

Connections with nature

In December 2017 three Indigenous women appeared before an All-Party Parliamentary Group for the Polar Regions in London, England to talk about what it's like to live in a rapidly warming Arctic. EMILY MCKENZIE and KATHERINE WYATT say such stories exemplify why a natural capital approach needs to guide future development in the Arctic.

OKALIK EEGEESIAK, the International Chair of the Inuit Circumpolar Council, Sarah James, an Elder of the Gwich'in Nation and Jannie Staffansson of the Saami Council were invited to speak at the 'Arctic Voices' event, organised by the United Kingdom's All-Party Parliamentary Group for the Polar regions. Their appearance was the first time Arctic Indigenous representatives spoke to the British Parliament about the changes happening in their homelands.

These three leaders shared powerful stories about how nature, when cared for, produces many diverse benefits for current and future generations, making people happy, healthy and safe. They spoke about the intimate connections of their peoples with Arctic lands, waters and ice: how Inuit use sea ice to travel and hunt; how the Gwich'in depend on the migratory Porcupine Caribou for

Photo: Emily McKenzie, WWF

Tanya Steele (CEO, WWF-UK), Okalik Eegeesiak (Inuit Circumpolar Council), Sarah James (Gwich'in Nation), Jannie Staffansson (Saami Council) and MP James Gray at Arctic Voices event in London, England.

their food, clothing and tools, and as a source of spiritual guidance; how Saami depend on reindeer for traversing the region, and for milk and meat.

Their stories also illustrate how these connections break down when nature is not cared for. Thinner sea ice caused by climate change is making hunting more dangerous. Poorly placed roads are altering wildlife migration patterns. Both are resulting in reduced access to traditional food sources and in turn, disrupting intergenerational learning and cultural identity. Inappropriately located or constructed developments combined with melting permafrost and eroding coastlines damages homes, schools, water supplies and roads, forcing entire villages to relocate.

The term 'natural capital' is anathema to many who equate these approaches with selling or pricing nature. But a natural capital approach is not about money. It is about shining a light on our connections with nature so that our children can continue to enjoy them. "Natural capital is about headwaters, springs, sources, mothers, fathers, children, ancestors, descendants, generations, caretaking, heritage, gifts, trusts and endowments," says Anne Guerry, lead scientist at the Natural Capital Project.

The Economics of Ecosystems and Biodiversity (TEEB) is a global initiative which aims to mainstream these values into decision-making at all levels. Since a TEEB Arctic Scoping Study (Issue 2, 2015, *The Circle*) was submitted to the Arctic Council in 2015, WWF continues to move this work forward through the Informing Decisions for Ecological and Economic Arctic Sustainability (IDEEAS) project. WWF, with partners in the Natural Capital Project and the support of Guggenheim Partners, is

A NATURAL CAPITAL APPROACH IS NOT ABOUT MONEY

exploring how natural capital approaches can promote better infrastructure decision-making in the region. Our guiding principles are to:

- make all information and tools free and open-source;
- support achievement of infrastructure sustainability standards;
- consider the whole system, including traditional knowledge and western science;
- have a multi-dimensional concept of value that considers cultural, ecological, social, health and economic values; and
- channel knowledge and innovation into good resource management and stewardship.

We have compiled an inventory of relevant datasets and models in the region. Next, we will review infrastructure sustainability standards with an eye to how natural capital approaches can help achieve them. We are hopeful that, with our guiding principles and the experiences of Arctic Indigenous people in mind, these standards can help maintain the connections between people and nature in the Arctic. ○

EMILY MCKENZIE is chief adviser, economics and sustainability on WWF's Global Science Team.

KATHERINE WYATT is an ecosystem services analyst in the Natural Capital Project based in Seattle, Washington.

Development in the Arctic

Long-term investors (LTIs) bring a unique set of resources that make them ideal partners for sustainable development. JAMES E. PASS addresses the benefits of LTIs in the Arctic.

THE ARCTIC stands at the crossroads of important trends in climate change and development. Given recent calls for private capital participation in development, especially infrastructure, Guggenheim Partners wants to emphasize how and why we believe LTIs can be the ideal partner for sustainable development in the Arctic with appropriate environmental and social safeguards.

The ability of LTIs to hold assets throughout business cycles and their preference for alternative investments, such as infrastructure and real estate, make them attractive partners to local leaders, planners, conservation groups and other stakeholders to create sustainably developed environments, while preserving plentiful natural habitat. They can provide capital that understands the convergence of long-term value and sustainability. LTIs have provided capital for essential projects for decades, including power, water, transportation and real estate development.

JAMES E. PASS is senior managing director at Guggenheim Funds.

