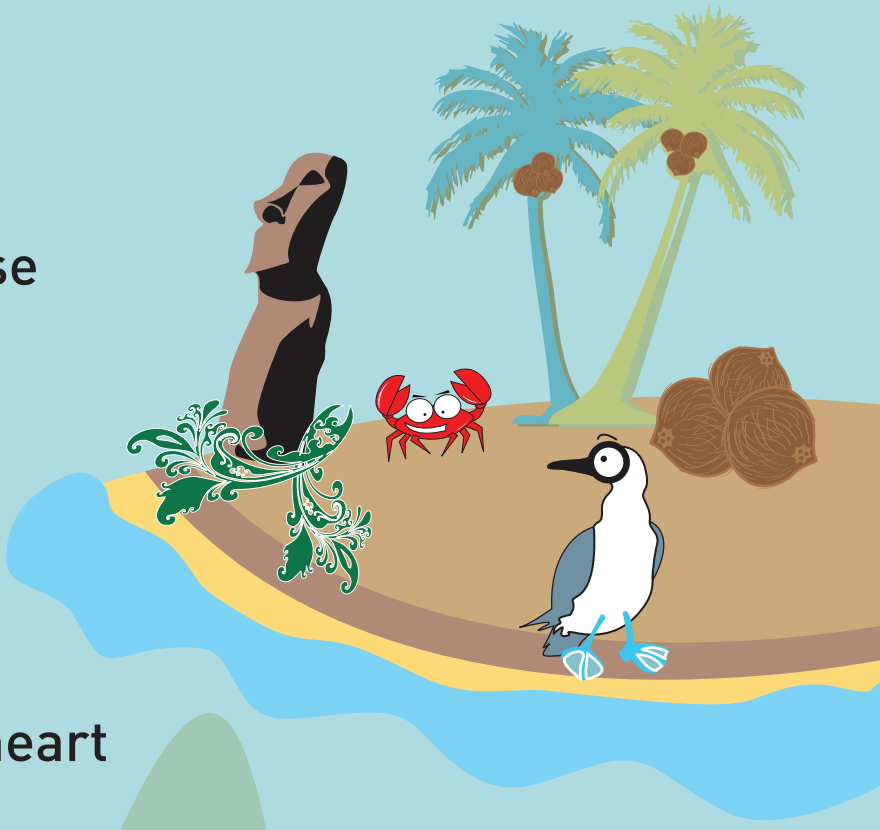
The UNEP Magazine for Youth

TUNZA

UNEP

for young people · by young people · about young people

Islands



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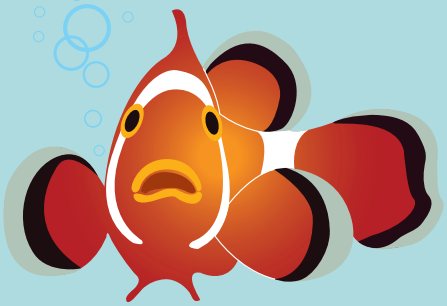

Sun block

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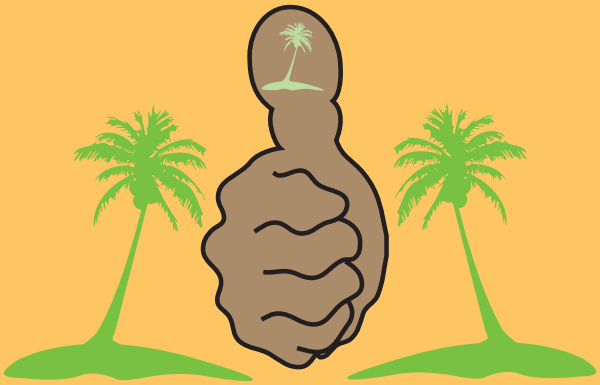
Partners for Youth and the Environment

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.

The partnership agreement, renewed to run through 2010, lays down a basis for UNEP and Bayer to enlarge their longstanding collaboration to bring successful initiatives to countries around the world 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 Africa, Asia Pacific, Europe, Latin America, North America and West Asia, the Asia-Pacific Eco-Minds forum, and a photo competition, 'Ecology in Focus', in Eastern Europe.



COOL & **COOLER**

COOL: Recycling your metal, glass and paper.

COOLER: Creating weird and wonderful art from your recyclables. You could take inspiration from the Wonder Welders in Tanzania, who make funky animal figures from scrap metal, customized cards from waste paper and natural fibre, and beads from old bottles and broken glass.

COOL: Cycling to the cinema.

COOLER: Cycling to power a cinema. The Magnificent Revolutionary Cycling Cinema in Cambridge, England, combines entertainment with education to engage cinema-goers with environmental issues. The touring cinema screens independent movies while demonstrating how clean power can be generated locally. The cinema works on pedal power – so the film only plays for as long as the people keep pedalling!

COOL: Visiting a nearby nature reserve or protected area.

COOLER: Volunteering for tree-planting, coral reef conservation or litter collection to keep your protected area green and clean.

COOLEST: Getting together with friends to research a local nature spot and see if it could become a protected area. Make presentations to your school and local community and see if together you can persuade the authorities to recognize its value.

