



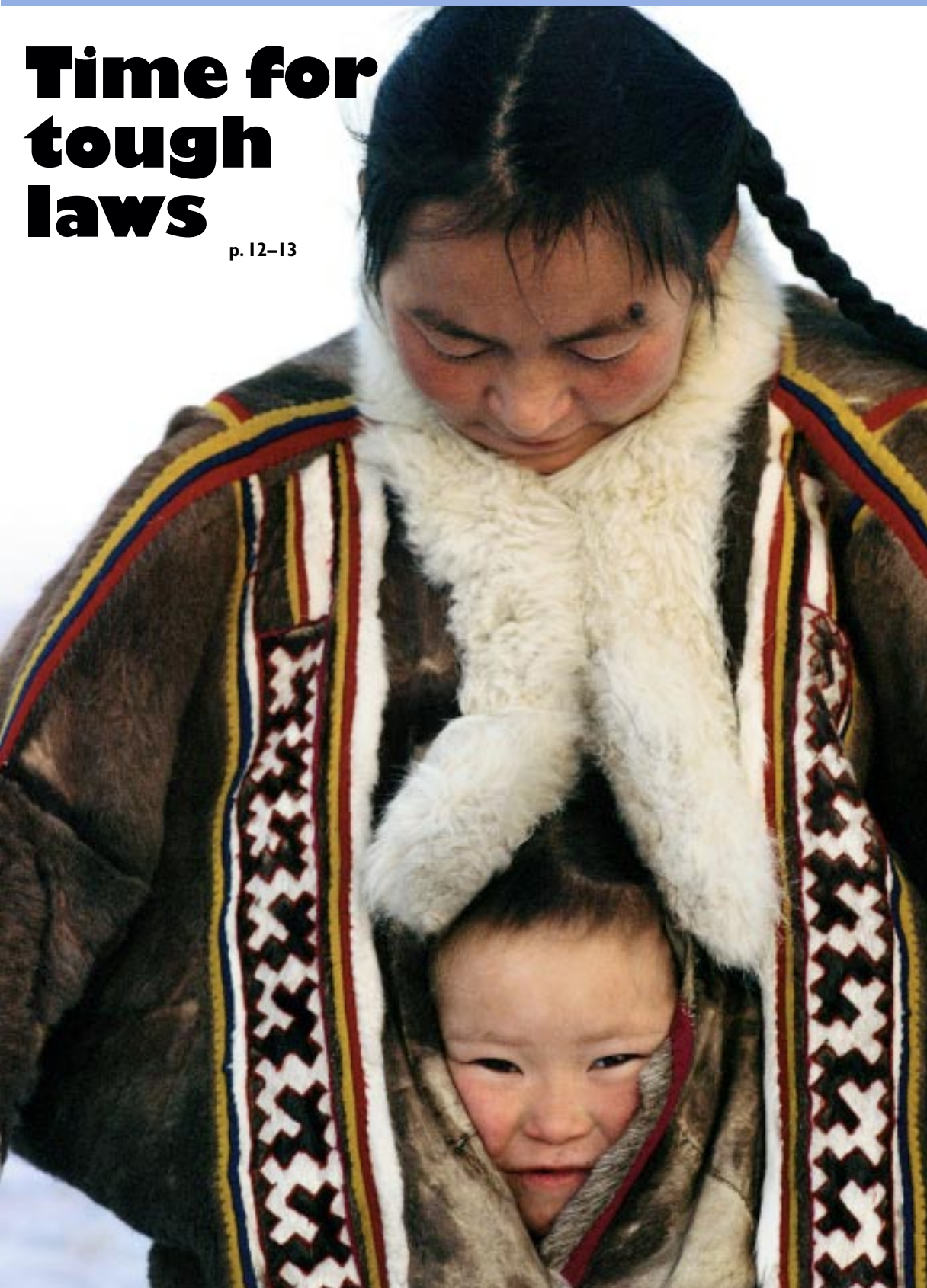
Arctic Bulletin



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Editorial

Montreal crossroads

Every week, more research appears that details the rapid and huge impacts of a warming climate on arctic ecosystems.

The world's polar bear scientists recently concluded that the conservation status of the polar bear should be upgraded, from Least Concern to Vulnerable. The conclusion is based on what they believe will be a 30 percent decline in the world's polar bear population over the next 35 to 50 years. The main cause of this decline is climatic warming and the resulting disappearance of sea ice, home to and key habitat for polar bears (see page 4 this issue).

Another report, which received widespread international media coverage, came from the National Snow and Ice Data Center and NASA.

For the fourth consecutive year, US scientists using satellite data have tracked a stunning reduction in arctic sea ice at the end of the northern summer. This year has seen the lowest extent so far recorded, and the persistence of near-record low extents leads the group to conclude that Arctic sea ice is on an accelerating, long-term decline. They conclude that if the current rates of loss of sea ice continue, the summer-time Arctic could be completely ice-free well before the end of this century. This goes well beyond the conclusions of the 250 scientists behind the Arctic Climate Impact Assessment (ACIA), which caused a sensation when it was released in November last year.

People living in the Arctic, though, don't need reports to confirm what they're seeing with their own eyes. As we go to press, indigenous peoples from around the Arctic have just met in Alaska to share their observations of climate change. They see that their world is changing fast, so fast that it threatens traditional ways of life and cultures.

But wait a moment: we can all relax now, can't we? The Kyoto Protocol is in force, and emissions of greenhouse gases are going to go down.

Wrong. The Kyoto Protocol may have been in force since February, but it is due to expire in 2012. And greenhouse gas emissions continue to rise: most

industrialized countries are still far above their Kyoto reduction targets.

This makes the 11th Conference of the Parties on the UN Framework Convention on Climate Change (COP 11), set to take place in Montreal, Canada at the end of November, crucial. This is the place where countries must decide how to deal with the threat of global warming and greenhouse gas emissions after 2012.

WWF, along with other environmental NGOs, will be pushing for the start of an international process that will lead to greater cuts in greenhouse gas emissions after 2012. We want an agreement in place no later than 2008. With major differences of opinions about the right approach between the US, Europe and developing countries, and with a total of 190 countries involved, reaching an agreement will be challenging. It's vital to start now.

WWF thinks that Parties, to claim success in Montreal, need to leave with a clear and agreed plan for negotiating the next phase of the Kyoto Protocol after 2012: a plan that includes the formal start of negotiations, the end date, the Kyoto Protocol as the legal base, and the issues to be covered in the negotiations.

Securing a future for Kyoto after 2012 is vital for businesses too. Many of the solutions enabling countries to meet their commitments under Kyoto are market-based; emissions trading, for example. Many large businesses have already begun work on emissions-trading strategies, as have financial companies and strategy consultants. For this work to bear fruit, these companies need long-term security. They need to know what's happening after 2012. Montreal can help build that security.

There is no time to lose. The window of opportunity to keep global warming below dangerous levels is small. Unfortunately it's even smaller in the Arctic, and it's closing fast.



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DENMARK CLIMATE PLEA

REUTERS – Denmark urged “new thinking” in August about ways to combat global warming at the start of climate talks by 25 nations in Greenland. “Climate change represents a growing global challenge,” Danish Foreign Minister Per Stig Møller told delegates at the start of the informal four-day talks on the island in Ilulissat, north of the Arctic Circle. Denmark hopes the Greenland meeting will help prepare for UN talks in Canada in late November on ways to widen the Kyoto protocol to include the United States and developing nations like China and India after a first phase running to 2012.

ARCTIC OCEAN ICE-FREE IN A CENTURY

The current warming trends in the Arctic may push the arctic system into a seasonally ice-free state not seen for more than one million years, according to a new report published in *Eos*, the weekly newspaper of the American Geophysical Union. The melting is accelerating, and a team of researchers were unable to identify any natural processes that might slow the de-icing of the Arctic.

Jonathan T. Overpeck, University of Arizona geoscientist and lead author of the report, said: “The trouble is we don’t really know where the threshold is beyond which these changes are inevitable and dangerous.”

For more information:
www.agu.org/sci_soc/prll/prll0530.html

UNIVERSITY OF THE ARCTIC OFFERS CLIMATE CHANGE COURSE

The University of the Arctic is set to introduce a new “Climate Change Impacts in the Arctic” course, as part of its Bachelor of Circumpolar Studies program. The course will deal with sustainable development in the Arctic in order to help communities with environmental, economic and social challenges. The course will be based on the findings of the Arctic Climate Impact Assessment, especially in relation to societies and communities that are particularly vulnerable to climate change. A draft outline and overview of the curriculum will be available at the UN Climate Change Conference meeting in Montreal in November.

Climate warning

The world’s largest frozen peat bog is melting. An area stretching for a million square kilometres across the permafrost of western Siberia is turning into a mass of shallow lakes as the ground melts, according to Russian researchers just back from the region.

The sudden melting of a bog the size of France and Germany combined could unleash billions of tonnes of methane, a

potent greenhouse gas, into the atmosphere.