Since 2013 Guggenheim Partners has maintained an Arctic Infrastructure Inventory, detailing the physical asset needs of the region. Over the next 15 years USD $ trillion of investment in the Arctic is needed. LTIs can help to meet this investment gap. The Arctic and near-Arctic is a vibrant region, counting 12 million inhabitants and a USD $500 million annual economic output. Despite this footprint, many basic needs and economic opportunities go unmet. Some of these require the following investment needs:

- Renewable Energy $60.6 billion
- Rail $23.3 billion
- Maritime $16.8 billion
- Social Buildings (schools, hospitals, etc.) $2.4 billion

LTIs can provide some of the capital to fund revenue producing assets but governments need to be a partner in investment, with input from local communities, planners and conservationists. When LTIs provide targeted capital for specific purposes, public capital can flow where it is needed most. To ensure the long-term license to operate for these private and public investments, national and regional development plans with strong social license are needed.

US$ 1 TRILLION OF INVESTMENT IN THE ARCTIC IS NEEDED OVER THE NEXT 15 YEARS

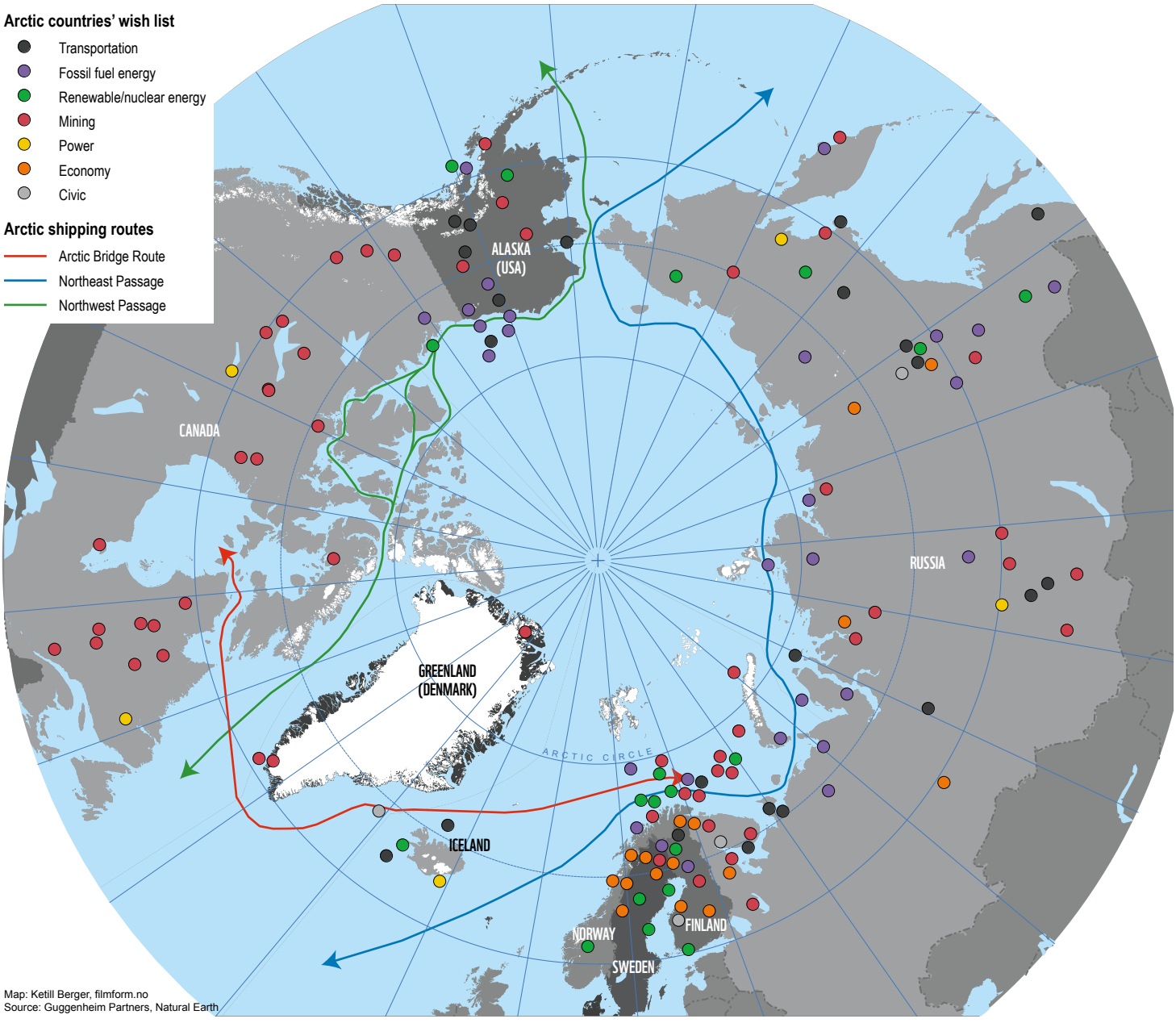
In 2016, Guggenheim Partners participated in the creation of the Arctic Investment Protocol at the World Economic Forum. This document provides a framework and a commitment for investors in the region. The Protocol helps investors understand how to contribute to sustainable development, but it is only the beginning. Robust standards, tools and indicators are necessary to properly measure and understand both environmental impact and societal impact.

