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A NEW DEAL FOR THE ARCTIC

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ABOVE: painted into a corner: a fisherman wasn't paying attention to the time and tide. Iqaluit, Nunavut.
Photo: Fiona Paton, CC, Flickr.com

A new deal for nature and people globally is a win for the Arctic, too

THE ARCTIC is at the hard edge of many of the biggest challenges facing the world today. Global warming, melting sea ice and ocean pollution all have direct implications for Arctic biodiversity as well as for communities that rely on nature's services for everything from cultural identities to livelihoods.

The threats to the Arctic are part of a larger trend in the decline of life on Earth. In fact, in the last 40 years, we have seen a 60 per cent decline in species populations worldwide. Nature is in the red, and we don't yet know the full implications. But we do know that we cannot continue to destroy habitat, pollute our oceans and destabilize our climate if we expect to continue to benefit from ecosystem services. The world's population is expected to reach nine billion by 2050. To ensure we have enough food, water, fresh air, and a stable climate for so many people, we must protect and restore our natural world and the biodiversity that underpins our very existence.

Unchecked, the acceleration of nature loss threatens us all. The global pandemic has made it abundantly clear that business as usual isn't working.

Unchecked, the acceleration of nature loss threatens us all. The global pandemic has made it abundantly clear that business as usual isn't working. There is strong evidence linking habitat destruction and illegal trade in high-risk species to pathogens that jump from animals to people. For example, scientists suspect the COVID-19 virus may have jumped from a bat by way of a pangolin. To safeguard humankind against future pandemics, we must reduce the opportunities that viruses have to make such leaps. This means halting any further losses of habitat and species.

The Arctic may be remote, but it is far from immune to the many factors causing catastrophic declines in species worldwide. Habitat loss, poaching, pollution and unsustainable development are direct drivers challenging Arctic biodiversity. For example, Pacific walrus are losing their homes as sea ice retreats and forces them onto land, where they are threatened by other species, such as humans. Unimpeded climate change could cause the loss of more than 30 per cent of the world's polar bears by 2050.

Over the next 12 months, critical decisions will be made that affect biodiversity, the oceans, the climate and development. Together, these represent a once-in-a-decade opportunity to secure a New Deal for Nature and People—one that supports the transition to a world that is "Nature Positive by 2030" (see p. 9) and unites people to preserve, protect and renew our relationship with nature and biodiversity.

To become nature positive, we urgently need to protect our planet's remaining natural spaces and bend the curve on biodiversity loss. We must also move to a sustainable consumption and production model that rebalances our relationship with the natural world and limits global warming to 1.5°C. We must halve our production and consumption footprint and transition to sustainable agriculture, forestry, fishing, extractives and infrastructure as part of a wider effort to build a world that supports nature and people.

GAVIN EDWARDS is the global coordinator of the New Deal for Nature & People at WWF International. He is based in the UK.

For all of that to happen, we need good governance, leadership and recognition of the problems globally—and Arctic nations should be leading the way. This year has proven how vulnerable we are as a species. While it has been necessary to postpone important global meetings on the environment until 2021, we must not lose the momentum for action on nature. We need world leaders to demonstrate ambition and accelerate movement. We must learn from this crisis by recognising the value of sustainable practices and heeding the call to a nature-positive world and a New Deal for Nature and People. ○

PANDEMIC

Researchers adjust to northern travel bans by turning to community-

CANADA'S THREE northern territories began banning non-essential travel shortly after the COVID-19 pandemic began. The strategy has helped keep the virus out, but it is also creating challenges for Arctic researchers.

Yukon, the Northwest Territories and Nunavut have public health orders in place prohibiting non-essential travel from the rest of Canada except for returning residents, essential workers and those exercising

Photo: kerryinlondon, CC, Flickr.com

Bearded seal at Monaco Glacier, Svalbard

LISTENING TO MARINE MAMMALS

Understanding vocalisations could lead to conservation strategies

THE SOUNDS that marine mammals make could help scientists better understand the impacts of climate change on Arctic ecosystems.

For four years, researchers from the Wildlife Conservation Society, Columbia University, Southall Environmental Associates and the University of Washington listened to five Arctic species to discover how they're affected by seasonal variations in sea ice thickness and surface temperatures.

The team worked with local Indigenous hunters and fishers, attaching three acoustic recorders to flotation devices anchored to the floor of the Bering Sea. They captured more than 33,000 vocalisations from walrus, bearded and ribbon seals, and beluga and bowhead whales off St. Lawrence Island.

The recently published study showed consistent seasonal distribution and movement patterns for most of the species. Its findings will serve as an important baseline for future monitoring and help inform conservation strategies for acoustically sensitive marine mammals affected by disappearing ice and increasing ship traffic in the Arctic.

-based research

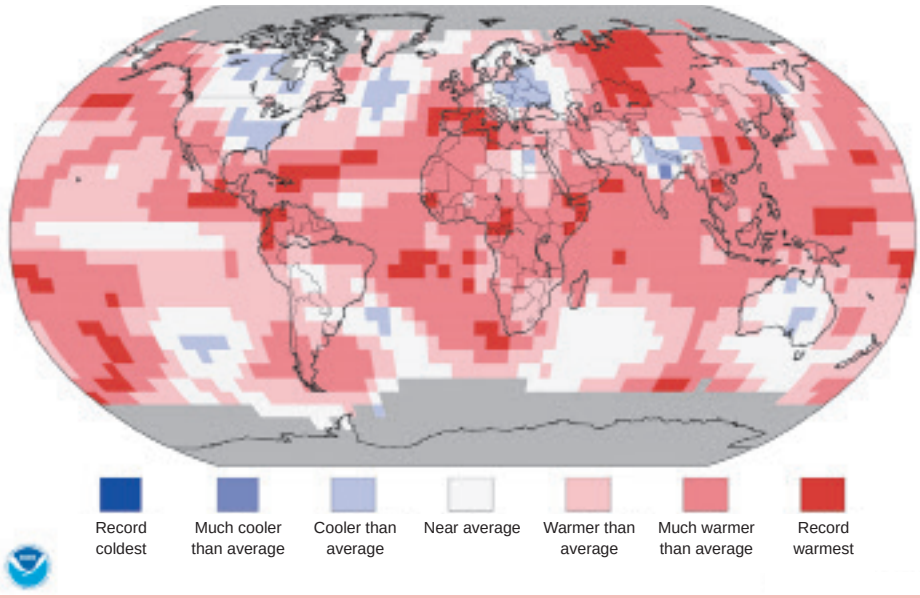
treaty rights. The situation has forced researchers to consider how to continue projects that require them to collect annual data, since there will be gaps unless they can find workarounds.

Some have turned to community-based research, using their relationships with residents to keep projects running—for example, getting them to monitor wildlife or collect samples.

Researchers speculate that this new approach could contribute to regional economies and may even serve as a "wake-up" that could have a positive impact on Arctic research by better meeting principles like inclusion, authentic partnering, shared benefits and commitment to the future.

Land and ocean temperature percentiles, May 2020

Map: NOAA National Centers for Environmental Information



HEAT SHOCK

Hottest May on record, greatest extremes in Siberia

MAY 2020 was the world's warmest on record, at 0.63°C warmer than the average May from 1981 to 2010. But the effects were noticed most sharply in the Russian Arctic, where some areas experienced unprecedented warming and months of record-beating high temperatures. The remote tundra near the Arctic Ocean is now among the regions of the world subject to the most rapid warming.