The news of the dramatic transformation of one of the world’s least visited landscapes comes from Sergei Kirpotin, a botanist at Tomsk State University, Russia, and Judith Marquand at the University of Oxford.

Kirpotin describes an “ecological landslide that is probably irreversible and is undoubtedly connected to climatic warming”. He says that the entire western Siberian sub-Arctic

Polar bear vulnerable

The Polar Bear Specialist Group (PBSG) of the World Conservation Union (IUCN) recently concluded that the IUCN Red List classification of the polar bear should be upgraded from Least Concern to Vulnerable.

The recommendation is based on a projected 30 percent decline in the polar bear population the next 35 to 50 years. The principal cause of this decline is climatic warming and its negative impact on the sea ice habitat of polar bears.

In some areas, contaminants may have an additional negative influence. High levels of PCBs and pesticides have been found in some polar bear populations.

The Group also called for stronger regulation and monitoring of harvest levels. Greenland will be regulating a quota system as of 2006. However, there is still no regulation on hunting in north-eastern Russia.

The Group has also concluded that increases in harvest levels or estimates

of sub-population size should not be based solely on traditional ecological knowledge without support from sound scientific data. They also advise that quotas should be set according to the precautionary principle.

There are estimated to be about 20 to 25,000 polar bears in the Arctic. There has already been some decline in sub-populations. In Canada’s western Hudson Bay, for example, the polar bear population has fallen from 1200 to 1000. Scientists there are looking at possible links between climate change and the population size. The results of this work are expected later this year.

The PBSG is made up of polar bear specialists from Canada, Denmark/Greenland, Norway, Russia and the United States. The group meets every three to five years to review polar bear research that has taken place around the Arctic in recent years and review the worldwide status of polar bears.

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Polar bear makes



Water droplets fly as a polar bear shakes

■ Skadi, one of the polar bears WWF is tracking on the Polar Bear Tracker website with the help of the Norwegian Polar Institute (www.panda.org/polarbears), swam at least 74km in one day – and maybe more. This is believed to be the first conclusive proof that polar bears cover such a great distance in the water.

as Siberia melts

region has begun to melt, and this “has all happened in the last three or four years”.

What was until recently a featureless expanse of frozen peat is turning into a watery landscape of lakes, some more than a kilometre across. Kirpotin suspects that some unknown critical threshold has been crossed, triggering the melting.

Western Siberia has warmed faster than almost anywhere else on the planet, with an

increase in average temperatures of some 3 °C in the last 40 years. The warming is believed to be a combination of man-made climate change, a cyclical change in atmospheric circulation known as the Arctic oscillation, plus feedbacks caused by melting ice, which exposes bare ground and ocean. These absorb more solar heat than white ice and snow.

Fred Pearce,
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RALLY FOR REFUGE

Around 5,000 people gathered in front of the US Capitol Building in Washington DC in September to protest against the proposed oil drilling in the Arctic National Wildlife Refuge.

The protestors were made up of aboriginal groups from northern Canada and Alaska, and youth from right across the US.



Photo: Randy Snodgrass

Native Alaskans join the protest against drilling in the Arctic National Wildlife Refuge in Washington DC.

POLAR EXPLORER DELIVERS VALUABLE SNOW DEPTH DATA

The European Space Agency's (ESA) CryoSat mission to monitor precise changes in the thickness of the polar ice sheets and floating sea ice was boosted by data from Dutch explorer Marc Cornelissen. Cornelissen collected the data in March this year, when he led the Pole Track 2005 expedition on a 1,000 km ski trek to the geographic North Pole. The expedition was supported by WWF.

Malcolm Davidson, ESA CryoSat Validation Manager, said: “Marc Cornelissen's careful measurements of snow thickness during his expedition are very valuable indeed.”

APOLOGY

We would like to apologise for two errors in *Arctic Bulletin* 2.05. In the article, ‘The battle for the Arctic Refuge’, the image caption was incorrect. The image that accompanies the story is of the south slope of the Brooks Range, and not the coastal plains of the Arctic National Wildlife Refuge. The article, ‘Arctic leaders spread climate message’, was mis-credited. The author was Clive Tesar, not Tonje Folkestad. We apologise to our readers for these two errors.

longest recorded swim



Photo: Bryn & Cherry Alexander Photography / www.arcticphoto.co.uk

her head whilst swimming amongst ice in Spitsbergen.

The female bear, equipped with a satellite tracking device, entered the water on the east of Svalbard on July 20, swam northeast and re-emerged on the island of Edgeoya a day later.

This is the first time that such a long swim has been documented by satellite telemetry for polar bears.

A sensor on the bear's collar

sent different signals when it was in salty sea water compared to on land or on ice.

Skadi had probably swum closer to 100 km since the bear almost certainly did not swim the 74km between the two points in an exact straight line.

The bear covered the gap in about 24 hours, giving an average

speed of 3–4 km/h – about as fast as a person walking.

The swim probably means that two cubs, with Skadi when the bear was marked in the spring, had died earlier in the summer. Mortality rates among polar bear cubs are high.

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Karsten Heuer, Being Caribou

Canada opposed to drilling in Arctic Refuge

Gwich'in First Nation leaders and Canadian conservation groups strongly support Canadian Prime Minister Paul Martin's recent statements opposing drilling in the Arctic National Wildlife Refuge in Alaska.

In a recent interview with the *Whitehorse Star*, Prime Minister Martin said: "I will call key senators and congressmen as identified by the embassy who can make a difference in this very important vote, and I will never miss an opportunity to raise it with the administration."

"I will never give up, I will do my best to protect the caribou and the aboriginal people."

"The Refuge is a sacred place for all Gwich'in people," said Norma Kassi of the Vuntut Gwich'in in Old Crow, Yukon. "I was thrilled to hear Mr. Martin support this as a human rights issue, which it definitely is for the Gwich'in."

The Refuge contains the calving grounds for the porcupine caribou herd, which is an important food source for Gwich'in in the Yukon and Alaska.

"By the stroke of a pen the president of the United States can destroy yet another ancient culture," said Kassi. "We're not going to stand by and let this happen."

At an upcoming vote in the U.S. Congress, Canadian voices may be enough to tip the balance and keep the oil companies out. The next step will be ensuring real and permanent protection to avoid any future attempts to drill in the Refuge.

Wendy Douglas

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The porcupine caribou herd migrate between the Arctic National Wildlife Refuge in northwest Alaska and the Yukon Territory, Canada.

New vegetation may accelerate arctic warming

Warming in the Arctic is stimulating the growth of vegetation and could affect the delicate energy balance, causing an additional climate warming of several degrees over the next few decades.

A new study indicates that as the number of dark-coloured shrubs in the otherwise stark arctic tundra rises, the amount of solar energy absorbed could increase winter heating by up to 70 percent.

The research, conducted by the US

Army Cold Regions Research and Colorado State University, presents the first evidence that shrub growth could alter the winter energy balance of the Arctic and sub-Arctic tundra in a substantial way.

Matthew Sturm, lead author of the study, said: "If tundra is converted to shrub land, more solar energy will be absorbed in the winter than before."

While previous research has shown that warmer temperatures during the arctic summer enhance shrub growth,

Sturm said: "Our study is important because it suggests that the winter processes could also contribute to and amplify the rate of the [growth]."

In addition, the increasing shrub cover would impact more than just the energy balance in the Arctic. The study concludes that the combined effects of increasing shrubs on both energy and carbon could change the Arctic in a way that affects the rest of the world.

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US politicians see climate warming for themselves

A delegation of US Senators has made another trip to the Arctic to see the effects of climate change for themselves.

The delegation, which included Democrat Senator Hillary Clinton and Republican Senator John McCain, visited Alaska and the Yukon Territory in Canada. The high-profile group of politicians visited Svalbard, Norway in 2004.

During their tour, they spoke with native elders and flew over forest devastated by the spruce bark beetle, a species that has thrived under a warmer climate.

McCain, a former Presidential contender, said: "The question is how much damage will be done

before we start taking concrete action. Go up to places like we just came from. It's a little scary."

Clinton said: "I don't think there's any doubt left for anybody who actually looks at the science. There are still some holdouts, but they're fighting a losing battle. The science is overwhelming."

Lindsey Graham, a Republican Senator, who was also part of the delegation, said: "If you can go to the Native people and listen to their stories and walk away with any doubt that something's going on, I just think you're not listening."

McCain and Democrat Senator Joe Lieberman have co-sponsored a bill that would cap US greenhouse

gas emissions. The US is the biggest contributor of greenhouse gases, which is believed by the majority of scientists to be causing climate change.

The delegation was not joined by any Alaskan federal politicians, all of whom have blocked previous efforts to limit US greenhouse gas emissions.

The bipartisan envoy also visited Kenai Fjords National Park in Seward, Alaska where glaciers have been retreating at a rapid rate, the causes of which are also connected to climate change.

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Witnessing climate change

A new WWF-funded project has given a voice to one native community in Alaska so that they can tell the story of what climate change means to them.

