The UNEP Magazine for Youth

TUNZA

for young people · by young people · about young people

UNEP

Melt down

Get COOL in 2007!

Polar plight

Mari Boine – singing nature

Warming ice

Ice explorers

Tara – riding high

TUNZA
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Partners for Youth and the Environment

UNEP and Bayer, the German-based international enterprise involved in health care, crop science and materials science, are working together to strengthen young people's environmental awareness and engage children and youth in environmental issues worldwide.

A partnership agreement lays down a basis for UNEP and Bayer, who have collaborated on projects in the Asia and Pacific region for nearly 10 years, to step up current projects, transfer successful initiatives to other countries and develop new youth programmes. Projects include: TUNZA Magazine, the International Children's Painting Competition on the Environment, the Bayer Young Environmental Envoy in Partnership with UNEP, the UNEP Tunza International Youth/Children's Conference, youth environmental networks in Asia Pacific, Africa and Latin America, the Asia-Pacific Eco-Minds forum and a photo competition, 'Ecology in Focus', in Eastern Europe.

CONGRATULATIONS to Charlie Sullivan (11) of the United Kingdom, global winner of the 16th annual International Children's Painting Competition on the Environment (www.unep.org/tunza/paintcomp/), themed on climate change. The joint second prize went to Catherine Nishchuk of the Russian Federation (see image on page 15) and Petkova Polina Zdravkova of Bulgaria.

World Environment Day

Cool & **Cooler**

IDEA 1: Empower people to become active agents of sustainable and equitable development.
Cool: Plant a community organic garden at school or in the neighbourhood.
Cooler: Start a group that meets regularly to prepare a special meal with the garden's harvest.
Coolest: Read Barbara Kingsolver's new book, *Animal, Vegetable, Miracle: A Year of Food Life*, and be inspired to eat only home-grown and local produce.

IDEA 2: Promote an understanding that communities are pivotal to changing attitudes towards environmental issues.
Cool: Go for a long walk or bike ride in a local nature area with family and friends.
Cooler: Organize a carbon-free parade, with people using their favourite mode of green transport, eg: walking, jogging, skateboarding, roller-skating, cycling and unicycling, even pushing baby buggies!

IDEA 3: Advocate partnership, which will ensure all nations and people enjoy a safer and more prosperous future.
Cool: Ask your teachers to help set up green pen-pals with a school in a different country, and share ideas on helping the environment.
Cooler: Find an environmental programme in another country that you'd like to support. Organize a local photo exhibition, talent show, concert or play to raise money to help support this cause and spread the word about it.

EDITORIAL

Not long ago, the polar ice caps and the world's mountain tops were thought to be pristine, among the few parts of the planet to have remained unsullied by humanity and pollution. Now we know they are feeling the heat more than anywhere else on the globe. For global warming is having its most dramatic and ominous effects at high altitude and high latitude, with enormous consequences for the rest of the planet. Like the canaries that miners used to take underground, they are providing an early warning of grave dangers to come.

Temperatures are rising faster in these cold corners of the Earth than over the planet as a whole, and the effects are already all too visible. The very atlases are having to be redrawn as great ice shelves collapse on the Antarctic Peninsula, forever changing the shape of its coastline. Arctic sea ice is shrinking much more than ever in recorded history, and may disappear altogether by the middle of the century. Glaciers are retreating at both poles, suggesting that both the Greenland and West Antarctic ice sheets may eventually melt, causing sea levels to rise to cover most coastal cities. And they are also rapidly thawing in mountains across the world, from New Zealand to Alaska, the Himalayas to the Andes, the Alps to Africa's Mountains of the Moon: their disappearance would devastate water supplies worldwide.

So melting ice is a hot topic, one of the hottest there could be. It is also one of the most urgent challenges we face. It demands immediate changes in government polices, in industrial practices – and in all our lifestyles. We must rapidly reduce our emissions of carbon dioxide and other greenhouse gases by reducing our use of polluting fossil fuels and by preserving forests and other key ecosystems. Otherwise we will be the first generation since the start of humanity to witness the vanishing of the Earth's ice and snows. And, like the canaries in the mines, their extinction will presage deadly peril for us all.