COOL: Drinking water from a biodegradable bottle made of corn.

COOLER: Green motor racing. Eco-One is a prototype racing car made largely from hemp and potatoes that proves that eco-cars can be both fun and functional. The latest plan is to go tropical and develop a Formula 1 car made from coconuts!

COOL: Bargain-hunting for vintage chic in second-hand clothes stores.

COOLER: Renovating your existing wardrobe. Personalize your clothes to update tired styles and get a unique new look!

COOLEST: Organizing a clothes-swap amongst your classmates or friends. Guilt-free shopping where everything from sweaters to scarves is exchanged in the ultimate friendly free-for-all.

EDITORIAL

In truth we are all islanders, clinging to our small inhabitable globe adrift in the limitless black ocean of space. And the world's islands are indeed microcosms of the Earth itself. Many of the most pressing issues affecting the planet arise first, and most intensively, on islands. For although they are among the most beautiful places in the world, they are also among the most vulnerable.

Islands are home to some of our richest wildlife, harbouring one in six of the world's plant species on their limited combined land area, but this life is particularly at risk of extinction. Islands usually have sparse resources, both mineral and natural, which are thus especially prone to degradation and overexploitation. They often depend on the seas that surround them for much of their food, and thus are hit hard by the devastating effects of overfishing. And with little hinterland, most are exceptionally at peril from natural hazards like hurricanes, droughts and tsunamis – and, above all, from the rising seas and changing weather resulting from global warming.

Their environmental fragility is compounded by economic vulnerability. Most islands are dependent on just a handful of crops or industries, and so are particularly prey to the uncertainties of the weather and of world markets. Most are heavily dependent on imports, and have to pay high costs for transporting their goods. And most, too, are among the least powerful nations on Earth.

All this makes the world's islands a natural place to start tackling the threats to the planet as a whole. And they also often have a social cohesiveness which makes solutions easier to implement. But, in practice, they have largely been neglected by the rest of the world. This must change. For in the fate of the islands can be read the future of the Earth itself.

Childhood paradise

When TUNZA first arranged to meet Lelei Lelaulu at United Nations headquarters, New York, we asked how we would recognize him amongst the scrum of visitors. 'Remember, I am a Samoan,' he joked – and indeed he was easy to pick out, towering above all other nationalities. Born in the South Pacific, Lelei has worked for many years in the United States of America, as a journalist contributing to CNN World Report from the United Nations, at the UN, and today as head of Counterpart, a non-governmental organization (NGO) that helps communities around the world reduce poverty through sustainable development and capacity building. He has never forgotten his island roots, serving as Chairman of the Foundation of the Peoples of the South Pacific – the largest network of NGOs in Oceania.

Q: What was it like growing up and living on an island?
A: Islands are made for kids. Like most islanders, my home was right next to the beach, so my playground was the ocean. The sea was full of playmates big and small: dolphins treat life as one big playtime, and they love sharing. And tiny fish swimming in schools by the hundreds would constantly surprise me with yet another combination of colours.

The ocean was also our larder. Shellfish, seaweed and countless other things made yummy nibbles. And the fun didn't stop when it got dark: at night the phosphorescent plankton would turn the waters of the lagoon into a light show. On an island, you can see almost everything by moonlight.

Q: Tell us how growing up an islander has formed your view of the natural world. Do islanders have a more intimate relationship with nature?
A: Island environments are special: there is often more biodiversity concentrated on islands than on large continents because, being surrounded by water, plants and animals are protected from predators of all kinds, including the two-legged variety.

At the same time, islanders are much more aware of the finite nature of everything because we cannot just pack up our bags and move to the next county or state to find more. We understand that our actions have consequences for other living things, including people.

For example, there is no anonymous dumping on islands because other villages soon notice the damage and know exactly who caused it. If someone pollutes a river upstream, everybody downstream could fine the polluter, and in some cases banish him from the river. We grew up knowing that if you cut down a stand of trees, you have to grow more somewhere else. And our elders would place taboos on

Paradise lost

I GREW UP on Han, the largest of the Carteret Islands, which lie 45 degrees northeast of Bougainville, Papua New Guinea. Growing up on these beautiful white beaches instilled a peace and tranquility in me that I have never experienced elsewhere. But my beautiful atolls are being taken away. Before my eyes, the angry seas rise and swell uncontrollably at high tide from October to March, sweeping away our root crops and leaving us with nothing but pain.

As a girl, I saw how the seas ate away at our island, washing onto our gardens, yellowing the banana and taro leaves. I didn't understand, choosing the brightest yellow leaf to wear for traditional dancing and singing while my mother and grandmother mourned. My grandmother said, 'One day, you will remember my days of mourning. There will be land shortages, and maybe your grandchildren will float in canoes as land is completely washed away.'

Now her words are coming true. As the sea has poisoned the land – where once we grew banana, breadfruit, cassava, papaya, sugar cane, tapioca and taro – all we have to eat are fish and coconuts, supplemented by rice imported twice a year. The groundwater is too salty to drink, so we rely on rainwater and coconut milk. When the seas rise, they sweep away our houses,

Pip Starr

fishing certain parts of the reef to allow fish to grow and return.