Under the guidance of village elders, community members, and the Tribal Council, high school students in the Athabascan village of Huslia have recorded elders and community members talking about the impacts of climate change on their community.

The students have used audio recordings, along with new and old images from the area, to produce a four-part radio series and an audio-slide show.

The series has been broadcast across the state of Alaska on KUAC and Alaska Public Radio news-hour programmes, and is being offered to radio stations nation-wide on National Public Radio's programme Independent Native News.

As producers of the four radio programmes, the students were involved in every aspect of production.



Students Sheila Esmailka, Kenny Sam, Ryan Olin and LeAnn Bifelt (left to right) and Athena Sam (not present in picture) from Huslia, Alaska, produced a series of radio programmes about their local elders' experiences of climate change.

The project's Principal Investigator is Huslia-born resident Orville Huntington, and Kathy Turco of Alaska's Spirit Speaks: Sound and Science is serving as

media consultant.

To listen to the radio interviews, visit www.panda.org/arctic.

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Illegal fishing threatens cod

Russian trawlers are not respecting cod quotas in the Arctic, threatening the last major stock of the fish, WWF announced in a report presented at a conference in Murmansk, Russia in August.

The report says figures based on Russia's own accounting indicated that Russian trawlers were catching 70,000–115,000 tonnes more than the 480,000 tonne per year quota set for the entire Barents Sea under a 50–50 shareout between Russia and Norway.

"The over-fishing is jeopardising the future of the cod stock," said Maren Esmark, WWF-Norway's marine conservation officer. "A fifth

of the fish caught is above the quota," she said.

WWF estimates that Russian overfishing of cod was worth about \$150 million. Esmark said the Russian violations were worst, but that Norwegian fishermen were also to blame.

"Russians are far from alone in illegal fishing in the Barents Sea," she said.

No estimates were available for possible Norwegian violations in the Barents Sea, but a Norwegian report in 2004 indicated that illegal fishing, such as the dumping of undersized fish, of all species, from herring to cod, along the Norwegian coast was worth about \$120 million a year.

Stocks of Atlantic cod off Canada collapsed in the early 1990s and stocks in the North Sea have also plunged. More than half the total Atlantic cod catch of about 800,000 tonnes a year now comes from the Barents Sea.

"Russian overfishing is destroying the image of the Barents Sea. It's reasonably well managed compared to the North Sea or Canada," Esmark said.

WWF said that ports in European Union nations including Britain and the Netherlands had landed Russian cod caught in violation of quotas. Esmark said ports and supermarkets should be stricter in checking the origin of imported fish.

Oil-free zones in the Norwegian elections

Oil development in the Barents Sea is set to be a difficult issue for Norway's new coalition government.

The new government, elected in mid-September, is a coalition of the Norwegian Labour Party, which is in favour of oil development in the Barents, and two smaller centre and socialist parties, which are both

critical of plans to allow the oil industry into the Norwegian Arctic.

During the election campaign, the Labour Party said it would consider protecting key habitats in the Barents Sea from petroleum development. The establishment of oil-free zones is, therefore, a likely compromise in the new coalition government. However, it remains to

be seen where and how large these areas will be and if they will include the most valuable and vulnerable areas of the Barents Sea ecosystem.

Dag Nagoda, head of WWF's Barents Sea Ecoregion Programme said: "The oil industry's claims to be able to prevent any negative environmental impact from their activities are false. Since 1990, there have been more than 2,500 acute oil spills on the Norwegian Shelf. Searching, drilling and transporting oil is inherently risky. The consequences for nature and the people that depend on that nature for their livelihood are likely to be disastrous."

The Norwegian Government's own experts say that the environmental risk linked with petroleum exploration in the Barents Sea is significant. The Institute of Marine Research, the Pollution Control Authority, the Directorate for Nature Management and the Polar Institute have all recommended that no petroleum exploration should be allowed in the most sensitive areas of the Barents Sea.

Fishermen's associations and a majority of the Norwegian population are in favour of establishing petroleum free areas in the Barents Sea.

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Photo: Miriam Geitz

New opportunity for conservation-oriented tourism projects

The WWF International Arctic Programme is calling for applications for the Arctic Tourism and Conservation Grant. The small grant scheme provides start-up funding for small-scale but effective measures that establish or improve links between tourism and arctic

conservation. The deadline for the 2005 grant is December 15, 2005. More information can be found on WWF's arctic website: www.panda.org/arctic or by contacting Miriam Geitz at mgeitz@wwf.no



Photo: Igor Stipilenok (www.stipilenok.com)

Mapping Russian PAs

Coastal view in Koryaksky Zapovednik on the Kamchatka Peninsula: The coast of the Bering Sea and mountains of the Goven Peninsula on a September day.

WWF has produced updated digital maps of all federal and regional protected areas in arctic Russia.

The exercise, led by WWF-Russia, involved compiling and reviewing all existing digital map information, as well as digitising maps of protected areas where no digital versions existed.

The maps and information are initially being used in a joint WWF and UNEP report on the status of protected areas in the Arctic, slated for release later this year.

Once the new data has been reviewed and quality-checked, it will be submitted to the World Conservation Monitoring Centre (UNEP-WCMC) in Cambridge, UK, to update and strengthen their World Database on Protected Areas (WDPA).

Dr Igor Lysenko, data analyst at WCMC, says: "This is a most welcome contribution from WWF. We are tasked with holding and managing the WDPA, but are dependent upon input from co-

operating agencies and organisations such as WWF for original data, revisions, and information on new protected areas. We are very pleased that we now can upgrade our information on northern Russia."

Russia is the largest of the arctic countries. The new maps show that nearly 15 percent, or just over one million square kilometres, are protected either under federal or regional laws in arctic Russia.

Stefan Norris, the WWF Arctic Programme's head of conservation, said: "This is impressive and vitally important in the arctic context, to ensure the survival of the many unique species found in these areas, the functioning of the high arctic ecosystems, and the livelihoods of the arctic indigenous peoples living in or near these areas."

The maps reveal an under-representation of marine, coastal and freshwater habitats in the protected area system of northern Russia – a shortcoming shared by all arctic countries.

For the existing protected areas in arctic Russia, the main challenges continue to be long-term financing, management, monitoring and enforcement, and the continuing threat from central authorities of dismantling the hugely important regional protected areas.

The new data differs in some respects from past data on Russian protected areas. This is primarily due to shortcomings in older data, the past lack of data from certain areas, changes in protection category or status of some areas, and recent losses of or creation of new protected areas. With this new data, the global reference database will be vastly improved with regards to information on northern Russian protected areas.

WWF relied heavily on the expertise and helpful assistance of many institutions and individuals in northern Russia for this project, including the Ministry of Natural Resources.

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Seabird pollution link

Arctic seabirds may be transporting industrial and agricultural contaminants to remote arctic locations according to a recent study published in the July edition of *Science*.

The study, conducted at Devon Island in arctic Canada, sampled 11 ponds and showed that persistent organic pollutants and mercury concentrations in high arctic pond sediments are closely related to the presence of seabird populations in or near the ponds.

The highest concentrations of the persistent contaminants HCB (hexachlorobenzene), DDT (dichlorodiphenyltrichloroethane), DDT metabolites, and mercury were observed in the ponds that were most enriched (with nitrogen that comes from the birds' excrement).

The researchers were studying a large and isolated colony of

northern fulmars. These birds eat marine organisms such as plankton and fish and are likely contaminated with these chemicals through their diet. The results are also a concern for people, as in northern regions it is common for some people to eat a marine-based diet and bird eggs.

The lead researcher, Dr Jules Blais, stresses that: "results are based on observations near seabird nesting sites, and therefore we can't extrapolate our conclusion – that this contaminant pathway dwarfs atmospheric inputs – to other parts of the Arctic."

For more information contact Brettania Walker, WWF International Arctic Programme, bwalker@wwf.no or Dr Jules Blais, University of Ottawa, Canada, jblais@science.uottawa.ca

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HSH Prince Albert II of Monaco travels to Arctic

His Serene Highness Prince Albert II of Monaco followed in the footsteps of his great-grandfather, Prince Albert I, when he visited the high arctic archipelago of Svalbard this July.

The Prince's great grand-father, known as the father of oceanography, explored Svalbard in the early part of the last century. His team of scientists studied glaciers, mapped previously unknown areas on Svalbard, and carried out other scientific research. Their work is still used by arctic scientists today.

HSH Prince Albert II was accompanied by marine scientists and other experts on his week-long expedition aboard the *Origo*, chartered by Swedish tour company Polar Quest. These included Samantha Smith, director of the WWF International Arctic Programme. She was advising the Prince and other tour participants about the Arctic's natural values and the environmental chal-



His Serene Highness Prince Albert II of Monaco on the Monaco Glacier, Svalbard.

lenges now facing the region, in particular climate change.