Guggenheim Partners, along with others, advocates for the development of more precise standards, tools and indicators to measure sustainability. Current practice is an improvement over efforts from years past but the mobilization of tremendous resources needs an institutionalized framework. To value sustainability investors need to measure it first.

The Arctic is changing at a rapid pace in both climate and human dynamics. In the years to come there will be opportunities for responsible economic growth. There will also be an imperative to protect this region. By proactively steering development on a sustainable and managed path, this region can be preserved while meeting the economic needs of its residents. ○

Future development

Some of the largest projects on each country's wish list, according to Guggenheim Partners and future shipping routes.



Map: Ketill Berger, filmform.no
Source: Guggenheim Partners, Natural Earth

Sustainable Development

The UN defines sustainable development as "...development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Investments often focus on infrastructure – power, water, transportation, health – but also include any sector that is critical to the functioning of a modern economy, such as real estate, education and finance.

Long-Term Investors (LTIs)

Any investor who possess multi-decade investment objectives. Insurance companies, pension funds and sovereign wealth funds are common examples of long-term investors who are responsible for paying out long-dated liabilities, such as insurance policies, retirement benefits, or national spending plans. Other LTIs include endowments and foundations. They often seek alternative investments, such as infrastructure or real estate, which offer greater returns with less liquidity (less ability to sell the investment quickly). Given their patience, natural inclination to hold assets and desire to maximize long-term total returns, they often make a good partner for sustainable development.

LTIs normally work with asset managers such as Guggenheim Partners, to help them make investment decisions.

The Arctic, home to approximately four million people in eight different countries, is attracting increasing interest and scrutiny. Perhaps more importantly, it is a region where infrastructure development – if it must happen – must be sustainable and inclusive. KATHARINA SCHNEIDER-ROOS and LORENA ZEMP urge infrastructure development in the Arctic be approached with care and not solely as a race to exploit – and near deplete – resources.

WITH AN ANNUAL economy above USD $450 billion, the Arctic represents new ways to manage trade. The inexorable wave of socio-economic development will demand support systems that don't sacrifice the environment and the people who call the Arctic home.

Infrastructure, if built in a standardized, resilient, sustainable and socially inclusive manner, can be a catalyst for sustainable development in the Arctic. The question therefore is not really about the future of infrastructure development but rather how can we take measures now to ensure infrastructure is aligned with long-term sustainable goals?

As with other environmentally sensitive areas, the Arctic is home to both unexploited natural resources increasingly uncovered by diminishing ice caps as well as Indigenous communities and settlements which thrive and hold rights over these lands. Infrastructure development in such a sensitive environment must consider and face the high costs of operating in a remote region where weather conditions are extreme and unreliable; basic infrastructure services are limited; unique flora and fauna thrive and where cooperation among different countries and populations is critical. Some communities in the Arctic lack key critical infrastructure, remaining unconnected to running water while at the same time being home to important ecosystems. Infrastructure in these regions needs to take into consideration the diversity and needs of the different groups that inhabit the area as well as aim to lessen negative impacts on the environment.

A Guggenheim Partners Infrastructure Inventory of more than 900 projects indicates infrastructure projects in the Arctic include the sectors of transportation, fossil fuel energy, renewable/nuclear energy, mining, power, economic and civil infrastructure. Oil and gas production represent the largest need for investment (approximately USD $200 billion).

This broad range of sectors necessi-

Sustainable and resilient

tates a standardized approach to ensure infrastructure projects are designed, built, operated and decommissioned in a sustainable, resilient and socially inclusive manner. This can be accomplished by following the principles of The Arctic Investment Protocol by the World Economic Forum. These principles highlight inclusion of local communities and building resilient societies.

Building strong partnerships that bring a holistic perspective to future development, such as the Arctic Futures Initiative, is key to ensuring availability of expertise on complex scenarios and the use of integrative techniques. Additionally, using tools such as Global Infrastructure Basel Foundation's SuRe® Standard – The Standard for Sustainable and Resilient Infrastructure – guarantees such an approach is used. With 61 environmental, societal and governance requirements, SuRe® is a tool that ensures infrastructure projects are designed and built according to

HOW CAN WE TAKE MEASURES NOW TO ENSURE INFRASTRUCTURE IS ALIGNED WITH LONG-TERM SUSTAINABLE GOALS?

good international industry practice. By requiring projects in every sector be built to withstand different climate change scenarios, involve the community in decision-making and consider nature-based design solutions, the Standard enables infrastructure to be built in line with local practices in conjunction with relevant international expertise.