Spring temperatures were close to 10°C above average over the lower reaches of the Ob and Yenisei rivers in Siberia. The rising temperatures led to a record-early ice break-up in several great Siberian rivers and raised the risk of wildfires: there had already been more than half a dozen by late May. The high temperatures are also affecting the region's ecosystems, with a significant number of lakes turning into wetlands.

Worldwide, the 10 warmest Mays have all occurred since 1998, and the months of May from 2014 to 2020 have been the seven warmest in the past 141 years.

URBAN HEAT ISLANDS IN THE ARCTIC

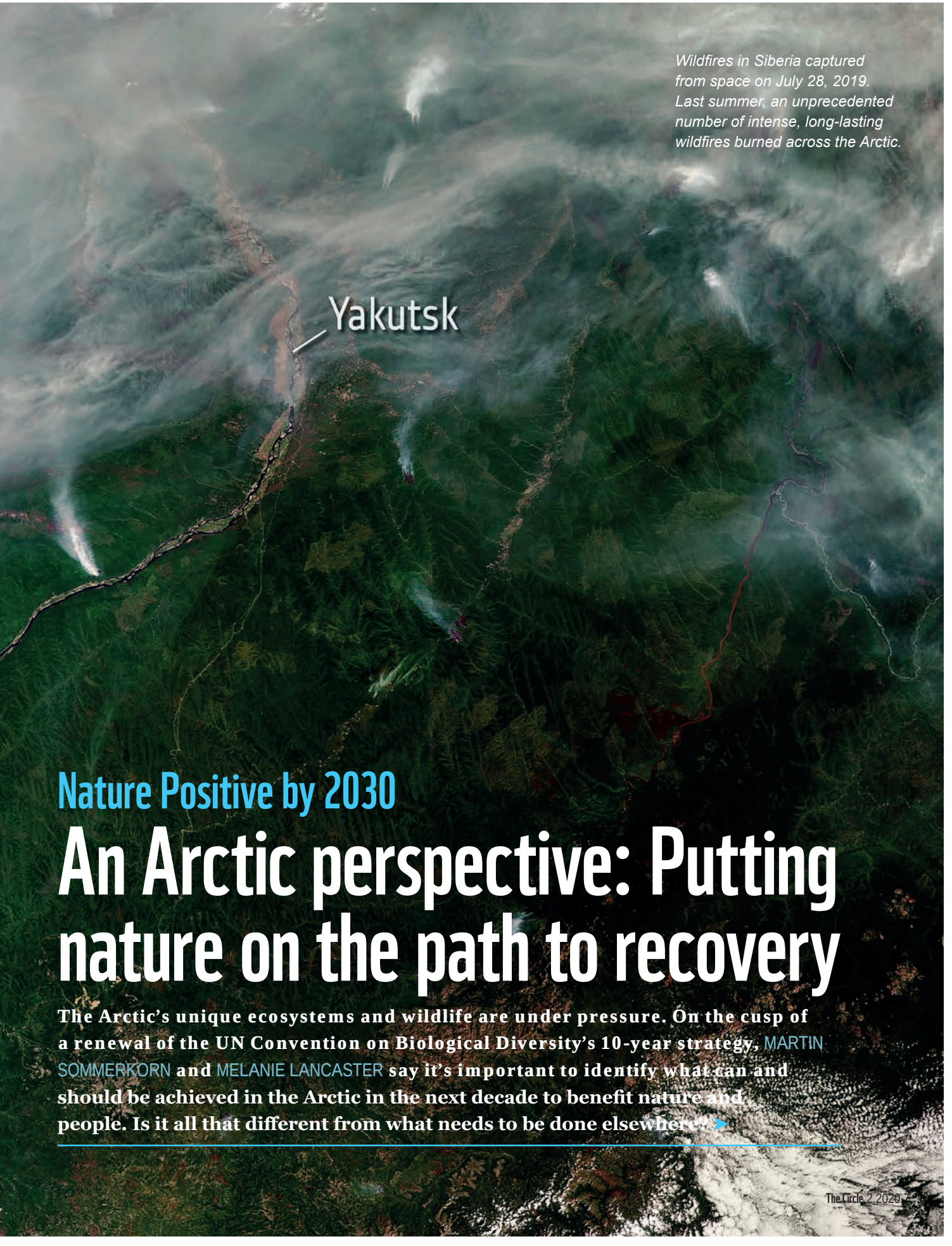
It's hotter than you think

ALTHOUGH WE'VE LONG known that cities in temperate climates can create and trap significant heat, less is understood about this phenomenon in northern urban areas. But a new study shows that urban environments in the remote Arctic are contributing to climate change in the region.

Using satellite spectral imaging, researchers from the Nansen Environmental and Remote Sensing Center at the Bjerknes Centre for Climate Research in Norway measured urban heat islands in 57 cities with 4,000 or more residents in Norway, Sweden, Finland and northwestern Russia. Urban heat islands are centres of warmth that occur when heat from human activities is trapped, making cities hotter than surrounding regions. They found that all of the measured cities had strong, persistent urban heat islands.

By better understanding heat islands in the Arctic, the researchers behind the study hope to develop strategies to support the sustainability and resilience of northern communities experiencing accelerated Arctic warming.

Photo: European Space Agency



Wildfires in Siberia captured from space on July 28, 2019. Last summer, an unprecedented number of intense, long-lasting wildfires burned across the Arctic.

Nature Positive by 2030

An Arctic perspective: Putting nature on the path to recovery

The Arctic's unique ecosystems and wildlife are under pressure. On the cusp of a renewal of the UN Convention on Biological Diversity's 10-year strategy, MARTIN SOMMERKORN **and** MELANIE LANCASTER **say it's important to identify what can and should be achieved in the Arctic in the next decade to benefit nature and people. Is it all that different from what needs to be done elsewhere?**

Photo: www.grida.no/resources/1148

Residents of the Alaskan coastal village of Shishmaref voted to relocate because the effects of the climate crisis are causing buildings to slide into the sea.

TEN YEARS is a long time in a region experiencing rapid transformative change. From 2011 to 2020—the lifespan of the last Strategic Plan for Biodiversity that was agreed to under the UN Convention on Biological Diversity (CBD)—nature and people in the Arctic experienced many firsts. For example, in 2016, residents of the Alaskan coastal village of Shishmaref voted to relocate because the effects of the climate crisis were causing buildings to slide into the sea. In 2018, a sperm whale surfaced in the waters of Canada's High Arctic, far north of its normal range, surprising local people and researchers alike. And in 2019, an extraordinary number of salmon running in the rivers of Wrangel Island off Russia became snacks for hungry polar bears.

MARTIN SOMMERKORN is head of conservation with the WWF Arctic Programme.

MELANIE LANCASTER is a senior specialist, Arctic species with the WWF Arctic Programme.

Last summer, an unprecedented number of intense, long-lasting wildfires burned across the Arctic Circle as temperatures hit record highs. The frigid waters of the Barents Sea became more hospitable to southern fish species, which replaced Arctic ones. And in each of the last five years, annual Arctic surface temperatures have exceeded those of any year since 1900.

...AND THAT WAS JUST THE BEGINNING

Last year's report from the Intergovernmental Panel on Climate Change was unequivocal in stating that trends like these will intensify in the coming decades, with grave impacts for Arctic habitats, species and ecosystems. Protecting habitats effectively and stemming their loss—cornerstones of past (and likely future) CBD strategies—will be virtually impossible for Arctic states without strong climate action on a global scale, and possibly even with it.