The trip included discussions with scientists at the research station in Ny Ålesund,


hosted by the Norwegian Polar Institute (NPI). The Prince's great-grandfather funded early arctic research, including work by Norwegian scientists in Svalbard. In time this led to the creation of the NPI itself. WWF also works closely with scientists at NPI.

Toxic contaminant and climate research was also undertaken during the trip.

Samantha Smith said: "WWF welcomes the Prince's genuine interest in the environment and in the Arctic, and hopes that his visit will draw attention to the

region's global importance for conservation as well as the environmental problems there." HSH Prince Albert II is now planning an expedition to the North Pole next spring.

Photo: WWF



Researchers found that seabirds such as the northern fulmar may be partly responsible for transporting toxics to the Arctic.

Photo:WWF-Canon/Kevin Schafer

Uranium exploration in NWT

As renewed interest in nuclear energy grows, so too does the interest in uranium mining. The price of uranium is higher than it has been in years, and areas previously thought uneconomical to explore now look appealing to expand current supply streams.

UR Energy, an Ottawa-based company in Canada, which applied this spring to explore for uranium at Screech Lake in Canada's Northwest Territories, withdrew their land use permit in the face of strong opposition from the Lutsel K'e Dene First Nation ('First Nation' refers to an organised aboriginal group or community in Canada).

Screech Lake is five kilometers from the Thelon River, south of the Thelon Sanctuary border. The

Sanctuary is the largest and most remote wildlife refuge in North America and is part of the migratory range of the Beverly caribou herd and home to countless muskox, moose, grizzly bears and other wildlife.

The First Nation refused UR Energy's permit to complete their land use and protected area planning.

Lutsel K'e is one of the closest communities to the Thelon Basin and a community with very strong traditional ties to the Thelon watershed.

Geological knowledge of the area depicts the Thelon Basin as similar to that of the Athabasca Basin in Saskatchewan, which produces a large percentage of the

world's supply of high-grade uranium.

It is anticipated that companies will be back to apply for exploration permits better prepared this fall after the strong opposition they experienced this summer.

WWF believes that this mounting interest in uranium exploration in the Thelon raises the fundamental question of whether a First Nation's legal right to decline a development project in their territory will be respected.

For more background information on the Screech Lake EA and uranium exploration in the Thelon Basin, visit www.mveirb.nt.ca.

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Fluorochemicals pollute 2

New studies show that fish, birds, and marine mammals in Greenland and the Faroe Islands, and pregnant women in Russia and Norway, are polluted with fluorinated chemicals. Brettania Walker investigates.

A new Greenland/Faroe Island study, financed by the Danish Environmental Protection Agency, has tested species including birds, seals, whales and polar bears for PFOS (perfluorooctane sulfonate) and other fluorochemicals used in common household products such as stain-retardants, surface-protectors for furniture, carpets, textiles, non-stick cookware, paper coatings and fire-fighting foams.

The study shows that fish, birds, and marine mammals are polluted with fluorinated chemicals. The results add

to the list of arctic locations where these chemicals have now been detected and show that polar bears are the most contaminated animals of those tested.

The full results of the study appeared in the July edition of the international journal *Environmental Pollution*.

Unlike many other persistent chemicals, which accumulate in fat, fluorinated chemicals bind to proteins in the blood and can accumulate and damage organs such as the liver. There is also

evidence that PFOS has negative effects on the hormone system. Although it is still unclear how PFOS is reaching the Arctic, it was detected in all tested animals from the Faroe Islands and 13 out of 16 samples from Greenland, with polar bears – at the top of the food chain – showing the highest concentrations. Other studies have confirmed marine mammals from arctic Norway, Alaska, and Canada are also contaminated with fluorinated chemicals.

Even more alarming is that it's not only wildlife which is at risk: a recent study sponsored by The Norwegian Pollution Control Authority reported that PFOS was detected in the blood of pregnant women from northern Norway and Russia. Researchers analysed blood from 20 pregnant women in Bodø, Norway and Taimyr, Russia. The samples from Russia came from a group of indigenous peoples living at the Taimyr Peninsula in Siberia.

While there are no known local sources of PFOS in Taimyr, the inhabitants of Bodø are exposed to pollutants from products used in daily life and from long range transported pollutants. PFOS was found in the blood of both Norwegian and Russian women, in about 70% of samples. The PFOS levels were higher in the Norwegian blood samples and were often higher than levels of older pollutants, such as PCBs.

These results are another reminder that pollution knows no geographical borders. Substances being transported over long distances and across borders, due largely to air and ocean currents that head north, must therefore be regulated on a global level. Indigenous peoples are particularly vulnerable because their traditional food, often the most nutritious and affordable available, is contaminated.

This study is the first report on new contaminants, such as PFOS, in humans living in the Arctic. Despite the small sample size of only 20



Photo: Bryn & Cherry Alexander Photography • www.arcticphoto.co.uk

Polar bears are the most contaminated animals of those tested in a recent study.

arctic people and wildlife





Soot impact on the Arctic

Soot travelling from Asia to the Arctic is causing increased melting of sea ice and snow. Rob Gutro of NASA explains.

Photo:WWF-Canon/Alain COMPOST

About a third of the soot in the Arctic comes from burning biomass or vegetation around the world, such as this forest fire in Kalimantan, Indonesia.

A new study shows that soot may be contributing to changes in the Arctic, such as accelerating sea ice and snow melt, and changing atmospheric temperatures. NASA is exploring the impact of black carbon, or soot, on the Earth's climate using satellite data and computer models.

Dorothy Koch of Columbia University, New York, and NASA's Goddard Institute for Space Studies (GISS), New York, and James Hansen of NASA GISS are co-authors of the study that appeared in a recent issue of the *Journal of Geophysical Research*.

"This research offers additional evidence that black carbon, generated through the process of incomplete combustion, may have a significant warming impact on the Arctic," says Koch. "Further, it means there may be immediate consequences for arctic ecosystems, and potentially long-term implications on climate patterns for much of the globe," she added.

The Arctic is especially susceptible to the impact of human-generated particles and other pollution. In recent years, the Arctic has significantly warmed, and sea-ice cover and glacial snow have diminished. Likely causes for these trends include changing weather patterns

and the effects of pollution. Black carbon has been implicated as playing a role in melting ice and snow. When soot falls on ice, it darkens the surface and accelerates melting by increasing absorbed sunlight. Airborne soot also warms the air and affects weather patterns and clouds.

Koch and Hansen's results suggest a possible mechanism behind the satellite-derived observations of arctic climate change. They found that the timing and location of arctic warming and sea ice losses in the late 20th century are consistent with a significant contribution from man-made tiny particles of pollution, or aerosols.

Koch and Hansen used GISS' General Circulation Model (GCM) to investigate the origins of arctic soot by isolating various source regions and types. The GCM employs a lot of different data gathered by NASA and other US satellites to study many environmental factors such as ice cover and temperature.

The research found that in the atmosphere over the Arctic, about a third of the soot comes from South Asia, a third from burning biomass or vegetation around the world, and the remainder from Russia, Europe and North America.

South Asia is estimated to have the largest industrial soot emissions in the world, and the meteorology in that region readily lifts pollution into the upper atmosphere where it is transported to the Arctic. Meanwhile, the pollution from Europe and Russia travels closer to the surface.

During the early 1980s, the primary sources of arctic particulate pollution are believed to have been from Russia and Europe. Those sources have decreased substantially in the past two decades, but the computer simulations indicate increasing emissions from South Asia have made up for some of the reduced Eurasian pollution. Koch and Hansen suggest Southern Asia also makes the greatest contribution to soot deposited on Greenland.

NASA-sponsored efforts using satellite data and models to assess polar feedbacks constitute an important contribution to the US Climate Change Science Program. By exploring processes in the earth's atmosphere, NASA scientists are seeking answers to how pollutants like soot are changing the climate of the world around us.

Rob Gutro

NASA – Goddard Space Flight Centre

The mystery of seabird decline

Kittlitz's murrelet, a rare seabird breeding in Alaska and far eastern Russia, has experienced sharp population declines and is listed as "critically endangered" in the World Conservation Union's (IUCN) Red List of Threatened Species. Thomas van Pelt investigates a link to climate change in the Russian Arctic.

There remains little doubt that climate change will drive significant changes in the Arctic. A warming Arctic will experience a daunting array of stresses, impacting both ecosystems and people. Authoritative voices are calling attention to predicted impacts, many of which have the potential to be dramatic and visible – rising sea levels and thawing ground, for instance.

But a warming Arctic will also experience countless smaller alterations, changing the arctic tapestry thread by thread. One example is the diversity and distribution of animal species.

A case in point could be the Kittlitz's murrelet (*Brachyramphus brevirostris*), perhaps the most threatened species of seabird breeding in the Arctic. This rare, enigmatic seabird relies on forage fish and zooplankton harvested from coastal waters, often in proximity to tidewater glaciers or other freshwater outflows. We know that Kittlitz's murrelets raise a single chick in an unprotected nest, usually high in coastal mountain talus. But we remain ignorant of the biology of this species, since only some 20 nests have ever been found, and only one nesting pair has ever been studied in any detail.