HEAT

It may sound like the least likely sales success story in history, but the Inuit are rushing to buy air conditioning as the world warms up. And no wonder. A year ago a heatwave sent temperatures soaring into the low 30s Celsius in parts of the Canadian Arctic, following a winter which saw people basking in February temperatures of 9ºC on the Arctic Circle rather than the normal -30ºC. Their buildings, designed to be airtight against the cold, are turning into heat traps.

And yet this is perhaps one of the least dramatic of all the changes facing the people of the far north. They are losing their hunting culture as their prey – like polar bears, walruses and seals – flee the warmer temperatures, and as the ice gets too thin for them to travel safely over it. Houses and other buildings are crumbling as the frozen earth beneath them melts: plans are underway to relocate whole villages.

The Inuit are at the sharp end of one of the most ominous changes ever to afflict the planet – the increasing disappearance of its ice. Arctic sea ice has been rapidly retreating, glaciers are thawing all over the world, and scientists are even beginning to fear that the great Greenland and West Antarctic ice caps are beginning to melt irreversibly – a process that could eventually raise sea levels by 12 metres, inundating vast areas of land and submerging most of the world's great coastal cities.

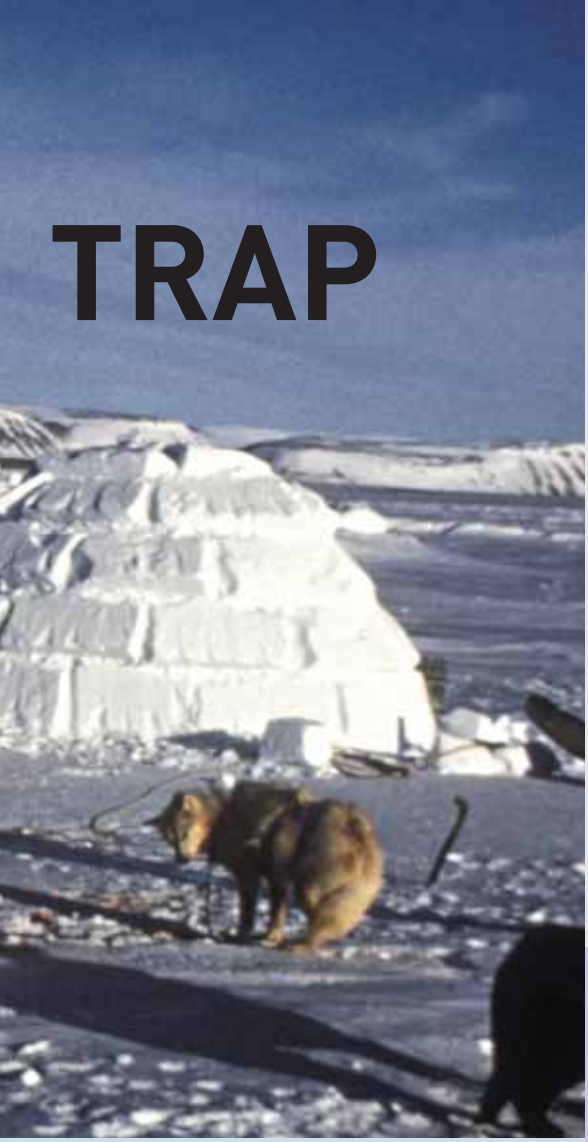
Sea ice in the Inuit's Arctic is now melting 40 times faster than just two decades ago, and the process seems to be accelerating. Last September it reached its second lowest extent ever – only behind 2005 – and scientists believe it would have set a new record had it not been for an abnormally cool August. And as white ice is replaced by dark ocean, less of the sun's radiation is reflected, and more of its heat is absorbed, causing the region to warm and thaw still more. Some experts predict that the ice will disappear altogether in summer in little more than 40 years; others fear that the massive addition of freshwater to the North Atlantic may disrupt the Gulf Stream, which makes northwest Europe hospitable to human habitation in winter.

Greenland's glaciers are greatly accelerating their once-slow progress towards the sea as temperatures rise, partly because the melting ice allows pools of water to form on their surface, which then flows down through crevasses to the rock beneath. Once there it forms a liquid layer between the rock and the bottom of the glacier, allowing it to move as if on a conveyor belt.