Take summer sea ice extent, for example, currently shrinking at a rate of approximately 13 per cent per decade. The sea ice ecosystem provides habitat for unique Arctic species, from algae and fish to polar bears and walrus. Arctic tundra is another example: its area is forecast to halve by 2050. This trend may drive barren-ground caribou, or wild reindeer—whose numbers have already declined by 60 per cent in the past two decades—beyond their ability to adapt. These and other impacts will deeply affect the benefits people receive from nature, ranging from food security to cultural survival.

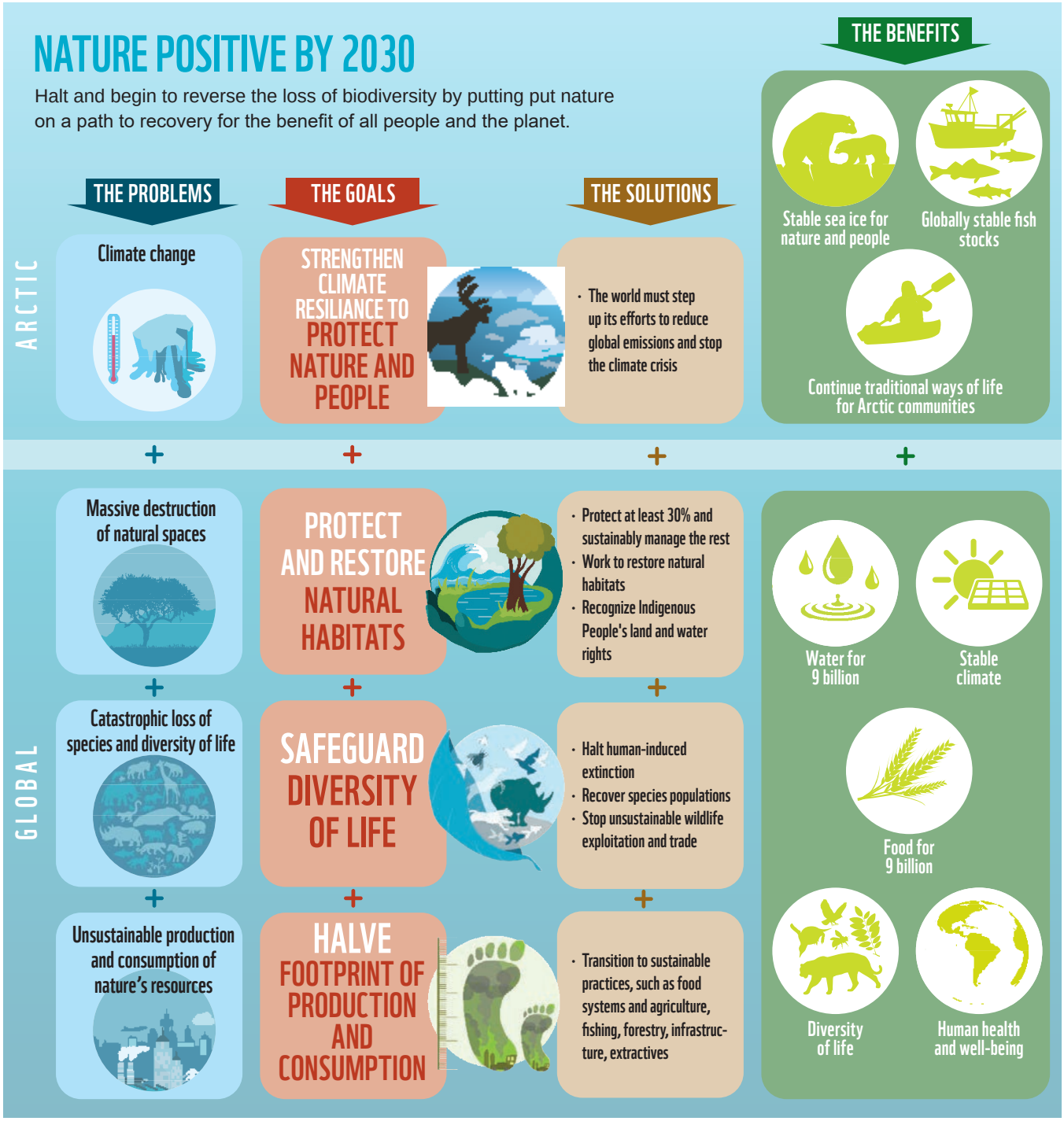
PROACTIVE EFFORTS COULD BE CAUSE FOR HOPE

In many ways, the Arctic has a head start compared with other regions of the world when it comes to efforts to be Nature Positive by 2030: numerous Arctic species are in good shape because many of the region's habitats and ecosystems are still largely intact. Rather than beginning with efforts to restore nature, we have an opportunity to be proactive and focus on supporting its inherent resilience and ability to adapt.

Arctic people and governments—and everyone who values Arctic nature and its benefits for mankind—must raise their stakes during the crucial decade ahead and act on the unique opportunities for engagement that exist both locally and globally. The Arctic's future hinges on halving humanity's global production and consumption footprint by 2030.

But Arctic states still need to prepare for the growing challenges of climate change, industrial development, and the loss and fragmentation of habitats in a systematic, co-operative fashion. Planning and management must include the participation of Arctic Indigenous Peoples to ensure that nature is managed in a way that strengthens current and future food security, livelihoods and cultural integrity.

Safeguarding the diversity of Arctic life should be approached at the ecosystem scale and consider both the current and anticipated distribution of Arctic nature. Establishing networks of protected and conserved areas that cover at least 30 per cent of the terrestrial and marine Arctic is critical to strengthening the resilience of biodiversity in the context of multiple mounting pressures. ➤



As of 2016, only 20.2 per cent of Arctic land and 4.7 of the Arctic Ocean, respectively, were under protection. This means there is no shortage of work to do in the coming years.

Planning for networks of protected and conserved areas should also include refugia for species that will be affected by future sea ice melt—and ensure that industrial development doesn't disturb those species or foreclose options for them to find new homes as they adapt.

Strong climate action and effective biodiversity conservation are inextricably linked in the Arctic. The positive narrative of polar bears fishing for salmon gives us hope that Arctic wildlife and ecosystems may yet adapt in some regions if they are given the conditions and space to do so.

UPPING THE ANTE

Arctic people and governments—and everyone who values Arctic nature and its benefits for mankind—must raise their stakes during the crucial decade ahead and act on the unique opportunities for engagement that exist both locally and globally. The Arctic's future hinges on halving humanity's global production and consumption footprint by 2030—an issue tackled by both the CBD and the United Nations Framework Convention on Climate Change, to which all Arctic countries but one are parties.

According to the Ecological Footprint Explorer, the per capita footprint of every Arctic country ranks within the top 17 per cent in the world, so pointing at global institutions is a call to lead, not an excuse to wait. Many regional efforts to protect habitats and safeguard the diversity of Arctic life and cultures are critically dependent on reducing these footprints. ○

Grappling with an existential question

Could social transformation help

When it comes to preserving biodiversity, we face twin challenges: a constantly shrinking number of species and constantly rising greenhouse gases. Both are the result of a growing number of people on the planet whose need to consume seems limitless. DAG O. HESSEN **explains why we must counteract the risk of a biodiversity tipping point—and how social tipping points could help.**

AS I PEER over the cliff's edge, I see them: two adult polar bears strolling through the valley 100 metres down. The wind is against me, so I can safely follow their journey until they vanish around a hillock. My pulse rate is a bit faster than usual. We're doing fieldwork in Svalbard, Norway, sampling DNA to reveal biodiversity at the microbial level. We are watching retreating glaciers and looking for signs of thawing in the permafrost. This High Arctic site is changing rapidly and may offer clues to what lies ahead for the rest of the Arctic.