The global population of Kittlitz's murrelet is geographically centered on the Bering Sea, stretching from the Gulf of Alaska north to the Chukchi Sea, and west to Russia's Sea of Okhotsk. Global population estimates range widely, from 9,000 to 24,000 individuals.

One fact is clear – the global population of Kittlitz's murrelets is much reduced from historical levels. Long-term population monitoring work in four of the core Kittlitz's murrelet areas have revealed steep declines, with up to 80 percent of the local populations

vanishing over the past ten to 20 years.

Two factors make a compelling link between climate change and declining Kittlitz's murrelet populations. First, the species is unusually dependent on foraging in glacier-influenced marine habitat. Second, the population decline is consistent across a broad geographic range. A handful of threats could be driving declines in Kittlitz's murrelet populations – oil spills, gillnet bycatch, or vessel disturbance – but climate change is the only threat that is consistent across the whole region that is experiencing population declines.

One of the missing pieces of the puzzle is the Russian portion of the population. Over the past five years, American wildlife managers and scientists have undertaken a series of studies focused on Kittlitz's murrelet. But until this summer, there was no parallel effort in Russian waters.

As a starting point for learning more about the Russian population, Dr Alexander Andreev, director of ornithology at the Institute for Biological Problems of the North (IBPN) in Magadan, Russia, proposed an expedition to the northeastern part of the Sea of Okhotsk. Two Kittlitz's murrelet nests are known from this region, and murrelets are regularly spotted in the area. But the region's coastline has never been fully explored by ornithologists.

The proposed expedition became reality with support from US Fish and Wildlife Service (USFWS), IBPN, and WWF. Alexander Andreev, Kira Regel,

Olga Mochalova and Thomas Van Pelt made up the scientific crew. We departed Magadan in June 2005. Three weeks and 2,300 kilometers later, we returned with a wealth of new information on coastal bird distribution and abundance in this exceptionally productive region.

We documented a substantial local population of Kittlitz's murrelets, filling in part of the picture of Kittlitz's murrelet in the Russian Far East. To measure population changes, the set of transects that we established can be repeated in future years.

In the coming months, we will use the data to estimate the local Kittlitz's murrelet population size, and we'll correlate the birds' distri-



Photo: Tom Van Pelt/US FWS

bution with environmental variables to shed additional light on the possible link between the species and climate change.

The expedition was a scientific success, and also illustrates the strong collaborative links between scientists in Alaska and the Russian Far East. Understanding even a fraction of the impacts of a warming Arctic will require new partnerships such as this one, reaching across national boundaries.

Thomas van Pelt
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Kittlitz's murrelet.

Fresh water transforms

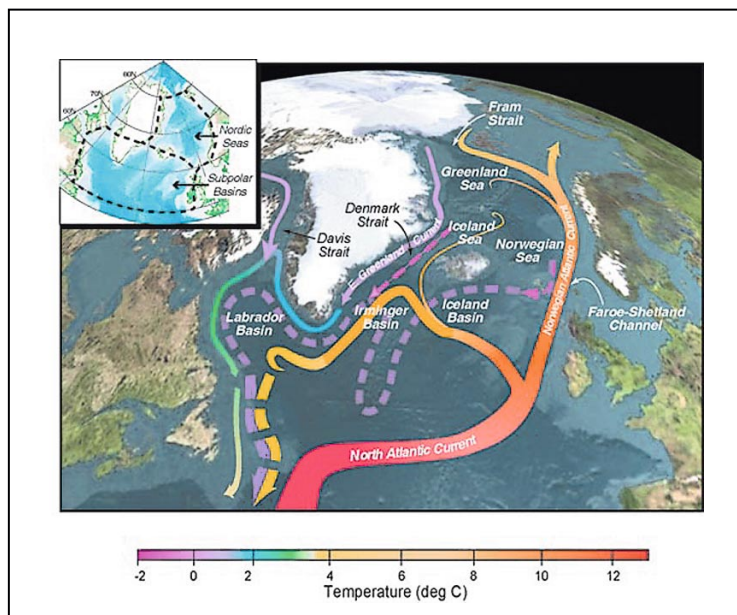
Freshwater from thawing ice in the Arctic is gradually changing the temperature of the North Atlantic Ocean. Shelley Dawicki of Woods Hole Oceanographic Institution explains how this could eventually affect the flow of warm water from the Tropics to the Arctic.

Large regions of the North Atlantic Ocean have been growing fresher since the late 1960s as melting glaciers and increased precipitation, both associated with greenhouse warming, have enhanced continental run-off into the arctic and sub-arctic seas.

Over the same time period, salinity records show that large pulses of extra sea ice and fresh water from the Arctic have flowed into the North Atlantic. But, until now, the actual amounts and rates of fresh water accumulation have not been explicitly known.

Ruth Curry of the Woods Hole Oceanographic Institution (WHOI) and Cecilie Mauritzen of the Norwegian Meteorological Institute quantified for the first time how much additional fresh water caused the observed salinity changes in the northern North Atlantic Ocean, how fast it entered the Atlantic circulation, and where that fresh water was stored.

They report that patterns of fresh water accumulation over the past four decades suggest that a freshening threshold important to the ocean circulation and its poleward transport of heat could be reached in a century, although future impacts of global warming



Topographic map of the Nordic Seas and sub-polar basins, with schematic circulation of surface currents (solid curves) and deep currents (dashed curves) that form a portion of the Atlantic Meridional Overturning Circulation (MOC). The color of the curves depicts their approximate temperatures. The map inset shows the boundaries of the Nordic Seas and sub-polar basins used in the analysis of water volume.

and glacial melting make prediction imprecise at this time.

They analysed data collected in the North Atlantic Ocean between Labrador, Greenland and northern Europe over the last 55 years to

reconstruct the history of ocean properties such as temperature, salinity and density.

In an average year, about 5,000 cubic kilometres (km³) of fresh water flows from the Arctic into the North Atlantic through passages located east and west of Greenland. The researchers estimate that in addition to this amount, an extra 19,000 cubic km flowed into and diluted the northern seas over the 30-year time period between 1965 and 1995.

About 80 percent ended up in the sub-polar basins, which are about twice the geographic size of the Nordic seas. The amount of fresh water involved would be equivalent to a layer about three meters (roughly nine feet) thick spread evenly over the total area of the sub-polar basins, and a layer about 1.8 meters (about five feet) thick over the Nordic seas.

A CTD (Conductivity-Temperature-Depth recorder) is recovered during a cruise aboard research vessel Knorr. CTDs are commonly used for climate and ocean circulation studies.



Photo: Craig Davidson, Woods Hole Oceanographic Institution

North Atlantic

The Nordic seas (located between Iceland, Greenland and Norway) and the Labrador and Irminger Basins (east and west of southern Greenland) are places where cold dense waters are formed, a critical component of the meridional overturning circulation (MOC) and part of a great “ocean conveyor belt” that carries warm surface waters from the tropics northward.

At high latitudes, the heat-bearing surface waters cool (the heat is released to the overlying atmosphere) and these denser waters sink and flow southward in the deep ocean – a process which helps keep the conveyor moving. The transport of heat northward contributes to the moderate winter-time climate at high latitudes, notably in regions near the UK and Scandinavia.

Excessive amounts of freshwater could alter the ocean density that drives a portion of this circulation system, diminish the amount of heat that is transported northward, and significantly cool areas of the Northern Hemisphere.

Curry and Mauritzen report that the changes in salinity observed to date do not appear to have changed, as yet, the ocean circulation and heat transport, but expect continued freshening to affect the ocean conveyor in the next two centuries.

“Precipitation and river runoff at high latitudes have been increasing,” Curry said. “In the last decade, fresh water has been accumulating in the Nordic seas layer (the upper 1000 meters) that is critical to the ocean conveyor, so it is something to watch. The Greenland ice sheet represents a wild card,” she

added. “There is an enormous amount of freshwater tied up there, which, as it melts, will affect the headwaters of the ocean conveyor.”

“It certainly makes sense to continue monitoring ocean, ice, and atmospheric changes closely,” Curry said. “Given the projected 21st century rise in greenhouse gas concentrations and increased fresh water input to the high latitude ocean, we cannot rule out a significant slowing of the Atlantic conveyor in the next 100 years. I emphasise that we are talking about century time scales to witness measurable changes in the ocean transports of mass and heat across the Greenland-Scotland Ridge – we are not suggesting that the Gulf Stream will shut down.”

Shelley Dawicki

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Ecological challenges for the Barents Sea fisheries

The Barents Sea cod stock is the largest remaining cod stock in the world. Vassily Spiridonov reports on Russian and Norwegian attempts to understand and control the affects of illegal cod fishing, and the urgent need for sustainable management.