Current trends require infrastructure brings tangible and measurable benefits to communities. The role of Indigenous populations is extended from project stakeholders to owners if sufficient investment can be attracted. One way is to require infrastructure projects to allocate a percentage of their investment to the creation of social funds for the Arctic communities to use in development of critical and basic infrastructure. Employing and training the local workforce ensures the benefits of job creation and skill transfer is shared with Indigenous communities. Tools such as the SuRe® Standard aid local communities and investors in finding a common language to measure, monitor and report on an infrastructure project's performance to attract investment in projects that are built as sustainably as possible. ○

KATHARINA SCHNEIDER-ROOS is CEO of the non-profit Global Infrastructure Basel Foundation

LORENA ZEMP is director, SuRe® Standard

infrastructure

The ice highway. Tuktoyaktuk, Northwest Territories, Canada.

Photo: Ian Mackenzie, CC, Flickr.com

A wave of investment

In 2014 the captain and owners of the freighter Nordic Orion made an historic decision: instead of carrying their load of coal from Vancouver, Canada to Finland via the Panama Canal, they headed through Arctic waters for the Northwest Passage. It was the first time a freighter chose the Canadian Arctic route over the Panama route, based entirely on business logic. ALAN ATKISSON says that voyage marks the start of a transformation in the Arctic economy.

ALAN ATKISSON is president of AtKisson Group, consultants on sustainable development and Blue Economy issues.

WHILE IRONIC that the first freight to traverse the Northwest Passage for cost-saving reasons was environmentally unfriendly coal, the voyage indicates warming Arctic waters are opening the region for development.

The Northwest Passage — when experiencing lighter-than-usual ice conditions — is shorter and cheaper. The risks have become manageable and insurable. Plus, the Nordic Orion's owners knew the ship could take a 25% larger load, while saving USD $80,000 in fuel costs.

Many of the factors driving change in the Arctic economy, as well as the many associated opportunities and risks, are described in an upcoming report from WWF looking at the Arctic's economy in marine, maritime, and coastal development terms — the "Blue Economy."

Investors believe that over USD $1 *trillion* will be heading to the Arctic in coming years, principally to develop infrastructure: roads, ports, airports, hotels, housing, hospitals, schools and other facilities. Guggenheim Partners, a global investment and advisory financial services firm, has estimated that over USD $500 billion in infrastructure is already being planned.

This combination of warming physical conditions and increasing investment is not only changing the Arctic, it is changing how humanity *sees* the Arctic. No longer a remote and inaccessible place dominated by nature and impenetrable ice, visited only by researchers and adventurers, the Arctic is fast becoming a tourist destination, an aquaculture development zone, a real estate opportunity, an Internet cable route, a shipping shortcut and more.

The speed of change is likely to catch many people by surprise. Some Arctic researchers I've spoken to are inclined to dismiss these trends, saying for example that expectations for the opening of the Arctic to shipping or mining are greatly exaggerated. But those who doubt that an unstoppable wave of economic investment is heading to the Arctic should take a closer look at the investment intentions of large players such as China. Transformative change often starts slowly but builds with surprising speed.

THE SPEED OF CHANGE IS LIKELY TO CATCH MANY PEOPLE BY SURPRISE.

No longer remote and inaccessible: tourists watching a polar bear, Northwest Spitsbergen National Park, Svalbard, Norway.

Photo: Peter Prokosch, www.grida.no/resources/1164

Most of the Arctic economy, including tourism, is linked to its ocean and coasts. Iceland received well over two million visitors last year, an increase of about 400 per cent in one decade. Svalbard tourism increased by 100 per cent over the same period. Last year a tour company operating out of Murmansk was offering five different departures for the opportunity to ride an icebreaker to the North Pole, while Norway's national tourism agency has produced a YouTube campaign on how to hike in Arctic coastal regions to better prepare tourists for vacationing in extreme Arctic conditions.

The Arctic is an increasingly attractive item on the "bucket list" of many tourists. While this helps improve knowledge and hopefully, concern

about the Arctic environment, tourism increases environmental risk.

Other Arctic Blue Economy sectors are experiencing similar growth and challenges. Norway's salmon aquaculture industry grew by 500 per cent from 1997-2016, and by 31 per cent from 2015-16. About 40 per cent of that growth happens in Arctic coastal waters; and Norway has also begun investing in Icelandic aquaculture.

The Arctic currently produces 10 per cent of the world's oil and 25 per cent of its natural gas, mostly from onshore sources. It is believed to hold 22 per cent of the world's undiscovered reserves under the Arctic Ocean. These sectors tend to dominate reporting on Arctic economic development issues.