Loss of diversity, burning forests, rising oceans, storms and heat waves: some fear that a series of such disasters could precipitate our extinction. But too many people seem to think these problems will sort themselves out, and that there is little that we, or I, can do about them. We face threatening and complex issues compounded by a wealth of contradictory messages. What is true and what is not? What do we know and what do we believe? How does it all fit together?

TWIN MENACES

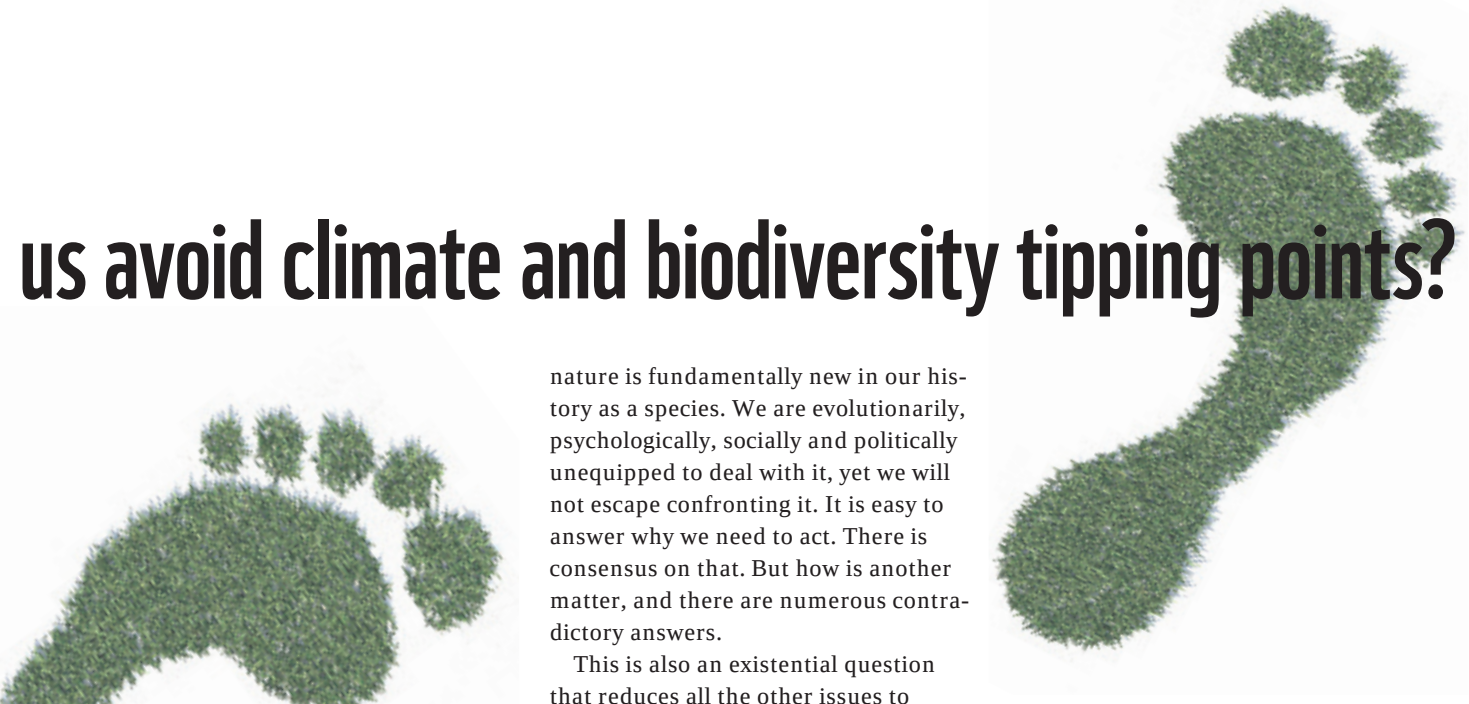
The gravest threats to all forms of life on Earth stem from population growth and mounting consumption. As such, I believe we need to view these problems as indivisible—and discuss them in the context of the great questions of purpose, meaning and the future of our planet on the scale of eternity.

■ **A [SOCIAL] TIPPING POINT** is a point in time when a group of people rapidly and dramatically change their behaviour by widely adopting a previously uncommon practice.

Since the literature on this topic is endless and few have read the various reports of the UN Nature Panel and the UN Climate Panel, I offer a personal conclusion: the world will not end, and we humans will not go extinct. However, we are headed for some tough

Illustration: Chris Potter, CC, Flickr

us avoid climate and biodiversity tipping points?



times. There are no quick fixes; we cannot consume our way out of these problems. Even achieving entirely CO_2-free energy will not be enough, because our footprint on the planet is about so much more than emissions.

On the threshold of the Anthropocene, the double threat of increasing greenhouse gases and deteriorating nature is fundamentally new in our history as a species. We are evolutionarily, psychologically, socially and politically unequipped to deal with it, yet we will not escape confronting it. It is easy to answer why we need to act. There is consensus on that. But how is another matter, and there are numerous contradictory answers.

This is also an existential question that reduces all the other issues to trifles. To have a meaningful existence here on Earth, we must be able to envisage a planet that offers both Homo sapiens and the five to 10 million other species with whom we share the planet the potential to live full lives. But getting agreement on how to do this—and on how pressing it is—is difficult because we all have different perspectives on what constitutes a relevant time horizon. Some people are mostly concerned about conditions on Earth during their own lifetimes. For others, a thousand years ahead seems like oceans of time, and the state of the planet in 3020 almost irrelevant. Others, like me, will think that the premise for a habitable planet must apply indefinitely.

To have a meaningful existence here on Earth, we must be able to envisage a planet that offers both Homo sapiens and the five to 10 million other species with whom we share the planet the potential to live full lives.

A SERIES OF TIPPING POINTS

It sounds dramatic to speak of a world at a tipping point, but strong language is sometimes necessary. In fact, there is not just one tipping point, but several potential tipping points in individual ecosystems and climate systems—such as the melting of the Greenland and West Antarctic Ice Sheets, permafrost thaw, rainforests turning into savannas or ocean circulation patterns changing. It is crucial that we avoid each and every one of these tipping points because they can trigger each other, kicking off the cascade of disastrous, cumulative global changes that we most hope to avoid.

Fortunately, awareness of this risk seems to be growing. In the best case, this will lead to socio-cultural, political and economic tipping points that will benefit the Earth—for example, perhaps leading to fewer flights, less consumerism and a shift from fossil fuels to renewable energy sources. We will need to overcome formidable systemic inertia to achieve this. Intriguingly, the pandemic crisis may be paving the way for such major transitions.

It is well known that our risk of reaching a dramatic tipping point in climate is real and imminent. But tipping points in ecosystems are equally problematic. Avoiding them calls for a suite of social transformations related to consumption, behaviour, economy, law and norms as well as technology and politics.

I think the essence of the challenge is accurately summed up in a meme I recently encountered on a poster: "The greatest threat to our planet is the belief that someone else will save it." ○

DAG O. HESSEN is a biology professor at the University of Oslo, Norway, where he is also head of the Centre for Biogeochemistry in the Anthropocene. He is the author of several popular science books.

Photo: David McGeachy

Survival of the fattest

Why the climate crisis is making it hard for polar bears to get enough calories

Longer ice-free periods have been linked to declines in the survival and abundance of polar bears in some parts of the Arctic.