Fishing activities did not significantly impact the Barents Sea ecosystem until the beginning of the 20th Century. But with the development of deep sea trawling, over-fishing has become more prevalent. A new WWF report, *Fisheries in the Russian Barents Sea and the White Sea: Ecological challenges*, shows that intensive fisheries activities over the last five decades have significantly impacted many fish stocks. Between the 1950s and early 1980s, the contribution of the Barents Sea and surrounding waters to the world catch of fish and seafood averaged five percent (2.9 million tons). However, by 1990 the total catch in the region had

dropped to just 0.8 million tons – less than one percent of the global catch.

The Institute of Marine Research in Bergen, Norway estimates that if the fishing pressure on cod from 1990 to 2000 had been kept at the level recommended by the International Council for the Exploration of the Seas (ICES), the spawning biomass in 2000 would have been closer to 900,000 tons, instead of the 220,000 tons that was actually observed.

In addition, the over-fishing of cod has led to drops in most other commercial species including redfish, halibuts, herring and capelin.

The new WWF report addresses four main challenges for the future of the fisheries in the Barents Sea region:

Overcapacity: In spite of all efforts to reduce the size of the Norwegian fishing fleet, it increased by 72 percent between 1992 and 2002. In Russia the average number of vessels fishing for cod nearly doubled in the period between 1994 and 2002.

Fish quotas not in accordance with scientific advice: For many years, the Russian-Norwegian Fisheries Commission has set the cod catch quota, and other quotas, in excess of the total allowable catch ➤



Russian fishing trawlers in Arkhangelsk, northwest Russia.

Photo: Thomas Nilsson/The Barents Secretariat

(TAC) proposed by the International Council for the Exploration of the Sea (ICES). WWF believes that increased transparency and a closer cooperation with environmental non-governmental organisations and other stakeholders would contribute to a more sustainable quota.

Illegal catch of fish: The Norwegian Directorate of Fisheries estimates the illegal, unreported and unregulated (IUU) catch of cod in the Barents Sea by Russian vessels at 80–100 thousand metric tons between 2002 and 2003.

Increased shipping and industrial development: Shipping activities in the Barents Sea are growing. WWF believes that Particularly Sensitive Sea Areas (PSSAs) should be established in the most vulnerable parts of the region. WWF also wants stricter Marine Protected Areas (MPAs) to protect biodiversity and maintain ecosystem functions.

A second WWF report published this autumn, *Analysis of illegal fishery for cod in the Barents Sea*, analyses Russian fisheries statistics and confirms what Norwegian authorities have claimed for a long time: every year cod to a value of around 120 million Euros are fished illegally from the Barents Sea by Russian trawlers. The numbers in the WWF report are partly based on an investigation carried out by PINRO, (NM Knipovich Institute of Marine Fisheries and Oceanography) in 2004. This is the first time that there has been a Russian estimate about the size of illegal fishing.

A report from the Norwegian Ministry of Fisheries from 2004 showed that illegal fishing in Norwegian waters by Norwegian vessels could amount to an additional 100 million Euros every year. Also, recreational fishing in Norwegian waters poses an additional pressure on the cod stock.

Russia and Norway have tried to address the need to prevent illegal fishing in the Barents Sea on several occasions. The Russian Norwegian Fisheries Commission believes strict fisheries controls should be put in place in the Barents. The Commission has also discussed a number of other measures, including control of Russian vessel landings in Norwegian ports and the strengthening of control over transshipments (the loading of fish from a trawler to a transport ship at sea before off-loading at other European ports). Mandatory reporting of landings of fish in other European countries and control of the ships in ports would help reduce illegal fishing.

Despite years of illegal fishing, the management regime set up by Russia and Norway has so far been able to avoid a collapse in the cod stock. ICES has assumed some illegal fishing in their annual advice, and this precautionary approach from ICES has proved helpful.

The reports are available in Russian and English. WWF hopes they will help improve the management of fisheries resources in the Barents Sea, and help secure a sustainable cod stock for the future.

Vassily Spiridonov,
Marine Programme Adviser,
WWF Russia

A plan for

A land use plan for the Sahtu Region of the Northwest Territories, Canada is providing hope that important cultural and ecological zones will be protected before major industrial development begin. Tracey Williams of WWF-Canada reports.

The Arctic is a region of great interest to companies eager to capitalise on resources that have previously been too expensive to access. As ice thaws, technologies improve and prices rise, the landscape now beckons to those eager to access its riches. Expanses of northern Canada have been staked out, as geologists look for signs of diamonds, oil or uranium under the surface.

Before the roads open up and the drills start to spin, northern people and conservationists want to ensure that important areas are recognised and protected. The Northwest Territories (NWT) Protected Areas Strategy is a community-driven, multi-stakeholder process to establish a network of protected areas in the NWT.

In the Sahtu Region (hereafter called the Sahtu) of the NWT, the recent developments at the Sahtu Land Use Planning Board are encouraging for conservation efforts of the community-driven Protected Areas Strategy process. The Board has a federal mandate to complete a land use plan through the Mackenzie Valley Land and Water Act. The Act was created to provide for an integrated system of land and water management in the Mackenzie Valley.

The completion of a land use plan will give Sahtu residents a tool to organise interests of economic development and conservation.

The Sahtu communities of Tulita, Fort Good Hope, and Deline have

● Download the report: *Analysis of illegal fishery for cod in the Barents Sea* (English version) at <http://www.wwf.no/pdf/20050818a.pdf>

● Download the report *Fisheries in the Russian Barents Sea and the White Sea: Ecological challenges* at <http://www.wwf.no/pdf/20050818b.pdf>

● The Report from the Norwegian "Dumping Commission" is available at <http://www.wwf.no/core/200405/03.asp>

the Sahtu

been working on protected area projects (see Sahouye-Edacho protected area profile article in *Arctic Bulletin* 02.05) and desire to sequence conservation of their culturally significant lands in advance of heavy industrial allocation.

The land use plan will delineate which lands in the Sahtu Settlement Region are to be conserved and which lands are open to industrial development, as well as prescribing thresholds for development on all Sahtu lands. Such a plan is needed during a key time with accelerating industrial development in the Sahtu and the release of the Mackenzie Gas Project's environmental impact statement.

With the potential advent of the Mackenzie Gas Project, Sahtu residents face the decision of whether to allow the largest Canadian industrial infrastructure project ever considered to intersect their own lands.

The three districts of the Sahtu have title to 41,437 square kilometers of settlement lands, which includes ownership of subsurface rights on roughly 22 percent or 1,800 square kilometers. These settlement lands are privately held lands, not reserve land managed under the Canadian Indian Act. The remaining 78 percent of land in the Sahtu remain as federal crown lands under the administration of the Northern Oil and Gas Secretariat.

Under the Land Claim, the Sahtu land corporations are required to be locally consulted by any company interested in industrial development in their settlement area, whether that development is to take place on settlement land or federal crown land. As the land corporations field the permits and oversee land use in the districts, a completed draft Sahtu Land Use Plan that could help to guide their work has only been available in a preliminary draft form. A fully consulted Draft Sahtu Land Use Plan can only result from community member discussions involving all key community land organisations.



The Sahtu Land Use Plan is proving to be an effective tool for the identification and potential protection of ecologically and culturally sensitive areas in the Sahtu Region, Northwest Territories, Canada.

At the federal level, when the Northern Oil and Gas Secretariat identifies a new claim block for oil and gas exploration, the government has no direct process to take into account cultural and spiritual site locations important to a community unless these are reported to them by the company. Therefore, many culturally important sites are not considered, even though many of these special areas in the Sahtu were identified by a regional working group in 1999 in the "Places we take Care of Report", and were included in the Preliminary Draft Sahtu Land Use Plan.

Most recently, significant sites to the Mackenzie Valley Dene in the Sahtu have been included in the 2005 published coffee table "Sahtu Atlas" (See the book review on page 23). The Atlas covers many vital statistics of the region as well as recounts the important stories related to significant cultural areas in the Sahtu.

There is a growing interest in the

Sahtu to protect culturally significant lands as well as to identify the best options for sustainable economic development. But there is creeping confusion, if not growing irritation with a federal government that concurrently supports ad hoc industrial development through unplanned oil and gas permitting and mineral exploration.

Though the verdict is still out, the recent positive developments at the Sahtu Land Use Planning Board could be a means to focus all land use planning with the possibility of an approved Draft Sahtu Land Use Plan in 2006. A completed draft plan has the potential to play an instrumental role in creating a balanced vision which ensures that the culturally and ecologically significant areas are conserved for the communities of the Sahtu and for Canada, in advance of industrial development.

Tracey Williams

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Permafrost not so permanent

WWF's Nigel Allan spoke with Dr Vladimir Romanovsky, a permafrost expert from the University of Alaska and president of the US Permafrost Association, about changes in the Arctic.

Nigel Allan: *Why is permafrost thawing?*

Vladimir Romanovsky: There are two major reasons. The first one is directly related to climate change. Permafrost is the product of a cold climate. It requires land to be cold. So any changes in the climate will eventually bring about changes in permafrost. There is an extensive 'belt' of permafrost in lower latitudes, which, with only a small temperature rise, will disappear. Of course, in higher arctic locations, the permafrost is more stable. Although we see some changes in temperature, we don't see any serious thaw yet.