Many articles on the Arctic economy focus on developing energy and mineral extraction; but a closer look at recent trends underscores that the Arctic is "open for business" in a much broader sense with significant conservation consequences. While there is much we don't know about the economic trends that will shape the Arctic's mostly "Blue" environments, it's time to take the expectations of rapid growth more seriously. One helpful resource is WWF's widely-cited Principles for a Sustainable Blue Economy, which have also been recognized by the World Bank and the United Nations. They can provide a starting reference for an Arctic adaptation to help steer these bold new investment plans in more sustainable directions.

Momentum keeps building. At the end of January 2018, the President of China, Xi Jinping announced he wants to extend China's enormous "Belt and Road" infrastructure development project — which is principally an enormous investment fund — to the Arctic. "China hopes to work with all parties to build a 'Polar Silk Road' through developing the Arctic shipping routes," said the country's official State Council Information Office.

China sees enormous economic opportunity in the Arctic and intends to commit a great deal of new infrastructure investment in the far north. So do many other countries. The time to start preparing for this wave of change is now. ○

Inuit and the Ice Blue Economy

The World Bank defines the Blue Economy as "*the sustainable use of ocean resources for economic growth, improved livelihoods and jobs, and ocean ecosystem health*". OKALIK EEGEESIAK suggests for Inuit, the term Ice Blue Economy would be more appropriate.

INUIT ARE marine coastal people. The sea ice and the Arctic Ocean define our culture, food, transportation, language, well-being and livelihoods. All of these depend on sea ice, the floe edge and increasingly, the open ocean.

Most of our communities are located on the coast or beside main waterways for direct and easy access to the sea. The Arctic marine environment nourishes our body, mind and soul. It is our food security. It keeps us strong and has sustained us for thousands of years. The Arctic Ocean is irreplaceable to us which is why Inuit have been using it sustainably and responsibly for millennia.

This is a critical time of change in the Arctic. It is imperative that Inuit be involved in Ice Blue Economy discussions. These decisions will shape the future of Arctic shipping, small crafts, commercial fisheries, oil and gas exploration, tourism and its peoples.

Inuit have always pursued innovation, partnerships and processes to drive economic development, prosperity and social equity in our communities. Much of this is related to marine activities.

The Inuit Circumpolar Council is an international organization with official United Nations status. We are a Permanent Participant at the Arctic Council giving voice to the 160,000 Inuit living in Canada, Greenland, Alaska and Chukotka – four very different political entities. Inuit may have a relatively small population in a global sense, but our homelands are vast and our collective voice strong through one language and one culture. We occupy and use a great part of the circumpolar world.

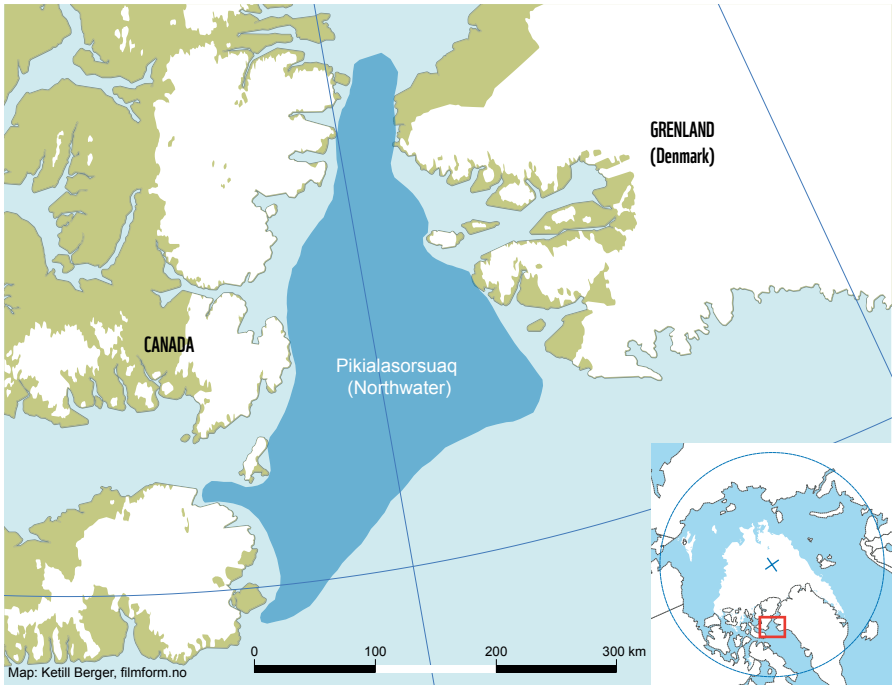
WE *ARE* THE BLUE ECONOMY

Will Inuit benefit from a changing Arctic and the Ice Blue Economy? Will we have the skills to live with and through the challenges ahead?

In 2017 ICC held the Circumpolar Inuit Economic Summit to explore potential collaborations among Inuit businesses and share experiences. A significant outcome was the establishment of a task force to create an International Inuit Business Council for business

Fishing hole in the ice. Uummannaq island, Greenland.