Q: In what ways does your traditional culture accommodate island life? Are there practices that continue to this day?
A: Sharing a fishing catch is always expected. In fact, a fisherman's prestige grows according to how much he shares with the community. And to this day, an entire village will spend a day a week farming a plot to benefit the whole village. Everybody is expected to spend some time working for the common good, so when someone's building a house, everyone pitches in to get it up in very short order.

Q: How are climate change and global warming affecting island life and culture?
A: Islanders are building sea walls to hold back the rising waters as many are already seeing some of their villages under water for part of every day. Coral reefs are bleaching and dying as water temperatures rise. And as the reefs die, fish lose their homes and food and die too. Even sadder, many villagers are leaving for larger countries where they can bring up their families away from the rising waters.

Q: Is tourism a good way for islands to raise money and environmental awareness?
A: Informed, responsible tourists bring us honour by admiring the island surroundings and by seeing and appreciating the customs and skills of our peoples. It makes islanders feel good to know that others from faraway lands dream of visiting their islands, and are willing to travel vast distances to be with us and enjoy what we enjoy.

Some villagers earn money by renting their small hotels to visitors. Visitors also help by buying food from island farmers and fish from fishermen, and pay foresters to take them through our rainforests. That way, islanders make more money by showing people their forests than by chopping down trees to send overseas.

Q: Do you worry that islanders are being left behind as the world starts grappling with global warming?
A: As the European countries talk about stopping long-haul jet travel, islanders fear a huge loss of income from tourism. Tourism brings the largest voluntary flow of money from rich countries to poorer island countries, and now they are talking about stopping it. Islanders feel abandoned.

Q: What do you feel islands have to teach the rest of us?
A: Islands are the most sustainable places on our planet because islanders know how important it is to ensure the ongoing use of their natural resources. They can teach others how to make the best possible use of what they have, but always sustainably.

Q: Do you think you'll go back to live on an island one day?
A: I will return to an island to play with the dolphins and to feel the trade winds cooling my face in the late tropical afternoon.

by Ursula Rakova

and when they recede, mosquitoes breed in the water and give us diarrhoea and malaria. We have tried to build barriers of clam shells and corals in wire cages. But it is of little use. My people are starving and frightened, and we must leave.

The Papua New Guinean Government had planned to start moving us in early 2007 to the island of Bougainville, but there has not yet been any movement because my organization, Tulele Peisa, is negotiating to purchase land in Tinputz and Raua Plantation. Before this can happen, the landholders must agree to sell to us. By June 2008 we hope to settle 10 families in Tinputz on 81 hectares, and in Raua we hope to buy 500 hectares of land where 3,000 people, about 600 families, can make their new homes.

We are lucky to survive, but it will not be an easy transition. My people, strongly bonded by tradition, will have to cope with language and cultural differences, and it will take a great effort to adapt to a new way of life. But I believe these problems can be overcome. What else can we do? God help me and my island people.

Ursula Rakova runs Tulele Peisa, an organization helping to manage the relocation of Carteret islanders.

World's END

Peter Kramer
Chairman of the Board
Charles Darwin Foundation for the Galapagos

Scott P. Mooney (Arlington, VA, USA)

In 1962 I had to wait for a month in the Ecuadorean port city of Guayaquil for a ship to take me to Galapagos, and remember using the time to read an account of the islands by the great American naturalist William Beebe, *Galapagos, World's End*, written after a visit in 1924. It was not easy to get to the archipelago at that time, and it was not easy to find good information on it, neither in Germany where I came from, nor in Guayaquil where I talked to biologists at the local university. Conservationists had only just started to pay attention to Galapagos – under the auspices of UNESCO and IUCN–The World Conservation Union – after centuries as a retreat for whalers and buccaneers, a destination for romantic (or desperate) settlers, a place of banishment for criminals, and a strategically significant site for a large US naval base to keep the Japanese away from Panama during the Second World War.

Scientists understood why Galapagos had been significant for Darwinian thinking, and they had taken note of the destruction brought about by human exploitation and invasive species like goats, pigs, dogs and rats. So museum scientists came to collect specimens during the first half of the 20th century, convinced that the Galapagos would suffer total habitat destruction – with only a few small remnants left under strict protection – as had occurred on Hawaii and most other tropical and subtropical islands. Similarly, Ecuadorean naval officers would often take pet giant tortoises back home to the continent after serving in Galapagos in the 1950s and 1960s.

Now, half a century later, the islands can be studied as an example of both success and failure. Almost extinct species, like the giant tortoise, survive, are reproducing and being reintroduced. Goats, pigs and donkeys have been removed from most islands and habitat destruction has been halted on all the uninhabited ones. But, at the same time, ever-growing tourism threatens to bring in more invasive invertebrates, micro-organisms and plants. And overexploitation and illegal fishing are having serious effects in the surrounding seas. Will we have the foresight, the wisdom and the will to resolve these problems?

Rats!

Nobody likes invasions of rats, but islanders have more reason than most to fear them. Blamed for half the world's extinctions since the 1600s, they wreak especial havoc when they arrive at islands where they have no natural predators.