Much the same is happening at the other end of the Earth, in Antarctica, where the movement of glaciers is being speeded up by similar layers of water: a study of 244 of them found 87 per cent to be retreating. And vast ice shelves have disintegrated, literally changing the face of the maps in a development unprecedented in at least 10,000 years.

Glaciers are melting almost everywhere in the rest of the world, as the map on

TRAP



Fred Bruemmer/Still Pictures

pages 12-13 shows. As they disappear, vital water supplies will be put in danger for perhaps a billion people, from the Chinese and Indian plains, to South America's dry Pacific coast, to the North American West. And as they melt, glacial lakes form high in the mountains, threatening to cause 'tsunamis from the sky' if they burst their banks. When this happened to a lake in the Andes in 1970, some 60,000 people are thought to have lost their lives in what was, perhaps, the first great disaster caused by global warming.

Even more worrying, vast amounts of carbon dioxide (the main cause of global warming) and methane (an even more potent greenhouse gas) could be released by the melting of the permafrost that binds the cold land areas of the world. This would cause the world to heat even faster, greatly accelerating climate change, and threatening to create a vicious cycle that could spin global warming out of control. And that would face all of us, not just the Inuit, with massive threats to our ways of life.

INTERNATIONAL POLAR YEAR

In March 2007, 5,000 scientists from 60 countries celebrated the opening of International Polar Year, a massive two-year research collaboration focused on the effects of global warming in the Arctic and Antarctica – such as melting glaciers and sea ice – and how the poles interact with the rest of the planet. The 220 individual research projects include a census of the marine biodiversity in the Antarctic recently exposed by the collapse of the Larsen B ice shelf, which involved scientists from 18 countries; exploration of subglacial lakes; and astronomical studies.

Many of the Year's projects are part of ongoing research, but it provides a valuable opportunity for individual institutions and nations to pool their resources – both financial and scientific – to explore these remote, treacherous regions. Scientists hope the information gleaned during this international effort will give us a more complete picture of how climate change affects the whole world, as well as increase our knowledge of the poles – conceding that it will still only be the tip of the iceberg.

Pole-pole

In February, US student Michael Agnone joined a UN-sponsored climb of Mount Kilimanjaro in aid of at-risk youth in Africa. Here he describes his experience on Tanzania's 'Rooftop of Africa', just 300 kilometres south of the equator.

'*Pole-pole*', slowly-slowly in Swahili, was our chant as we climbed. The beauty of the mountain was astounding, as were the sights: the plants, the horizons, the icy blue glacier. The snowy top was the most beautiful thing I have ever seen. But this beauty is fading; the glaciers of Mt Kilimanjaro are slowly melting. I had heard about the effects of global warming around the world, but up there I witnessed it first-hand. It is destroying the mountain's beautiful glaciers – they have shrunk by more than 80 per cent since 1912, the first year they were measured, literally disappearing. According to numerous studies, all ice on the mountain top will be gone in the next 15 years. But I've been there and seen that icy blue from Gilman's Point. I will always remember it as it gives way to the effects of global warming… and not so '*pole-pole*'.

Core of the issue

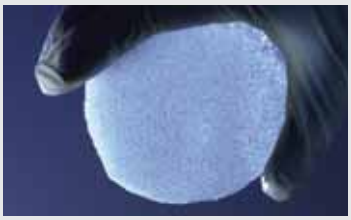
Understanding the present means understanding the past – in climate science as in anything else.

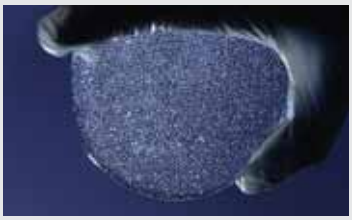
The high levels of atmospheric pollution now being recorded by scientists mean little unless they are put into perspective. We need to understand how they compare with those of hundreds of thousand of years of history, so we must travel back in time to take measurements of the atmospheric conditions of the past. But that's impossible… isn't it?

Actually, it is as simple as drilling a giant tube of ice out of Antarctica or Greenland. The process is called coring, through which scientists can study the composition of past atmospheres.

Ice is made of stacked-up, squished snowflakes; snowflakes contain air bubbles. As snow falls, layers of ice pile up. If you looked at a cross-section of ice that had built up over a week, you would see layers of identical little air samples trapped by snowflakes throughout the seven days. But the scientists are examining a cross-section of ice built up over 400,000 years, with air bubbles at the bottom containing the air that was breathed by Neanderthals. Studying it reveals the temperature, atmospheric composition and precipitation at that time.