To survive, polar bears need two things: seals to eat, and a platform of sea ice from which to hunt them. Pregnant bears, in particular, must get very fat from hunting seals before they hibernate, as they may not eat for eight months: they rely on stored fat for the energy they need to produce and nurse cubs, meet their own needs and travel back to the ice in spring. But as NICK LUNN explains, warming Arctic temperatures and declining sea ice habitats are making it challenging for polar bears to stay fit by staying fat. ➤

Photo: David McCeachy

How fat a female polar bear is when she first goes ashore to hibernate is critical, not only for her own survival, but for the health and survival of her cubs.

IT'S SUMMER in northeastern Manitoba, Canada and as the Hudson Bay sea ice melts, polar bears are forced ashore. For the next four months, they will use stored fat reserves to meet their energy needs while they wait for ice to reform. But not all bears will go back to the sea when the ice returns: pregnant females will remain in their dens on land for another four months. When they finally emerge in spring, they will not have eaten seals for eight months, and will be famished. How fat they were when they first went ashore is critical, not only for their own survival, but for the health and survival of their cubs.

NICK LUNN is a Canadian government research scientist. His primary interest is in polar marine ecology, with particular emphasis on polar bears and marine mammals.

Polar bears are a keystone species, meaning they provide us with insights into the overall health of biodiversity in the Arctic marine ecosystem. They are distributed throughout the ice-covered waters of the circumpolar Arctic in 19 relatively discrete subpopulations. Although polar bears still occupy much of their historic range, the Arctic has been warming more rapidly than the global average, and the loss of sea ice is accelerating. This has raised long-term conservation concerns for Arctic marine mammals, including polar bears.

The average weight of solitary and presumed pregnant adult females declined by 15 per cent between 1980 and 2019—from 266 kg to only 226 kg.

Increasing temperatures in this region have resulted in earlier sea ice break-ups and later freeze-ups, forcing the bears to spend progressively longer periods on land. The onshore period is now 34 days longer than it was in the early 1980s.

LESS ICE MEANS LESS FAT—AND FEWER CUBS

Ongoing research on the Western Hudson Bay subpopulation of polar bears began in 1980 and has provided researchers with an unparalleled opportunity to examine and speculate about the effects of past, present and future environmental conditions on the bears. This subpopulation lives near the southern limit of the species' range. Like all polar bears, they need ice to hunt seals, which make up the bulk of their diets.

But increasing temperatures in this region have resulted in earlier sea ice break-ups and later freeze-ups, forcing the bears to spend progressively longer periods on land. The onshore period is now 34 days longer than it was in the early 1980s. Longer ice-free periods have been linked to declines in the body condition, survival, reproduction and abundance of Western Hudson Bay polar bears.

Female polar bears are critical to the sustainability of polar bear subpopulations. We know that larger, heavier females tend to have larger litters and produce heavier cubs with higher survival rates. We also know that when female bears are not in good condition, they may not produce any cubs at all.

Unfortunately, the average weight of solitary and presumed pregnant adult females declined by 15 per cent between 1980 and 2019—from 266 kg to only 226 kg. While we don't know the exact weight below which female polar bears will not produce cubs, over the course of our long-term study, the lightest female known to have done so weighed 189 kg.

The abundance of Western Hudson Bay polar bears has declined by 30 per cent—from an estimated 1,200 animals in 1987 to just 842 in 2016. The production of litters declined by 39.7 per cent from 2001 to 2004 and from 2017 to 2019. The persistence of polar bears as a species depends on their ability to reproduce. Continued reductions are likely to lead to further declines in the abundance of the Western Hudson Bay subpopulation.

POLAR BEAR HABITAT NEEDS PROTECTION

Polar bears are not only an iconic Arctic species, but an important natural and cultural resource for Indigenous People. Their conservation is guided by the 1973 Agreement on the Conservation of Polar Bears.

In 2015, five nations—Canada, Greenland, Norway, the United States and the Russian Federation—adopted a co-operative circumpolar action plan to strengthen polar bear conservation. One of its key objectives is to communicate to the public, policy makers and legislators around the world the importance of mitigating greenhouse gas emissions to protect essential sea ice habitat for polar bears and ensure their continued presence in healthy numbers.

Although the Arctic is far removed from everyday life for most of us, and many will never experience its beauty first-hand or see a polar bear in the wild, there is no escaping the fact that the environmental changes occurring there are key drivers of change across the entire planet. If we want polar bears to continue to exist and thrive, then we must work together to protect sea ice habitat so polar bears can stay fit by staying fat. ○

Lessons from lemmings

Ecosystem disruptions can have cascading effects on species

The climate crisis will lead to environmental changes that are not always easy to foresee. TOM ARNBOM **discusses the ups and downs of the Scandinavian lemming to illustrate how the fate of a single species can influence that of many others—and to show that we must begin building a more resilient Arctic now if we want to protect ecosystems and the biodiversity they support.**

MY FIRST ENCOUNTER with a Scandinavian lemming was 46 years ago, but I remember it as clearly as if it were yesterday. It was 1974, my first visit to the Arctic. It was a good year for lemmings—and by extension, for the snowy owls that preyed on them. I remember seeing 22 breeding snowy owls all at a single glance—a rare sight. They all had stacks of dead lemmings in front of their young chicks.

The Arctic has changed dramatically since then. The climate crisis has entered the arena dramatically and is now the biggest driver for species changes in the Arctic. Sadly, it doesn't look good for the Scandinavian lemming.

It's normal for these feisty rodents to experience boom-and-bust cycles: they can be completely absent from the mountains of Norway, Sweden and Finland (Fennoscandia), then found in enormous abundance there three years later. The rustle of their movements can be heard everywhere in the mountain forest, high up on the treeless tundra and even inside your tent. They are always on the move.

> We can steward the future to a certain degree, but we must be aware that many changes will happen in a way that we do not expect and cannot foresee.

THE LITTLE ENGINE OF THE TUNDRA

The lemmings' boom-and-bust cycles influence the diets and even the numbers of many other Arctic species. In years when lemmings are abundant, raptors—such as rough-legged buzzards and merlins, including snowy and short-eared owls—breed in large numbers, with large clutches. Other animals switch to lemming-focused diets, ➤

Arctic hare

Photos: Staffan Widstrand

Arctic fox

The lemming is at the centre of an Arctic food web. Here is one with Frida Arnbom.

including weasels, wolverines, foxes, brown bears and lynx.

When these predators are busy munching on lemmings, other species benefit. For example, waders and ptarmigans are less likely to become prey. As well, lemming droppings fertilise plants that are eaten by reindeer and Arctic hares—so a strong year for lemmings is good for these species too. Essentially, the Scandinavian lemming is like an engine running the tundra in Fennoscandia.

One species that is particularly influenced by the presence of lemmings is the Arctic fox. This species can typically be found all over the Arctic and is generally faring well in most places today. However, the Arctic fox nearly became extinct in Fennoscandia in the late 1990s after being over-hunted for its

Photo credit: Bert-Ove Lindström

Photo: Tom Arnbom/WWF

Author Tom Arnbom with a snowy owl

Rock ptarmigan

Photo: Jan Frode Haugseth, Wikipedia

This is just one example of how the climate crisis can affect an intricate ecosystem. There are many other Arctic examples.

fur throughout the 19th and early 20th centuries. Amplifying the situation—for reasons that are not understood, but not related to climate change—the lemming cycles completely disappeared for nearly two decades, from 1982 to 2000. By the end of that period, the number of Arctic foxes had dipped to just 30 individuals in Sweden. Thanks to lemmings and conservation measures, their numbers are now back up to about 200.