They get there by boat, hiding in cargo, swimming from ship to shore or riding in on shipwreck debris. Once on land, they eat the eggs and chicks of ground-dwelling seabirds, and even climb trees to get at ones that nest in them. When birds disappear, so does their nutrient-rich guano, on which plants rely. And researchers partly blame rats for the deforestation of Easter Island because they ate the palm nuts.

harleyannie

Introducing them is easy; getting rid of them is enormously difficult. New Zealand and the Falklands have successfully used poisoned bait, but it can take a lot to kill a rat. A team of scientists recently released a Norway rat on the island of Motuhoropapa, and tracked it to research better trapping methods. It dodged 70 traps and two dogs for 18 weeks and was finally found on another island, 400 metres across the sea, having apparently swum there in search of a mate.

Juan Carlos Avila

Size matters

Imagine islands inhabited by giant rats and dwarf elephants. A setting for a sci-fi film? Perhaps, but 10,000 years ago, 1-metre tall elephants roamed the island of Sicily, while Tenerife was home to rats weighing as much as a kilogram. Indeed, fossil evidence from around the world shows that strangely sized mammals have lived on islands for millions of years. And ever since Charles Darwin's Galapagos extravaganza, scientists have wondered if islands could be special evolutionary incubators.

Virginie Millien has long been fascinated by what is known as the 'Island Rule', and as the curator of palaeontology and zoology at McGill University's Redpath Museum in Montreal, she has been well placed to test its validity. 'The idea was that on islands, large mammals would become smaller through evolution, and small mammals would become larger,' she explains. 'People have been working on islands forever, and there is an immense body of knowledge about fossils and evolution, but nobody had looked at all of it together. We just assumed that evolution was faster on islands, but there was no qualification or comparison. It's not a new idea; I was just the first person to test it.'

Millien – a geologist and palaeontologist – didn't have to set sail to the Galapagos. Instead she searched through hundreds of academic studies and compared fossils of 88 species. Her findings suggest that island mammals quickly adapt to their new environments through changes in size and form. Large animals, like elephants, gradually become smaller in a confined habitat, allowing more of them to thrive, and small animals grow larger when they don't have to worry about natural predators.

MAKING SENSE

'When you think about what happens to an animal suddenly isolated on an island, the idea makes sense,' she says. 'They find themselves in very different circumstances from their relatives on the mainland, and have to adapt quickly or they will die out. So we see relatively fast rates of evolution at first, and then, when the population becomes stable, it slows down.'

Speed isn't the first thing that comes to mind when you think of evolution, and Millien points out that while island mammals evolve faster than their mainland counterparts, the changes still take ages to come about. Sicilian elephants took between 200,000 and 400,000 years to become a hundredth of the mass of their mainland ancestors.

It may be based around ancient fossils, but Millien's research has implications for the future. 'My results demonstrate that most mammal species retain an intrinsic capacity to evolve quickly.' Climate change and habitat fragmentation can mirror the conditions in island habitats, so if Millien is correct, some mammals could successfully evolve to cope with them if they do not happen too fast.

Millien may have helped solve an important piece of the evolutionary puzzle, but she is quick to point out that nobody has all the answers. 'Island evolution is a spectacularly varied field. There are so many theories and so many exceptions that it's impossible to get a universal explanation. So fortunately I will always have something to work on!'

Front-line fighters

'IF WE WAIT FOR THE PROOF, THE PROOF WILL KILL US.' With that stark sentiment – articulated nearly two decades ago by Charles Fleming, former United Nations ambassador for St Lucia – the world's small island countries banded together to try to force international action on climate change, even though scientists were still not absolutely sure that it was taking place.

They felt compelled by a sense of 'apocalyptic urgency' about climate change, and no wonder, for they were, and are, truly at the front line of its effects. As the seas rise, many low-lying atolls – and some entire island nations like Tuvalu and the Maldives – will become uninhabitable. Already, especially high tides or storm surges wash over much of their land. And even before the islands are totally submerged, precarious supplies of groundwater will be contaminated by salt, making it impossible for people to stay.

Individual island countries, small as they are, could apply little pressure on the rest of the world to cut emissions. But together, they realized, they could exert influence that far outweighed both their relative population size and their economic power. So despite different economic and cultural profiles, they formed the Alliance of Small Island States (AOSIS) in 1990.

Doing so converted their weakness into potential power. For, though small and scattered, islands form a considerable block at the United Nations. The 39 AOSIS states, plus four observers, share only 5 per cent of the global population but together make up 20 per cent of United Nations members.

AOSIS also has considerable moral authority, as it comprises many of the states that will suffer first and worst from climate change, but which are also among those who have done least to cause it, as they emit so little pollution. Their success depends on working together, for they symbolize the old saying 'united we stand, divided we fall'.

Q & A

Q We hear that the people of Vanuatu are the happiest people on Earth: is that true?

A One of the criteria used to define happiness when the people of Vanuatu received this accolade was linked to their impact on the environment – they have an ancient culture and live peacefully and in harmony with nature. In 1914, Maxim Gorky wrote: 'Happiness always looks small while you hold it in your hands, but let it go, and you will realize how big and precious it is.' Perhaps the same could be said of the natural world.