The second cause of thawing is the result of natural and man-made disturbances to the land's surface. Normally, there is a thick organic layer on the surface of the permafrost, which makes it more stable and less likely to melt. The removal, or partial removal of this layer, affects the permafrost directly. This can be caused by a forest fire, for example, or by a flood. But it can also be caused by agricultural activities or construction work on buildings, roads or pipelines. Most permafrost thaw is currently caused by this type of disturbance.

Changes caused by climate change are more gradual. But permafrost temperatures have risen over the last 20 to 30 years. We are now in a position where even small increases in temperature could trigger a widespread thaw, although we haven't crossed that threshold yet

NA: *What signs are you seeing?*

VR: The signs vary, and some of them are more dramatic than others.

We see 'thermokarst', which is when the ice has melted and the



Dr Vladimir Romanovsky.

ground has dropped away. You can also see where roads and buildings built on permafrost have collapsed as the ice has melted. This can be very dramatic.

On a smaller scale, you can see the development of new ponds, or the disappearance of ponds, where thawing permafrost allows surface water to run away through sub-surface channels. There are also

effects on ecosystems. We also see "drunken forests" where permafrost has thawed, leaving forested land waterlogged.

A lot of these changes now take place on a relatively small scale, but if the climate continues to warm, we are likely to see much more dramatic impacts across a far wider area.

NA: *What are the implications for the Arctic?*

VR: There will be changes in the ecosystem. Some species will be 'winners' and some 'losers'. However, there are likely to be major impacts on infrastructure;

thawing permafrost will be very expensive for businesses.

Of course, the changes to the ecosystem in the Arctic will have implications for the rest of the world. For example, thawing permafrost will effect the amount of freshwater that flows into the Arctic Ocean and could potentially contribute to disrupting the thermohaline circulation. The thermohaline circulation operates like a giant conveyor belt that transports warm water to the north and cold water to the south. It relies on heat (thermo) and salinity (haline) to run, and a large influx of freshwater related to the thawing of permafrost will effect the balance of both and could thereby slow this system down. This circulation of warm water to the north is partly what keeps Europe warmer than other areas of similar latitude (see p. 16).

Also, the amount of carbon trapped in permafrost in the form of frozen organic material is enormous and could easily double atmospheric carbon dioxide. In general, the effect of thawing permafrost on the carbon cycle is a very complex issue and so far not as well understood as other impacts.

NA: *What action is being taken to address this issue? What action do you think needs to be taken?*

VR: Further studies need to take place to assess the scale of the problem. The Arctic Climate Impact Assessment (ACIA) has gone a long way to address this problem. There is a lot of attention right now in the media, but if you look at funding for further research, it's still pretty low. It is difficult to convince people that the Arctic is important. We need to show people that the importance of the Arctic is not proportional to its area.

● For an in-depth essay by Dr Romanovsky on thawing permafrost and its implications for climate change, visit: www.arctic.noaa.gov/essay_romanovsky.html

... we are likely to see much more dramatic impacts across a far wider area.

Threatened sites and shorebirds of the East Asian-Australasian flyway

Industrial projects in Asia threaten important staging areas for shorebirds migrating to and from the Arctic. Nial Moores of Birds Korea reports on the work being done to preserve these important wetlands.

Connected to the Arctic



The Saemangeum estuarine system, a 99,000 acre (40,000 hectare) area of shallows and tidal-flats on the west coast of South Korea, is now widely recognised as one of the most important shorebird sites in the Yellow Sea, itself a region of great importance to global biodiversity.

The Saemangeum system's two adjacent estuaries support 27 or



A diagrammatic representation of the “finished” reclamation, displayed at the Saemangeum centre. Note both how much construction remains to be done before completion, and that the diagram still claims the area will be used for rice agriculture (it will not). Note also how this “environmentally friendly” reclamation will involve the straightening of both rivers; the draining and cultivation of all the tidal-flats; and the conversion of all remaining estuarine areas into freshwater reservoirs. Too small to make out, a bird reserve is proposed for the area where the two rivers meet.

more species of waterbird in internationally important concentrations, including at least 30 percent of the total population of great knot on northward migration, and on southward migration the highest concentrations in the Yellow Sea of

bar-tailed godwit, dunlin, grey plover and the endangered spoon-billed sandpiper.

The whole estuarine system has been slated for “reclamation” by the South Korean government – for conversion to rice-fields, agricultural reservoirs and now industrial sites (see *Arctic Bulletin* No. 3. 01, p.12–13). Although the project was initiated in 1991, the 33-kilometre long sea wall still remains part unfinished, with further new work blocked by a court ruling. Approximately three kilometres of the outer sea wall remains open to the sea, and although tidal regimes have been altered, and some species of shorebird appear to have declined, the area remains vital to migrating birds.

The project is unpopular domestically, being opposed by many local fisherfolk, in addition to the majority of those not living in the area. Although still considered largely an economic issue (being either now too expensive to continue or too expensive to cancel) there is also a gradual recog-

A non-breeding plumaged spoon-billed sandpiper in Thailand.



► nition that the nation's tidal-flats are a natural resource of very high value to both wildlife and people.

Following popular protests (including a gruelling ritualised "samboilbae" walk from the Saemangeum area 320 kilometres up to the nation's capital in 2003), the Government acknowledged that the project has no clear end-use. This in turn prompted the courts to rule in February 2005 that sea-wall construction be halted, and that the whole project be reviewed.

Although construction will likely start again sometime in the near future, the repeated suspensions offer welcome opportunities to project opponents. Birds Korea has, for example, initiated discussions with the Australasian Wader Studies Group and other key researchers to undertake a joint shorebird monitoring programme in the Saemangeum area in spring 2006, to be repeated in subsequent years. Such monitoring will do much to convince the international conservation community of the area's immense value to migratory wildlife; increase international pressure on the South Korean Government to cancel the project; and provide an East Asian example of the impacts of reclamation that can be cited region-wide.

This last element seems especially important. Throughout East Asia, loss and degradation of wetland habitats continues on apace. While the majority of shorebird populations globally are considered to be in decline, precise data on many population trends in this region are lacking. In addition, there are no benchmark studies in the region to support the logical assumption that the loss of optimal sites will have impacts on shorebirds at the population level, including on charismatic flagship species like the fast-declining spoon-billed sandpiper.

The spoon-billed sandpiper is endemic as a breeding species to the western Bering Sea, migrating south through key staging sites in especially Sakhalin and South Korea to winter in South and Southeast Asia. The total population was estimated at between 2,000 and 2,800 pairs in 1977, but at less than 1,000 pairs by 2002.

Since the 1970s, there have been few major changes in breeding areas. However, there has been very significant degradation of known staging areas. Sakhalin is now targeted by oil and gas companies, including Royal Dutch Shell, whose Sakhalin II project includes the construction of a gas processing plant in Aniva Bay – where up to 200 spoon-billed sandpiper have

been recorded.

In South Korea, the two largest flocks were 210 at the Nakdong estuary in 1987, and 185 at Saemangeum in 1998. At the Nakdong, following estuary barrage construction in the late 1980s, recent maxima have reached only eight individuals, while shifts in tidal regimes and sediment deposition caused by sea-wall construction at Saemangeum have seen recent peaks there of less than 30.

Even key wintering sites are threatened. In Thailand's Inner Gulf, where up to 16 spoon-billed sandpipers were found wintering in 2003/2004, Siam Gulf Petroleum started construction of a refinery only one kilometre from the main site. In addition (though shelved for now), the Thai government had proposed a massive trans-gulf road bridge, which would have cut through inter-tidal habitats used by tens of thousands of northern-nesting shorebirds.

Saemangeum, Sakhalin, Thailand's Inner Gulf... a chain of internationally important and threatened sites in urgent need of conservation.

Nial Moores

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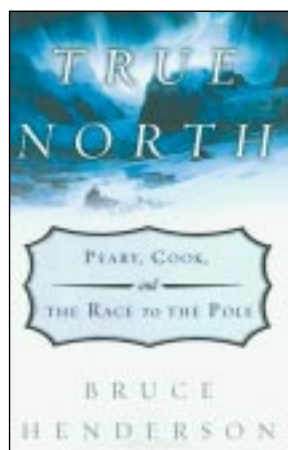
<http://www.birdskorea.org>

<http://www.birdskorea.org.kr>

True North: Peary, Cook and the Race for the Pole
Bruce Henderson
Norton
2005
331 pages
ISBN 0-393-05791-7

■ Perhaps it's wrong to review a book about two famous polar explorers in the *Arctic Bulletin*: we do after all focus on environmental issues in the Arctic in the early 21st Century. However, our knowledge about, and perhaps passion for, the Arctic is at least partly due to the exploits of men like Peary and Cook at the turn of the century before last. And so on this occasion, the *Arctic Bulletin* reviews *True North: Peary, Cook and the Race for the Pole* by Bruce Henderson.