Arctic foxes began their remarkable comeback in Scandinavia because the lemming cycles started to run again. Several deliberate conservation measures also helped, such as complementary feeding with dog food at fox dens in the worst rodent years and the removal of the red fox—a larger, more aggressive species that has been known to compete with the Arctic fox for food and prey on Arctic fox cubs and adults.

Still, in Sweden, the Arctic fox normally only breeds every third or fourth year—during "lemming years." When there are no lemmings, no fox pups are born, while during a lemming year, a female Arctic fox can give birth to up to 18 pups. Fox parents can be a bit stressed about finding enough food for all their hungry, growing youngsters during these years.

Unfortunately, the relationship between the Arctic fox and Scandinavian lemming is starting to break up again due to the climate crisis.

TOM ARNBOM is a senior advisor on Arctic and ocean issues at WWF–Sweden. He has more than 45 years' experience in Arctic issues. His main interests are future management of the Arctic and how Arctic species will adapt to climate change.

WARMER WINTERS UPSET ECOSYSTEMS

Winter temperatures in northern Sweden have increased by an average of 3°C since 1960. Winter rains can now occur any time between October and April, with lethal consequences for lemmings:

when the rain freezes, an ice shield is created under the snow that prevents them from reaching moss to feed on. The population can crash, setting off a cycle that affects many other species.

For example, predators that feed on lemmings do not breed—and they switch to eating other species, such as waders, ptarmigans and hares. When ptarmigans are badly hit by many predators, this in turn affects gyrfalcons, which normally feed on ptarmigans. Sweden has experienced a 30 per cent decrease in the number of breeding gyrfalcons over the last 10 years.

This is just one example of how the climate crisis can affect an intricate ecosystem. There are many other Arctic examples. Orcas (killer whales) are one: they are taking over as the top predator in several areas, replacing polar bears when the sea ice disappears. Orcas scare belugas and narwhals away from Indigenous hunting areas, affecting subsistence lifestyles. Another example is in Russia, where greater volumes of freshwater runoff from rivers may change the distribution and behaviour of fish and marine mammals, affecting local people's ability to hunt.

Quick changes in species distribution will challenge many Arctic ecosystems as new predator and prey species establish themselves. With increasing shipping in the region, the risk of new invasive species is also high.

We must prepare for dramatic changes in the Arctic. We can expect to see many new interactions and distributions of species. Some species currently classified as invasive might actually become sustainable food resources for local communities and commercial fisheries.

We can steward the future to a certain degree, but we must be aware that many changes will happen in a way that we do not expect and cannot foresee. We must start the process of building a resilient Arctic now in order to cope successfully with future changes and challenges. ○

Fisheries in Canada

Building a sustainable Blue

Economy in northern communities

Dr. David Deslauriers and harvester Noah Meeko sort through a haul of sea scallops, sea cucumbers, sea urchins and sea stars.

Photo credit: Hannah Polaczek

In Canada's eastern Arctic, fish harvesters are combining traditional knowledge with cutting-edge technology to bring much-needed economic opportunities to their communities. DOUG CHIASSON **explains how WWF–Canada is working with harvesters in the northern Canadian communities of Arviat, Sanikiluaq and Kinngait to build renewable commercial fisheries.**

DOUG CHIASSON is a senior specialist working in marine development in the WWF–Canada Arctic Program.

AS A SLEEK blue-and-white drone is hauled over the side of the boat, GPS coordinates are written down in a spiral-bound notebook beside an Inuktitut place name.

"This is Kataaluk," explains the boat's ➤

Photo: Doug Chiasson

Doug Chiasson holds an Icelandic scallop.

If the fisheries succeed, they could become the pillars of a new, sustainable Blue Economy in the region.

captain, Lucassie Arragutainaq, referring to the main harbour between Claw Point and Mosisee Point near Sanikiluaq in the Belcher Islands. "It means 'the big entrance.'"

The catch of the day is a video of the Hudson Bay seafloor. Collected by the drone and relayed to the surface through a smartphone attached to a video game controller, it reveals the intended target: scallops.

The waters of Hudson Bay have been a source of both food and clothing (from sealskin to eiderdown) for the people of the nearby Belcher Islands since time immemorial. Now they may provide another necessity: sustainable economic opportunity.

Communities in Canada's northern territory of Nunavut have some of the highest unemployment rates in the country. Some have looked to mineral exploration, while others have focused on traditional art. But increasingly, communities are looking to the sea. In September 2019, as part of WWF–Canada's community-based Arctic fisheries project, a team of researchers and local harvesters undertook their first fisheries harvest survey near the community of Sanikiluaq in southeastern Hudson Bay to determine the feasibility of this idea.

The survey, which combined underwater video with traditional and commercial harvesting methods, will serve as the foundation for the development of a commercial fishery. Species like Icelandic scallops, sea cucumbers, green sea urchins and blue mussels all call the frigid waters of Hudson Bay home. The video surveys will be used to develop an artificial intelligence–based tool to estimate abundance, while biological sampling will measure important nutritional and life cycle data. Local harvesters see this potential seafood harvest as a way to address food insecurity at home while supplementing the local economy through sales to other parts of Canada and across the world.

Over the next year, WWF–Canada will undertake more surveys around Sanikiluaq and begin surveys for crab and shrimp in the Hudson Strait with the community of Kinngait. It will also begin surveys for whitefish inland from eastern Hudson Bay with partners in the community of Arviat.

These are early days yet for the surveys in these three Nunavut communities, but residents are hopeful. Future commercial fisheries will build not only on this research, but on the accumulated ancestral knowledge of harvesters. If the fisheries succeed, they could become the pillars of a new, sustainable Blue Economy in the region. ○

What is a sustainable Blue Economy?

The "Blue Economy" refers to the use of the sea and its resources for economic development. A sustainable Blue Economy:

- Provides social and economic benefits for current and future generations
- Restores, protects and maintains the diversity, productivity, resilience, core functions and intrinsic value of marine ecosystems
- Relies on clean technologies, renewable energy and circular material flows to secure economic and social stability over time within the limits of one planet

For more information, see Getting It Right in a New Ocean: Bringing Sustainable Blue Economy Principles to the Arctic, a WWF report.