Q How can the people of low-lying Pacific islands avoid the threat of sea-level rise? Can people living on the other side of the world help them?

A The world's seas are rising at about 3 millimetres a year, twice as fast as a few decades ago. This will increase as glaciers and ice sheets melt, and continue for centuries. There is little that low-lying island nations can do to save themselves. Even if they could afford to build high defences, the seas would eventually overwhelm them, yet they contribute almost none of the pollution that is causing sea-level rise. Only cuts in carbon dioxide emissions, particularly in the rich world, can help to slow down or limit the rise.

Q Are islands doing enough to exploit renewable energy sources?

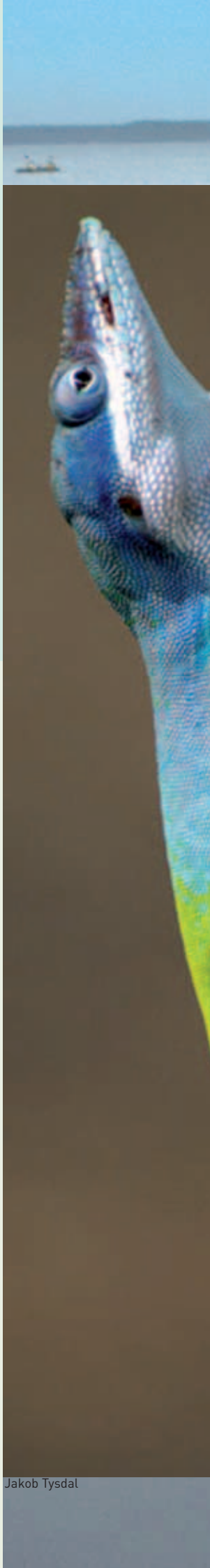
A Many islands are working hard to exploit their renewable energy sources. Indeed they offer excellent opportunities for research and development of these technologies, which the world will need as it seeks to move to low-carbon economies.

Q Tourism and environmental well-being rarely go hand in hand, and the pressures are particularly great on islands. Can they be reconciled?

A Tourism, one of the world's fastest growing industries, does have a significant impact on the environment. However, responsible tourism can promote conservation and local cultures, and contribute to sustainable development.

Q What can happen when an outside species is introduced into an island ecosystem?

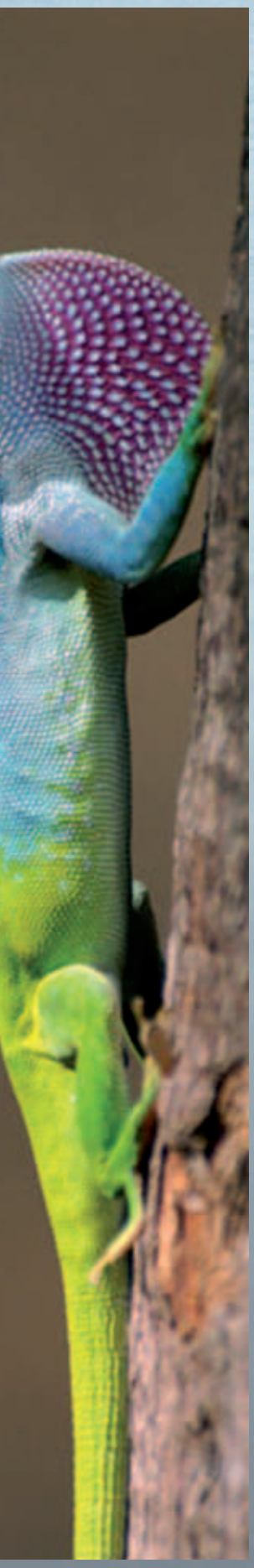
A The sensitivity of island ecosystems means that an outside species can do great harm and even lead to extinctions. We need to enforce international agreements aimed at preventing introductions.



Jakob Tysdal

There's only one **Cuba**

by Handy Acosta Cuellar



Which is the only country in the world that provides both a high level of human development for its people and a globally sustainable demand on the Earth's natural resources? Sweden? Switzerland? Spain? None of these. The *2006 Living Planet Report* identified it as my home, Cuba.

This is not by chance. Cuba recognizes the importance of the environment in its constitution. 'The state protects the environment and natural resources of the country, recognizing their links with sustainable social and economic development for the survival, well-being and security of current and future generations,' it says. 'It is the duty of citizens to contribute to the protection of our water and atmosphere, to conserve soils, flora, fauna and all potential use of nature.'

Cuba has lots to protect: coral reefs, mangroves, wetlands and swamps, tropical montane forests and semi-arid savannahs. And around half its animals and plants are indigenous to the island, with a high proportion found nowhere else in the world.

The economic ups and downs of the 1990s – in part the result of the ending of the Soviet era and the United States of America's economic embargo – meant that for Cuba sustainability was not *an* option, but the *only* option. Promoting organic and urban agriculture, improving production processes and energy efficiency, and adopting cleaner production with the help of international organizations, have all been achievements on the road to economic and environmental sustainability, while maintaining an astonishing growth rate of 12 per cent a year.