Photo: Lawrence Hislop, www.grida.no



Map: Ketill Berger, filmform.no

cooperation and development for Inuit at the local, national and international level.

Economic development can mean different things to different Arctic countries, regions and even individual communities within Inuit regions. One thing is certain: economic development done right means equity. It means long-term sustainability for our communities, brighter futures for our youth and the opportunity to break the cycles of poverty that plague our communities. It means economic development is not done *for* the peoples of the Arctic, but *by* them. We must pursue economic development that considers social equity to be as important as, or more important than, shareholder and stock value. We must create economic development opportunities that build cultural sustainability and community wellness rather than compete with them.

Economic solutions can address immediate challenges such as food insecurity, social development and climate change if they are approached through a new lens led by, and in partnership with, Inuit. A healthier, educated, self-determined and skilled labour force along with a robust tax base in the Arctic will create cost efficiencies for industry, governments and Inuit.

Innovative, successful Ice Blue Economies include fisheries, renewable energy, tourism, shipping and mining. Inuit-led success stories are only made possible through multi-lateral partnerships between the private sector, government and communities.

Inuit have addressed the Ice Blue Economy and the future of the marine region through innovative stewardship planning. In 2017 ICC released the Pikialasorsuaq Commission report proposing a vison of the Northwater – the marine region between Canada and Greenland. The Commission made three recommendations after listening to the communities that use the Pikialasorsuaq:

- reinstate free movement for Inuit across the Pikialasorsuaq;
- establish an Inuit Management Authority; and
- create an Inuit-led monitoring regime.

This unique and highly sensitive marine region is central to the biological integrity of the central Arctic ecosystem and the cultural integrity of Inuit in Canada and Greenland. Inuit wish to be the stewards of it. To that end, in 2017 the ICC was part of the Canadian delegation negotiating the Central Arctic Commercial fishing moratorium. This was precedent setting for its precautionary principle, and its management and monitoring plan for commercial fisheries.

OKALIK EEGEESIAK is chair of the International Inuit Circumpolar Council

As Inuit, we don't have a choice as to whether we are part of the "Ice Economy" or the "Blue Economy". We *are* the Blue Economy. ○

Energy in a changing North

Since the first Arctic Energy Summit convened in Anchorage, Alaska in 2007 the Arctic energy landscape has changed significantly. NILS ANDREASSEN looks at approaching sustainable development in the Arctic from the perspectives shared during the 2017 Summit in Finland.

THE ARCTIC is increasingly defined by its renewable energy and energy efficiency leadership. As governments, communities and Indigenous peoples respond to climate change goals, clean energy will feature prominently. Oil and gas development will occur where economics, environmental and societal interest align. For many in the region, that development will facilitate additional investments in renewables as Arctic states generally work toward a green transition. This green energy transition will happen at different rates and scales, and over different periods of time across the Arctic. The feasibility and the regional benefits of renewable energy projects are increasingly pertinent to sustainable development in the Arctic.

NILS ANDREASSEN is executive director of The Institute of the North

Included in this dialogue must be local communities and Indigenous peoples as key stakeholders, rights-holders, and energy partners with whom project proponents and governments must engage. Engagement at the local level must include the option to say, 'yes or no' to development and provide ways in which concerns or hopes will be addressed. It is important that local peoples are at the table and not represented or misrepresented by outside interests.

The Sustainable Development Working Group's Arctic Renewable Energy Networks Academy (ARENA), and Arctic Environmental Impact Assessment (Arctic EIA) projects highlight the importance of engaging local and community expertise in sustainable development planning. Benefits of doing so include improved project planning and design, better decision-making, and ensuring more equitable benefits to community and Indigenous stakeholders. The ARENA project demonstrates how a collaborative, circumpolar renewable energy training program is bringing lasting benefits to Indigenous and northern communities in Canada, the U.S, Iceland and Norway. Its unique approach to developing "community energy champions" and having these champions present their stories was an effective demonstration of energy literacy, capacity building and training opportunities as good practices.

Wind turbines, Havøysund, Norway.

Photo: Jantar–commonswiki, Wikimedia Commons

Similarly, local communities on the North Slope of Alaska have played a key role in prudent oil field development for more than 40 years through a Cultural Resources Management Plan. Industry and community alignment and collaboration is a must; inclusive multi-layered engagement encourages innovation and project success.