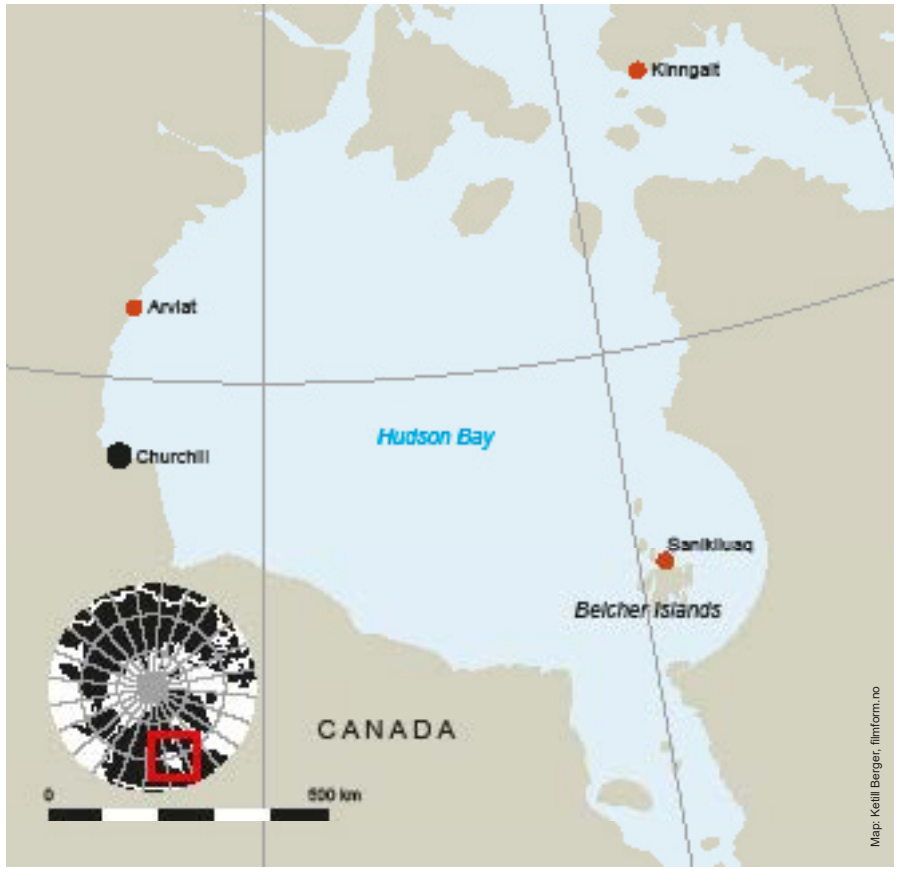


Photo: ©Chickweed Arts / JamieGriffiths 2019

Mumilaaq Qaqqaq, Member of Parliament for Canada's northern territory of Nunavut, says residents face unique challenges when it comes to surviving a global threat like COVID-19.

Global crises, Arctic vulnerabilities

"We shouldn't have to be resilient"

To survive prolonged crises, communities around the world need many of the same things: food security, clean water, safe housing, reliable infrastructure and accessible health care. But not every community has all these—and those in the Arctic face unique and additional challenges. The Circle asked MUMILAAQ QAQQAQ, Member of Parliament for Canada's northern territory of Nunavut, what Arctic communities need to cope with a global threat like COVID-19.

How have people in Nunavut been affected by COVID-19?

We are fortunate to have no cases so far, but we know that if it hits, it has the potential to spread like wildfire. That's because we have residents who lack access to things that are basic human rights—like adequate housing, affordable healthy food and accessible, clean drinking water year-round. So I think people here are frustrated and anxious. How can we ask them to wash their hands and clean their homes without access to clean water? How can we ask them to eat healthy foods all the time if that's not affordable where they live? How can we tell people to physically distance in ➤

overcrowded homes? There are unacceptable basic human rights issues in the territories, and COVID-19 has amplified them.

What are some of the Arctic's unique vulnerabilities in terms of the pandemic?

The biggest one is the distance people must travel to access health services—and now with COVID-19, there's also the need to self-isolate after each trip. For example, in most places, you have to leave your community even to give birth. You leave for check-ups, then you come home for a time and leave again—and now you need to go into mandatory isolation after each trip. Considering the amount of money that is spent every year on travel to health facilities, why aren't we building more health-services capacity within the territory?

What do Arctic communities need in order to reduce their vulnerability during crises like these?

We're behind in a lot of ways. We lack the equality of access that we should have across Canada to necessary services. The internet and transportation are two key areas. The internet connections in Canada's territories are poor, so we're missing out on a lot of potential resources, like online counselling and education. With schools closed across the country, how are we supposed to get resources to students? The internet here lacks the required speed to teach effectively, and it's compounded by the fact that more people are working from home. It's also not sufficient to deliver mental health services online. And it's not affordable.

When you look at transportation, the 25 communities of Nunavut have real challenges with connectivity. If you need to renew your driver's licence or government ID, the application gets sent down south to Ottawa because the internet capacity isn't sufficient to handle it from Nunavut. I've heard from many constituents who have had to wait over a year to get a driver's licence or general ID card renewed. And if you have no other means of getting photo ID, how are you supposed to travel?

All of Nunavut's communities are fly-in only. If you want to visit relatives in a neighbouring community, it can cost thousands of dollars for a family. People just can't afford it.

We shouldn't *have* to build resilience. Nobody in Canada should have to "be resilient" or try so hard to achieve equality. I feel like I have to keep justifying why our lives in Nunavut are just as important as lives anywhere else.

Scientists have talked for years about a pandemic, yet most countries were caught off-guard by COVID-19. How can the Arctic build resilience to survive crises that are hard to foresee?

We shouldn't *have* to build resilience. Nobody in Canada should have to "be resilient" or try so hard to achieve equality. I feel like I have to keep justifying why our lives in Nunavut are just as important as lives anywhere else. I think our communities are doing a phenomenal job under the circumstances with the resources we have, which are still inadequate, unequal and very much under-funded. About a third of my constituents live in overcrowded and mouldy homes. If this was happening in Ottawa or Toronto, there is no way that would fly.

There are unacceptable basic human rights issues in the territories, and COVID-19 has amplified them.

Do you think the pandemic is siphoning much-needed attention from the climate crisis, or could it open a door to a "green" recovery?

I hope people can start grasping the idea that we have an opportunity here to create a new normal. For example, as a result of this crisis, people who wouldn't otherwise be getting benefits or being paid a living wage, like those in the food industry, are now being called essential. That in itself exposes a glaring problem—we need these individuals. We need to make sure they are safe, treated fairly, have access to benefits and can earn a liveable wage.

We keep talking about returning to normal, but we need to start talking about shaping a new normal. This is an opportunity to implement a just transition to a cleaner economy. If we come together and support each other, and work with one another, we can create change and determine our futures, especially as Indigenous People of Canada. ○

Science supporting culture

Alaska programme launches research careers from home shores

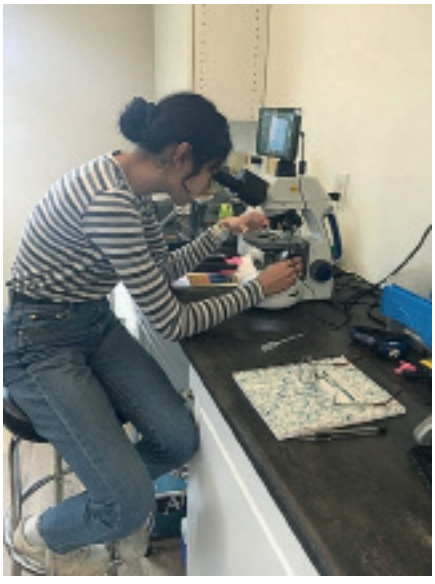
Southeast Alaska is a coastal archipelago—far removed from the world's large biomedical research labs. But as ELLEN CHENOWETH writes, it is a place where Indigenous culture, fishing economies and subsistence activities highlight the connections between human and environmental health.

MARGARET PETERSON grew up in Sitka, Alaska, an island community of about 8,500 people. She vividly recalls late-night trips to the beaches with her family to collect clams when she was young enough to worry that the large sea stars exposed by the low tide might attack her. This year, during her senior year in high school, she was among the first group of students to explore these same beaches as part of an educational research initiative called Rural Alaska Students in One-Health Research, better known as RASOR. RASOR is a unique collaboration between the University of Alaska Southeast Sitka campus, the Sitka Tribe of Alaska and the Sitka Sound Science Center, a non- ➤

Naomi Bargmann of the Sitka Tribe of Alaska (centre) teaches author Ellen Chenoweth (left) and student Shane Bennett, from Ketchikan, Alaska, how to conduct a clam survey on Starrigavan Beach, Sitka, Alaska.