For those who aren't familiar with the facts, Robert Peary is honoured as the first man to reach



the North Pole, but fewer know that his feat has been questioned since the day it was announced in 1907. Frederick Cook, in fact, was possibly the first to reach the Pole nearly a year before Peary. Henderson weaves a spell-binding tale about these two driven men:

the many sacrifices they made and their several trips to the Arctic. Indeed Cook also explored the Antarctic and claimed to be the first man to have reached the summit of Mount McKinley in Alaska.

This reviewer has no deep knowledge of the rival claims. However, one feels on reading this book, that Cook, at the very least, was done a grave injustice. His case appears as strong, if not stronger than Peary's. And one can't help but be outraged by Peary's refusal to transport Cook's logbooks and scientific instruments back to the US after Cook had been forced to leave them behind on an earlier expedition; especially as these logbooks might well have proved Cook's claim to have reached the Pole before Peary. It seems clear Peary knew this.

But readers should decide for themselves which claim is stronger. Cook should be remembered for

Forthcoming arctic meetings & events

Conferences and workshops

International Glaciological Society Nordic Branch Meeting

WHERE: Copenhagen, Denmark • WHEN: 3–5 November • CONTACT: <http://server.oersted.dtu.dk/igsnb/>

13th Annual Arctic Conference – Archaeology and Human Ecology Data Sharing

WHERE: Davis, California • WHEN: 4–5 November • CONTACT: Chris Darwent, email: cmdarwent@ucdavis.edu

Joint XVI International Conference on Marine Geology and VIII International Workshop on the Loira Project

WHERE: Moscow, Russia • WHEN: 4–18 November • CONTACT: email: Gordeev@Geo.Sio.Rssi.Ru or School@Ocean.Ru

Workshop: Arctic Sea Ice Thickness: Past and Present

WHERE: Copenhagen, Denmark • WHEN: 8–9 November • CONTACT: Olivia Low, email: o.low@damtp.cam.ac.uk

Second International Conference on Arctic Research Planning ICARP II

WHERE: Copenhagen, Denmark • WHEN: 10–12 November • CONTACT: www.icarp.dk

UN Climate Change Conference (COP11 and COP/MOP 1)

WHERE: Montreal, Canada • WHEN: 28 November – 9 December
CONTACT: unfccc.int/meetings/cop_11/items/3394.php

Third International Symposium on Deep-Sea Corals

WHERE: Miami, Florida • WHEN: 28 November – 2 December • CONTACT: conference.ifas.ufl.edu/coral/

International Symposium on Sea Ice

WHERE: Dunedin, New Zealand • WHEN: 5–9 December • CONTACT: www.igsoc.org/symposia/

Snow, Ice and Water Surfaces in Polar Atmospheric Chemistry

WHERE: San Francisco, California • WHEN: 5–9 December • CONTACT: www.agu.org/meetings/fm05/

6th International Conference on Global Change: Connection to the Arctic

WHERE: Miraikan, Koto-ku, Tokyo, Japan • WHEN: 12–13 December
CONTACT: www.stelab.nagoya-u.ac.jp/ste-www1/div1/GCCA6/

For more on these events and other meetings, please visit:

<http://www.arcus.org/Calendar/upcomingEvents.shtml> • <http://www.iasc.no/SAM/samtext.htm>

his real love of the Arctic and its people: he learned the language of the Greenland Inuit, and respected their cultures. He realized nothing could have been achieved without their knowledge of this wild place and their help. And he dedicated the story of his extraordinary journey to the top of the world to the people that lived there. This in itself is a legacy worth remembering. Henderson has helped greatly in achieving this.

Julian Woolford,
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*The Sahtu Atlas: Maps and Stories
from the Sahtu Settlement Area
in Canada's Northwest Territories*
James Auld & Robert Kershaw (Eds.)
Government of the Northwest
Territories/Sahtu GIS Project, Canada.
2005
68 pages
ISBN 0-9737630-0-0

■ This is an outstanding new book about the people, resources and changes in the Sahtu region in the lower reaches of the Mackenzie Valley in Canada's Northwest Territories (NWT). Prompted by accelerating changes in this largely

pristine and intact natural region (there are no paved roads here) since 1996, the Sahtu GIS project – led especially by the Government of the NWT – has compiled numerous databases on ecological, socio-cultural and economic resource distribution, trends and potential.

The Sahtu Atlas covers the region in four sections, all illustrated very clearly by high quality maps and photos: The Sahtu people and their history; the natural world

(geology, climate, ecosystem processes and water); wildlife; and resources and development.

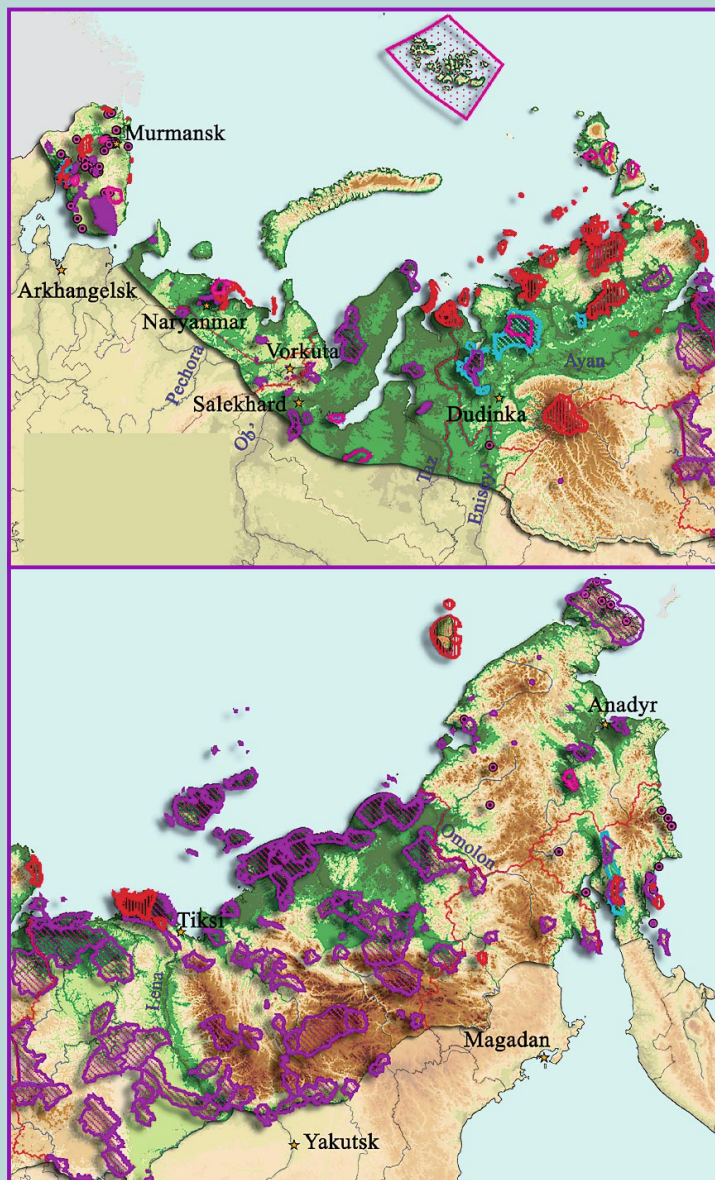
In many ways, this large-format book is a fine reflection of the new age facing the wildlife, people and places of the Sahtu region.

For those who have worked in more remote natural regions for a while, the whole approach here and such a book's utility will be obvious. I hope and expect that this new-age approach will be followed elsewhere, ahead of the conventional wave of industrial developments and change, so that those who have to make the big hard decisions about the future will be sufficiently well-informed of the full range of values at stake, and that their decisions will indeed be in the best long-term interest for all people in the region, and the natural resources on which we all ultimately depend.





Beyond the obvious technical importance for today's decision-makers this book would make a wonderful high school or university geography class resource in any country.

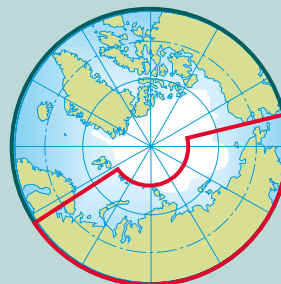
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Protected areas in northern Russia



WWF has produced the most comprehensive digital maps of arctic Russian protected areas available. The maps reveal an under-representation of marine, coastal and freshwater habitats in the protected area system of northern Russia.

-  **Federal Zapovednik (IUCN category Ia)**
-  **Federal Zakaznik (IUCN categories II-V)**
-  **Regional protected areas**
-  **Ramsar sites (wetlands)**



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WWF is the world's largest and most experienced independent conservation organisation, with almost five million supporters and a global network active in 90 countries. WWF's mission is to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature. WWF continues to be known as World Wildlife Fund in Canada and the United States of America.