Cuba is now involved in an 'energy revolution', aiming to reduce the use of electricity and conventional non-renewable fuels while increasing energy efficiency. High energy-use equipment is gradually being replaced in power stations, improving their efficiency and capacity. Generators have been installed in hospitals and nationally important production centres, and isolated areas are benefiting from solar panels. Meanwhile, studies to introduce such alternative energy sources as wind and biomass are under way.

There has been a big campaign to increase tree cover. It has risen from 15 per cent of the island in 1959 to 24 per cent today, and the aim is to reach 26 per cent by 2010 without compromising economic development. Both the Government and civil society have joined UNEP's Plant for the Planet campaign and pledged 135 million saplings – equivalent to 12 per cent of all pledges yet made.

Many Cuban youth organizations understand the need to look after the present in order to have a better future, and adopt it as a guiding principle, inspiring a new generation to 'think global, act local'. Organizations such as ProNATURALEZA involve young people by giving them opportunities to design, develop and implement community action. This led, for example, to the University Project for the Study and Conservation of Marine Turtles, involving 1,369 young people over 10 years.

Collaborating with UNEP in the Global Environment Outlook for Youth project – which concluded successfully in 2006 – was perhaps one of the biggest challenges for Cuban young people. Another organization, Cuban Youth Environmental Network, was set up in early 2007 as a coordination and information platform for youth groups to exchange experiences, promote ideas and join forces for such campaigns as Clean up the World and Plant for the Planet.

'We want young people to work with us and set up debates, forums and workshops where the key message is including them and their opinions at the heart of environmental organizations,' says one youth leader. 'We must take the lead. It is, after all, our future, and we want it to be healthy, clean and in tune with the environment.'

Handy Acosta Cuellar is a Tunza Youth Advisor for Latin America and the Caribbean, 2007-2009.

No waste of time

Microbiology student Clarisse Quimio rips a sheet from a presentation pad and excitedly scrawls out a chemical equation. She's explaining how she's developed a way to reduce the levels of toxic chromium from tannery wastewater in the Philippines by isolating, growing and reintroducing bacteria from the water before it reaches the river.

It's the third day of the 2007 Bayer Young Environmental Envoy (BYEE) conference at Bayer headquarters in Leverkusen, Germany, and the information exchange is sophisticated and intense. It's easy to see why the company selected this group of 50 young environmentalists – from Brazil, China, Colombia, Ecuador, India, Indonesia, Kenya, Malaysia, Peru, the Philippines, Poland, Republic of Korea, Singapore, Thailand, Turkey, Venezuela and Viet Nam – for this week-long gathering to learn about new developments in environmental protection and, of course, from each other.

Effective waste management

In the 'waste' session, Ratu Tisha Destira, a mathematics student from Indonesia, describes a formula she developed to standardize managing rubbish on her campus. In the discussion on 'agriculture', Jan Patac Dacumos from the Philippines describes how he developed an effective low-cost, organic biofertilizer by using vermicompost, mycorrhizal fungi and agricultural waste, which he sells to farmers for use on crops and trees. 'I'm learning many brilliant things from my fellow Envoys, from biofuel production to waste monitoring,' remarked Marvin Okoth Oluoch from Kenya. 'If all these ideas were implemented, the world would be a better place!'

This was a chance for the Envoys – ranging from environmental engineers through chemists to medical students and journalists – to discuss their own work formally. The rest of the week, they were being whisked from lecture to excursion and back again at a blinding pace – an opportunity to see first-hand how Germany handles environmental protection and sustainable development.

Delegates visited Bayer's toxic waste incineration and wastewater management facilities, designed to keep pollutants out of the environment, and were given demonstrations at Bayer CropScience to see how scientists test pesticides to make sure they do not contaminate food crops, groundwater or the natural world. Sinem Erdo, an environmental engineering student from Turkey who has developed a system to treat and divert wastewater to irrigate crops, found this particularly useful. 'It's like being with colleagues; I know what they are talking about, and some points are really improving my understanding.'

Crossing borders

Later, the Environment Agency of North Rhine-Westphalia discussed water and air-quality monitoring, especially important in a region that has the highest proportion of industry – and the densest population – in Germany. As Dr Brigitte von Danwitz, who heads the surface-water quality unit at the Agency said, 'pollution knows no borders'. The Rhine is an international waterway on which 50 million people live, a wastewater outlet and a source of drinking water. Though once heavily polluted, cooperation between governments and industry has rehabilitated it. Delegates took a cruise on a lab boat to see how sediment samples are taken.

There was much to absorb, but lectures provoked debate as well. When Annik Dollacker from Bayer CropScience presented ways in which the company is trying to improve nutrition and yields in crops, Ruchi Jain, who works on sustainable agriculture projects in India, pointed out that intensive farming techniques have left her country's small farmlands infertile and farmers impoverished. 'The farmer takes loans to buy pesticides,' she explained, 'and though yields are good at the beginning, when he comes to repay the loan he can't grow any more as the land becomes depleted.' Annik Dollacker

All photos: Michael Rennertz/Bayer

conceded that for small and subsistence farmers, organic farming makes sense, but added that to feed all the world's people using organic farming would take up much more land, leading to unsustainable practices like deforestation.