Photo: Angela Hessenius, Sitka Tribe of Alaska

Photo: Jing O'Brien



Jade Balasag is a RASOR student from Wrangell, Alaska.

RASOR engages Southeast Alaska high school students in remote communities in research that monitors the shellfish from their local beaches for the presence of paralytic toxins.

profit field station. It is centred on the concept of "one health," which emphasises holistic research that considers the indivisible ties between human, animal and environmental health.

Funded by a Science Education Partnership Award from the National Institutes of Health in the United States, RASOR engages Southeast Alaska high school students in remote communities in research that monitors the shellfish from their local beaches for the presence of paralytic toxins. Generated by certain types of plankton, these toxins can concentrate in many of the shellfish that are core components of local subsistence diets. Paralytic shellfish poisoning, which results from acute overexposure to these toxins, was recently designated as Alaska's top zoonotic (passed from an animal or insect to a human) disease threat.

ELLEN CHENOWETH is a cetacean biologist, affiliate professor of biology, and research advising and mentoring professional in the Biomedical Learning and Student Training Program at the University of Alaska Southeast and University of Alaska Fairbanks.

PROVING THAT SCIENCE CAN SUPPORT CULTURE

RASOR students gathered last fall for Sitka Whalefest, a marine science festival managed by the Sitka Sound Science Center. During the week-long event, students connected with their regional RASOR peers at cultural, outdoor and training workshops. They met college students taking the next steps in their research careers and ocean scientists on the cutting edge of marine research. Then they travelled home to begin their own studies in the field.

Thanks to the Sitka Tribe of Alaska's work to develop the Southeast Alaska Tribal Ocean Research network, we are able to connect students across six communities with local mentors. The network connects tribal environmental researchers in communities across the state who monitor their beaches for the presence of harmful plankton and send shellfish samples to the Sitka Tribe of Alaska Environmental Research Lab for testing. The mentors assess students' interests and guide them toward projects that are locally and culturally relevant.

This year, students chose to test previously unmonitored beaches, examine how environmental variables relate to toxin levels, and track toxin levels through the food chain. Their field experiences were supported by rigorous academic coursework at the University of Alaska Southeast. Through highly personalised distance delivery, students engaged in discussions about the role of science in society, the importance of diverse perspectives, and strategies for college success. They presented their results digitally to an audience of researchers and community members.

Together, this programme and our students are demonstrating how science can support both cultural and individual identities. For Margaret, that

RASOR student Jade Balasag (far left), Sitka Tribe of Alaska mentor Will Peterson (left), Margaret Peterson (middle), and RASOR student Myra Guthrie (right) dig for shellfish.

Photo credit: Robin Kim

meant teaming up with her collaborators to present scientific research that demonstrated promising growth and survival among blue mussels kept in a monitoring cage. Their research was also the subject of her first article in the local newspaper where she works. She has since earned a scholarship to study marine science at the University of Alaska Fairbanks.

Together, this programme and our students are demonstrating how science can support both cultural and individual identities.

But perhaps the most intriguing and inspiring aspect of Margaret's participation in RASOR is that she and her fellow researchers completed their work while living and contributing to the small communities that helped form their unique perspectives as rural Alaskan scientists. ○

The next decade in biodiversity

The Convention on Biological Diversity: Looking beyond 2020

Adopted at the Rio Earth Summit in 1992, the Convention on Biological Diversity (CBD) arose from a growing recognition that our natural world is an asset we need to conserve. With 196 parties, the multilateral agreement aims to protect biodiversity, ensure ecosystems are used sustainably and share the benefits of diversity equally between nations. At its next governing body's conference, the CBD will set out its actions for the coming decade in a post-2020 global biodiversity framework. The Circle spoke to acting executive secretary ELIZABETH MARUMA MREMA to find out why the agreement is still relevant and how it can protect biodiversity in the years ahead.

How has the CBD evolved over the past 30 years?
Its objectives have remained the same, but the Convention has evolved in response to developments, such as new insights into nature and its contribution to people. Our 10-year strategic plan on biodiversity and biodiversity targets is now in its last year, and 2020 concludes the UN's Decade on Biodiversity. But that doesn't mean our biodiversity problems have been sorted out. All indications suggest that most of the targets have not been met at the global level, notwithstanding some important successes at the national and regional levels. We need to continue to focus on biodiversity. The post-2020 global biodiversity framework will be a stepping stone to our long-term vision of living in harmony with nature.

We are looking to the Arctic to see how changes there may affect the rest of the world—and what happens will contribute immensely to all aspects of the post-2020 biodiversity framework.

How much focus does the new framework have on Arctic biodiversity?
The Arctic is what I call "undisturbed and unchartered waters," and it's important to maintain that richness. We are looking to the Arctic to see how changes there may affect the rest of the world—and what happens will contribute immensely to all aspects of the post-2020 biodiversity framework. The Arctic is changing much more quickly than the global average. Not only will this have disastrous effects on species and ecosystems—it also means we are likely to see more human activity in this vulnerable region. We hope we can avoid a disastrous tipping point in the Arctic.

What actions should we be taking in the Arctic?
As parts of the Arctic become more accessible, businesses will see opportunities for economic development. But we have seen over and over again that jumping into economic development without considering ecological inputs and developing proper safeguards is short-sighted. It might end up costing the region dearly in the long term. Clearly, the region needs to look at pre-

Elizabeth Maruma Mrema, acting executive secretary of the CBD Secretariat, says more must be done to ensure the long-term health and well-being of the Arctic and its species and people.

venting such impacts and degradation. We have a chance to embed sustainability and environmental responsibility in the industries being developed before things get out of hand.

What role do you think Arctic nations need to play in protecting biodiversity?

The Arctic is home to an incredibly unique confluence of species, ecosystems, people, culture and human activities—and all of these are extremely vulnerable to a wide range of stressors. For example, consider the agreement to prevent and regulate high-seas fisheries in the central Arctic. To us, that was a major achievement, as it was a legally binding precautionary approach to protect the region from commercial fishing before it even began. Likewise, we know that the protected areas recently designated by the governments of Canada and Russia are major achievements. But we need to see positive steps like these replicated in other Arctic nations and sectors to ensure the long-term health and well-being of the Arctic, its species and its people.

Looking to the post-pandemic period, how much focus do you anticipate there will be on protecting the environment—and biodiversity in particular?

The COVID-19 crisis has thrown the world into a state of uncertainty and fear. Countries are focused on protecting their citizens, and we're in solidarity with that. But it has also become clear that to avoid future pandemics, we need to look to nature. When the crisis ends, we will have an opportunity to build on the temporary environmental benefits we've seen—such as improved air quality and reduced greenhouse gases—and rethink our relationship with the natural world. As governments work on economic recovery and stimulus packages, we hope they will offer sustainable approaches to development. The bottom line is that economic development can only be sustainable in the long term if it does not undermine the services, functions and resources that nature provides. ○

To avoid future pandemics, we need to look to nature. When the crisis ends, we will have an opportunity to build on the temporary environmental benefits we've seen.

THE PICTURE

The Arctic deserves better

UN Photo/Tom Prendergast

In 1992, the first UN Conference on Economic Development aimed to get governments to rethink economic development, with a focus on sustainability. Participants signed an Earth Pledge, promising to “help make the Earth a secure and hospitable home for present and future generations.” While there have been some improvements since then, the world has fallen short when it comes to preserving biodiversity and minimizing climate change. The world and the Arctic need a New Deal for Nature and People.