A recent study, revealing that current greenhouse gas concentrations are unprecedented in the last 800,000 years, required a sample 3.2 kilometres long, taller than a stack of 126,000 ice cubes.





Left: a slice of shallow ice core through which air can circulate freely. Right: a slice from a depth of 120 metres, in which the trapped air bubbles are clearly visible. Below: scientists in Antarctica remove a 10,000-year-old ice core from a drill.

Photos: Chris Gilbert/British Antarctic Survey

Sniffing

Kim Holmén (pictured below right) stands on top of the world. He spends much of his time at Ny-Ålesund, a science research station on the island of Spitsbergen, deep in the Arctic Circle and surrounded for much of the year by frozen ocean. And from there he travels in the world's most northerly cable car to the top of a mountain.

Mount Zeppelin is named after Ferdinand von Zeppelin, well known as an airship designer, less so as an Arctic explorer. One of his airships flew from Ny-Ålesund to the North Pole in 1931. Today, his name is again at the cutting edge of science in the Arctic; the mountain has some of the world's most sophisticated equipment, sniffing pollutants out of the Arctic air.

Kim and his team call it their watchtower. 'This is the place where humanity will get the first hints of the world's future – of global pollution, or runaway climate change, or a sudden alteration of the ozone layer,' he says. 'For here, in the thin, cold Arctic air, is where much of the world's pollution ends up.'

Spitsbergen is an international island, run by Norway, but under a treaty that allows anyone to come here. Ny-Ålesund, the world's most northerly town, is full of scientists from a dozen countries. Kim comes regularly because he is in charge of many of them. And because he loves it.

It's a weird place. It may be close to the North Pole, but Kim remembers when, in July 2005, a party of politicians and journalists, togged out in their heaviest overcoats and fur hats, 'stepped off the plane to find scientists in t-shirts and shorts. Temperatures had hit 19ºC.' Even though the town – which is reached by the Gulf Stream – is warmer than most places in the Arctic, he adds, this was yet another sign that global warming has taken a grip on the frozen north.

Ny-Ålesund stands on a fjord once filled by a huge glacier. Now it has retreated by 5 kilometres. As we watch, huge chunks of blue ice fall off the front of it and float slowly towards the Atlantic. Last winter the fjord remained ice-free. Seals – which usually give birth to their pups on the ice – failed to produce any live offspring.

Kim's ice expert, Jack Kohler, observes that Spitsbergen's glaciers are disappearing fast, raising sea levels right around the world. 'If you want to see the world's climate system change,' he says 'you'd probably better come here to see it first.'

the future

BY FRED PEARCE

But, if you accept his invitation, take care. As the land warms and the sea ice breaks up, polar bears are coming ashore to hunt and getting increasingly aggressive. They break into huts on the island and eat anything that looks like meat – bed mattresses, inflatable boats. And you, if you get too close.

It's a scary 10-minute journey up Mount Zeppelin in a tiny four-person cable car that lurches in the wind. But you are greeted by a magnificent view across the shrinking glaciers looking like giant frozen waves. There are fresh fox prints in the snow, though thankfully no signs of polar bears.

But for the moment, Kim only really cares about his equipment, sensitive enough to sniff out the smoke from a cigarette 2 kilometres away. There is a strict no-pollution policy in Ny-Ålesund down below. Kim says he had a row with Greenpeace when their boat showed up here a few years ago, because the emissions from its engines upset his instruments.

The equipment's job is to measure the world's pollution. The Arctic may seem remote – but find it on a globe and you will see that it is surrounded by great continents. The winter winds bring car exhausts from the United States of America, coal smoke from Europe, methane from leaking gas fields in the Russian Federation and heavy metals from Siberian smelters.

Sometimes the pollution forms a yellow haze over the ice. Sometimes it rains mercury. But even the tiniest, most invisible particles register on Kim's monitors. His team can use computer calculations of where the wind has come from to track back to the source of the pollution – sometimes even to individual factories.