In challenging and remote locations, the sharing of ideas and good practices is often a prerequisite for successful cost-effective projects and technology implementation. Collaboration with multiple stakeholders in the Arctic is important at all levels: local, regional, national and global. The merits of regional oil and gas operator collaboration is demonstrated in the Norwegian sector of the Barents Sea. The Barents Sea Exploration Collaboration (BaSEC) achieved significant savings in operating costs through shared logistics, reduction of environmental footprint and enhanced cooperation on HSE matters. Science – including Indigenous and local knowledge – must be a primary basis for decisions in the energy sector, and Arctic endeavours tend to have high levels of scientific activity within the oil and gas industry itself. Research and education generally follow in the wake of large projects, but it is important to coordinate and cooperate early in project development to reduce the research burden on communities. Local communities should be involved in the scientific work, including sharing of Indigenous knowledge which is a valuable resource. It is wise to incorporate this knowledge

base and partner with local experts in a range of fields.

The oil and gas industry is transitioning at an increasing pace to renewables and lower carbon emissions through technological innovations and the gradual shift from oil to gas. Many companies additionally engage in developing low carbon, downstream solutions and fuels including hydrogen. This has important implications for Arctic societies and Arctic businesses wishing to secure sustainability in a low carbon future. More focus on the transition roadmap of the energy industry should be included at the 2019 Arctic Energy Summit. The successful transition to renewable energy is an element that affects all energy and political sectors.

Carbon pricing is generally held as the best incentive for carbon emission reductions because it is independent of the source of energy and encourages open competition, innovation and technology development. The Norwegian special carbon tax for example, helped Norway become among the lowest carbon emitters. This is highly relevant for the Arctic energy debate since there are clear expectations of the lowest possible carbon emissions from future energy production including oil and gas and other industrial activities in the Arctic.

In addition to lower carbon emissions, Arctic states must remain focused on addressing "energy poverty" which refers to the lack of access to modern, reliable and affordable energy supplies. Reducing transaction costs for northerners will result in improved living and economic conditions, and high cost energy will negatively impact the sustainable development of the region. Meeting affordability goals while increasing clean energy development is the objective Arctic states and others – including the investor and shareholder community – must consider in spending capital on Arctic energy projects infrastructure, industrial projects and societal development projects. Policies for which sustainability is a key component will influence future decision-making by all. ○

The Arctic Council – a need for reform

The Arctic Council is considered the most important international forum in the Arctic. However, SVEIN VIGELAND ROTTEM notes that the inclusion of more stakeholders in the Council's work raises questions as to capacity and coordination.

THE ESTABLISHMENT of a permanent secretariat in Tromsø, Norway and the signing of three internationally binding agreements created under the auspices of the Arctic Council have raised its political prominence in recent years. At the 2013 Kiruna ministerial meeting the question of observer status for the EU and Non-Arctic States headed the agenda. China, India, Italy, Japan, Singapore and South Korea were granted permanent observer status. Aspirations to this designation by these and other countries show how the region is perceived as important by stakeholders outside the geographically limited Arctic region. The Arctic Council is popular.

Furthermore, the Council's agenda is widening and getting more diffuse. The Arctic Council has produced substantial knowledge on circumpolar issues and informed the debate on challenges and opportunities in the region, ranging from research on climate change to introduction of shipping guidelines and emphasizing regional health issues. It is a significant player in the region as a producer of knowledge, presenter of guidelines and recommendations, Arctic environment assessment and as a monitoring body. In 1996 the Council was running 30 projects; today the number is passing 80 and is likely to grow. One could claim, however, without any serious discussion on which direction.

I would like to present three recommendations to meet the governance challenges facing the Arctic Council. First, a clearer vision/strategy for the work done at the Council is needed. ➤

■ **THE NORDIC COUNCIL OF MINISTERS (NCM)** has adopted a new four-year Arctic program, *Nordic partnerships for the Arctic,* which underscores the importance of people, planet, prosperity and partnerships. The program is linked to the global Sustainable Development Goals (SDGs) and will run from 2018 to the end of 2021. Under the program the NCM will allocate close to five million EURO focusing on societal, economic and environmental aspects of development. The partnership component of *Nordic partnerships for the Arctic* directly relates to SDG #17: Strengthen the means of implementation and revitalize the global partnership for sustainable development. As SDGs are implemented throughout the Nordic countries, the NCM will learn and use the information gleaned from this exercise when implementing and allocating funds to its new four-year program. SDGs can be used to increase our knowledge about changes in the region and ensure that the principle of sustainability is upheld in the Arctic.

➤ The Senior Arctic Officials (SAOs) have started defining vision, but it needs to be higher on the agenda. A formulation of such a strategy both at political and working group (WG) levels will enhance continuity and allow for a more structured and coordinated approach to whatever political issues have been given priority. A comprehensive vision for the Arctic could be formulated at an Arctic Summit. Secondly, with an increasing workload, coordination challenges need to be addressed through an expert panel to look at the question of coordination and restructuring. This debate must involve all relevant stakeholders (permanent participants, SAOs, and WGs).