'What really makes sense is to take the middle path,' Ruchi said afterwards. 'Maybe some traditional farming techniques could be integrated into intensive farming research to make it more sustainable.'

Changing mindsets

The Envoys were most impressed by Leverkusen's municipal waste-recycling facilities, where citizens voluntarily sorted their rubbish – everything from computer and TV monitors to mattresses – something that wouldn't occur in their home countries. 'Have you seen how many cars are coming?' said Ayhan Çuhaci, from Turkey. 'A guy even came in a Mercedes!' Samuel Lim Yong Peng added, 'I think the primary difference between here and Singapore is cultural – how deeply engrained environmental mindsets are.'

Voluntary recycling is certainly not what chemist David Chuquer, from Ecuador, would expect. Besides finding ways to extract toxic chemicals from mobile phone batteries for industrial and laboratory use, he thinks it will be necessary to pay Ecuadoreans to refrain from throwing batteries away. 'If I tell them it harms the environment, they say "whatever", but people hate to lose money.'

Cultural acceptance

The delegates will take home an appreciation of the important role of cultural acceptance. 'Government, industry and citizens all have roles to play,' explains Hu Ching, also from Singapore. 'But if people are not enlightened, there is nothing much the government can do to force change.'

Husnul Khatimah of Indonesia agrees and, as an environmental educator, adds: 'The potential to change the world starts with information, so people know, understand and care.'

Sun BLOCK

'Adapting a building to the climate is better than adapting the climate to a building,' Bayer MaterialScience's Ian Paterson told conference delegates.

At least a fifth of man-made global greenhouse gas emissions now come from energy consumption in buildings, he told a workshop on Protecting the Climate Through Smart Construction. And saving energy is the best and simplest way to combat climate change.

Bayer is to build a zero-emission office block near New Delhi, constructed with high-tech materials. A recessed ground floor, cement heat sinks and polyurethane insulation will help keep it cool, while 600 square metres of rooftop solar modules will provide its power. The energy-independent building will use 70 per cent less electricity than the conventional equivalent, which should offset the additional construction costs in less than 10 years.

The building is one of several 'lighthouse projects' in the Bayer Climate Program, which was announced at the BYEE conference. The programme pledges an investment of EUR1 billion (approximately $1.4 billion) over three years to fund research and projects, such as developing stress-tolerant plants, an emissions auditing tool and the EcoCommercial Building initiative.

No island is an island

We imagine islands as havens of warm turquoise waters and pristine beaches, cut off from the world's problems. But more than 500 million people live on them. Of course, islands are still special, with tremendous biodiversity and rich cultures. But the very isolation that makes them so magical also makes them particularly vulnerable.

Biodiversity

Islands are home to about one in six of the world's plant species as well as many special animals. Isolation reduces competition between species and can cause genes to mutate faster, so many islands have become hotspots of biodiversity with a high concentration of endemic species – those found nowhere else on Earth. The wildlife of the Galapagos is famous for helping Darwin form the theory of evolution. Newly discovered lemurs are still being added to Madagascar's list of 8,000 endemic species. Over 90 per cent of Hawaii's species are similarly special to the island chain.

Earth's largest lizard, the Komodo dragon, only lives on three islands in Indonesia. Icelanders are fiercely protective of their special horse, a small, sturdy creature with a unique gait whose ancestors were imported sometime around 900AD, and whose bloodline has remained pure for eight centuries.

The seas around islands are host to half the world's marine biodiversity and include some of its richest habitats, such as Fiji's Great Sea Reef, which has recently revealed a new species of damselfish, mangrove island habitats and 43 hard corals not previously found in Fijian waters.

Sea-level rise

Sea levels are rising with global warming, as ocean waters expand with the extra heat and glaciers melt, spelling trouble for low-lying islands. In 2006, Lateu villagers on one of Vanuatu's coral atolls were moved to higher ground. People of the Carteret Islands in the South Pacific are currently preparing to evacuate. And 80 per cent of the Maldives' 1,200 islands in the Indian Ocean protrude only a metre above the waves and so are regularly flooded by tidal surges. And as the seas rise, saltwater makes soil infertile and gets into the groundwater, threatening to render the islands uninhabitable long before they are actually submerged.

Melting ice

Ice melting due to climate change is affecting islands in the far north too. In the early 1990s, seal hunters from the Inupiat village of Shishmaref on the Alaskan island of Sarichef, just north of the Bering Strait, noticed that sea ice was forming later than usual in the autumn and breaking up earlier in the spring. This allows storms to erode land already made vulnerable by thawing permafrost. Houses near the shore are now being moved inland, and the whole village is likely to be evacuated.

On Greenland, the world's biggest non-continental island, global warming is having a mixed effect; the melt is uncovering gold and other valuable minerals and making farming easier, but also making it impossible for the Inuit to hunt over no-longer frozen sea.

Fisheries

Islanders all over the world depend on fish, but overfishing, pollution and the destruction of coral reefs and mangroves damage fisheries. One study of 49 coral island countries found that over half their fisheries were being exploited unsustainably. Coral reefs face many threats, not least being killed by bleaching as waters warm up. Reefs may supply only around 5 per cent of the total world fish catch, but developing island nations depend on them.