Overhead, this is one of the places where holes form in the ozone layer. By a quirk of atmospheric chemistry, gases like chlorofluorocarbons (CFCs) from old refrigerators destroy ozone only in the freezing air above the polar regions. So at Ny-Ålesund they check for that too. Some nights see a green laser light pointing into the sky as German researchers probe the ozone layer.

Strangely, many of the world's most toxic pesticides also end up here. Though mostly sprayed onto fields far to the south, often in the tropics, they evaporate from the soil and travel on the breezes until they reach the Arctic. In the cold air, they condense out, like a toxic frost. The pesticides end up on the ice, in seaweed, or absorbed by the mosses and grasses of the tundra – to be eaten by insects or fish, and then move up the food chain to mice and birds and seals and polar bears.

Millions of guillemots live on nearby Bear Island, Norway's largest bird colony, eating the fish that eat the seaweed that soaks up the pesticides. 'The birds contain extraordinarily high levels of pesticides,' says Kim. 'And their droppings collect in a big lake on the island, filling it with toxic chemicals in a place where you might expect to find the cleanest water in the world.'

Scariest of all, Kim gets an early warning of the rising levels of the gases that are warming up our planet, as he and his team measure the amount of carbon dioxide in the air. Strange to say, concentrations here are the highest in the world. During my visit, most other stations around the globe found the air contained about 380 parts per million of the gas. But some days on Mount Zeppelin, the equipment measured 390 parts per million.

Kim thinks this is due to the 'very rapid increase in emissions from the booming economies of Asia'. That pollution, like the pesticides, seems to be getting fast-tracked north. Not for the first time, Kim believes he has caught a whiff of the future at the top of the world.

Q & A

Q How much time do we have to bring global warming under control?

A Global warming is going unchecked, more so every year, with increasing impacts around the world. We should have started tackling it seriously years ago. The best current estimate by leading scientists and other experts is that we have only a decade to bring it under control before catastrophic consequences for the world become inevitable. We still have an opportunity to reduce our emissions of carbon dioxide – and dependence on energy from fossil fuels – and at least to pass on to the next generation a planet that is not entirely damaged and polluted. But the longer action is delayed, the more drastic and difficult it will have to be. The situation demands immediate attention. Act, act and take action.

Q What are the consequences of melting glaciers for people and the environment?

A About a billion people worldwide depend entirely on glaciers for their water supplies, including several hundred million people in China and India alone, and scores of millions more in the countries of the Andes in South America. Large parts of developed countries, like the western United States of America, also rely on them. As the world warms up, the meltwater comes earlier and earlier and there are increasing shortages later in the year. In the long run, when the glaciers have gone, there will be no dry-season water at all, with catastrophic consequences for both people and agriculture. Increasing meltwater also threatens to make glacial lakes high in the mountains burst their banks, causing devastating floods downstream. And then there is the contribution of glaciers to sea-level rise as well.

Q What exactly does the human family have to do to stop the polar ice caps melting?

that run cleaner and burn less fuel, to generate electricity from wind and sun and other renewable sources, to modernize power plants, and to build refrigerators, air conditioners and whole buildings that use less power. But if we do not act very quickly it will be too late.

Q Will climate change open up the Arctic and Antarctica for some kinds of agriculture, human settlements, etc.?

A It may do. Farmers in Greenland are already beginning to grow broccoli, cauliflower, Chinese cabbage and other temperate area crops. Unfamiliar species like salmon and robins, for which the Inuit people have no names, are beginning to appear in their lands. And oil companies are keeping an eye out for new reserves as ice retreats in Arctic waters. But any 'benefits' from global warming will be far offset by harm in warmer climes, and will disappear even in the polar regions if the world goes on heating up.

Q If the glaciers and ice caps melt, by how much will sea levels rise?

If all the glaciers outside the polar regions melted, sea levels would rise by about half a metre. According to scientists, if the Greenland and West Antarctic ice caps melted, sea levels could rise by as much as 12 metres, changing the map of the world, submerging low-lying islands and coastal cities and vast areas of countries like Egypt and Bangladesh.

Q What are the most important things that governments and people, especially young people, should do?

A Governments need to sign up rapidly to effective treaties, starting with one agreeing on heavy cuts in greenhouse gas emissions from 2012 when the present arrangements under the Kyoto Protocol run out. But they should not wait for these agreements, and should immediately start taking action to cut

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