SVEIN VIGELAND ROTTEM is a senior research fellow at the Fridtjof Nansen Institute

Finally, a recurring challenge is the frequency of travel and growing number of meetings related to Arctic Council business. A solution might be to arrange one of the two annual SAO meetings in the capital city of the state holding the chairmanship. This would increase participation for relevant stakeholders including Indigenous people. In connection with such a SAO meeting, the WGs could conduct workshops on issues relevant to the agenda. This should apply both to designing new projects and running existing ones. An annual "Arctic Week" could be arranged in the capital of the state holding the chairmanship. These suggestions, if implemented, could strengthen the work of the Arctic Council and it could still be the most important international forum in the Arctic, with a clearer vision and more inclusive character. ○

Arctic biodiversity:

Arctic biodiversity currently enjoys large areas of habitat that support a full range of ecological processes and interactions. But the Conservation of Arctic Flora and Fauna Working Group of the Arctic Council says climate change, industrial development, pollution, local disturbances and invasive alien species are affecting the Arctic, and impacts are increasing. TOM BARRY and COURTNEY PRICE explain.

THE MOST CONSPICUOUS changes in the Arctic are those to the physical environment, including warming temperatures, the loss of sea ice and an increasing footprint from industrial activities. The resulting biological effects are often much harder to see and to attribute. Stressors on biodiversity do not act in isolation, and often exacerbate one another, leading to surprising and unexpected cumulative impacts. These stressors are important to investigate,

Photo: Roy Wood, CC, www.flickr.com

Golden light muskox, Bering Land Bridge National Preserve.

challenges

track and analyze now since changes today may take years or even decades to show their full effect. The world has seen many examples of long-term biological damage due to increasing human activity. The 2013 Arctic Biodiversity Assessment (ABA) demonstrated that in the Arctic we still have an opportunity to act before it is too late.

Globally, habitat loss and degradation pose the main threats to biodiversity. The relative well-being of many Arctic ecosystems today is largely the fortuitous result of a lack of intensive human encroachment, thanks to the extreme climate and long distance from major population and economic centers. This history does not guarantee a healthy future. It does however, provide humankind with a rare opportunity to create spaces where ecosystems and species can evolve naturally, and Indigenous cultures can continue to practice traditional ways of life. Conservation of Arctic biodiversity will no longer happen by default. It is possible only if decisive actions are taken now to conserve for posterity the Arctic legacy that enriches the world today.

DECISIVE ACTION NOW CAN HELP SUSTAIN ARCTIC BIODIVERSITY

The challenges facing Arctic biodiversity are interconnected, requiring comprehensive solutions and international cooperation. Climate change affects the physical environment with consequent impacts on ecosystems and species as well as the mobilization of contaminants. Human activity in the Arctic may increase due to improved access and rising global demand for resources. Risks from pollution such as oil spills will increase as Arctic development proceeds. Pathways for invasive species to reach the Arctic will increase as more ships travel north and new roads are built.

There will be greater potential for habitat degradation. Additional activity may mean more people who may increase fishing and hunting pressures.

Individually, each of these challenges places stress on Arctic biodiversity. Together, they create a web of stresses and impacts that cannot be successfully addressed in isolation. In the Arctic and globally, biodiversity must be conserved in a holistic fashion so that efforts to reduce one stressor do not unintentionally worsen the effects of another stressor.

The habitat needs of migratory species, long-range transport of persistent contaminants, global shipping lanes and the geography of ecosystems do not follow political boundaries. Thus, international cooperation is increasingly needed to fully address the conservation challenges that face Arctic biodiversity now and in the decades to come. ○

TOM BARRY is executive secretary to the Conservation of Arctic Flora and Fauna (CAFF) Arctic Council Working group

COURTNEY PRICE is the CAFF communications manager

The Arctic Biodiversity Assessment outlined 17 recommendations designed to respond to the challenges facing Arctic biodiversity. Approved by Foreign Ministers of the Arctic states, these recommendations fall under the following headings:

- climate change;
- ecosystem-based management;
- mainstreaming biodiversity;
- identifying and safeguarding important areas for biodiversity;
- addressing individual stressors on biodiversity; and
- improving knowledge and public awareness.

The *Actions for Biodiversity 2013- 2021: implementing the recommendations of the ABA*, comprises the implementation plan for ABA recommendations and guides how the Arctic Council responds to these challenges. Success in conserving Arctic biodiversity depends upon actions by Arctic and non-Arctic states, regional and local authorities, industry and all who live, work and travel in the Arctic. Therefore, these recommendations also act as a guide for action for states, authorities and organizations beyond the Arctic Council.

Arctic biodiversity is being degraded but decisive action now can help sustain vast, relatively undisturbed ecosystems of tundra, mountains, fresh water and seas, and the valuable services they provide.

FOR MORE INFORMATION:

- https://www.arcticbiodiversity.is/index.php/congress
- https://caff.is/actions-for-arctic-biodiversity-2013-2021

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