Natural hazards

Islands are highly vulnerable to storms, tsunamis, earthquakes and volcanic activity, and their remoteness makes it hard to get help in an emergency. Everyone remembers the 2004 tsunami, but this was just the latest of a series of large-scale disasters. The 1883 eruption of Krakatoa in the Sunda Straits between Java and Sumatra caused tsunamis that washed away 165 coastal villages and killed 36,000 people. In 1972, Hurricane Bebe made 120,000 homeless in Fiji – more than a fifth of its population. In 1980 Hurricane Allen destroyed 80 per cent of Dominica's housing, and Hurricane Isaac rendered half of Tonga's people homeless in 1982.

Waste

Limited space and growing numbers of tourists make it hard for island countries to cope with their wastes, but space is not the only issue. Lack of affordable technologies makes it difficult to treat sewage properly or recycle materials like plastics, aluminium and paper. In the Caribbean, about 90 per cent of sewage is discharged untreated into surrounding seas; in Pacific islands about 98 per cent goes the same way. When rubbish is dumped at sea it can wash up on islands – Aldabara, in the Seychelles, is as famous for its rubbish-strewn beaches as for its giant tortoises. Only 6 per cent of the rubbish generated on the island of Madagascar is regularly collected, and creeks near houses and roads in Samoa are choked with garbage. Degrading rubbish contaminates waterways and groundwater and can be a breeding ground for disease.

Deforestation

Nearly all island countries are losing their forests to logging, fires and agriculture, threatening wildlife habitat, soils, water supplies and ultimately economies.

Easter Island was once covered in lush palm forest, allowing the people who built the iconic statues to make canoes. It is now thought that it was the overcutting of trees – together with a proliferation of rats, which eat palm seeds – that made the island uninhabitable. The rainforests of Madagascar have been exploited since the late 1800s for grazing, agriculture, fuelwood and mining, threatening one of the most biodiverse places on Earth. In Tasmania, logging for paper imperils the island's old-growth forests, including giant eucalyptus trees – the tallest hardwoods in the world. And in the late 1980s, deforestation in Java caused the loss of 770 million tonnes of topsoil a year; this is thought to have shrunk rice harvests by 1.5 million tonnes, enough to feed up to 15 million people.

www.airviewonline.com.au

Water

Water is often in short supply on small islands. Deforestation – which destroys the trees that intercept rainwater and allow it to filter into the ground – is particularly serious in such limited areas, while the lack of space leaves little room for reservoirs. Rising seas contaminate groundwater with salt. Population growth, development including tourism, and rising living standards all put pressure on supplies. Drought in Zanzibar has caused supplies from its springs, boreholes and wells to fall from 14 million to 4 million litres a day. Barbados, Mauritius and Seychelles also have severe water shortages because of drought.

Extinctions

Half the world's recorded extinctions have taken place on islands. Best known of all is the dodo, the 23-kilo bird that lived without predators for so long on Mauritius that it lost the ability to fly. When Portuguese sailors first landed in the 1500s, they killed them for food; later people brought monkeys, rats and pigs that ate dodo eggs, and the bird died out in 1681.

The brown tree snake, which arrived on the island of Guam on cargo ships after the Second World War, has decimated the island's bird population and could spread to other Pacific islands. And it's not just land animals that hitch illegal rides: botanists visiting Macquarie Island in the Southern Ocean – home to two threatened albatross species and already largely denuded by rabbits – discovered 981 seeds and the fruits of 90 different species stuck in their clothing and shoe fastenings. And ships discharging ballast water have introduced invasive species to new waters, including snowflake coral to Hawaii.

Bouvet Island, in the Southern Ocean, is probably the last place on Earth untouched by invasive species. Few people have ever been there, leaving its two mosses, three liverworts, 49 lichens, five mites and three springtails undisturbed.

Nick Lyon/www.films4.org/forests

Wild heart

Borneo, the world's third largest island, is one of Earth's last truly wild places.

Despite intensive felling, rainforests still cover much of the island. And it is home to up to 6 per cent of all the world's flora and fauna, including 15,000 plant, 222 mammal, 13 primate, 100 amphibian, 394 fish and 420 resident bird species. One 6.5-hectare area of forest on Borneo was found to have over 700 species of trees, while you might find 50 in a similar forest area in northern Europe and 171 in eastern North America. And as many as 1,000 insect species can live in just a single dipterocarp tree.

Many species – such as the Bornean gibbon and the bay cat – are found nowhere else. Other rare animals include the orangutan, the clouded leopard, the Bornean elephant – the smallest and rarest in the world – and the Sumatran rhino, also the world's smallest.

New species are being found on the island all the time. More than 360 were discovered in just a decade from 1994 to 2004: 260 insects, 50 plants, 30 freshwater fish, seven frogs, six lizards, five crabs, two snakes and one toad. In the last quarter century, 422 plant species from the forests have been classified and named by scientists. And many more are believed to exist undiscovered.

Yet unsustainable logging – especially for the plywood industry and to clear land – is threatening all this. Since 1996, Borneo has lost 2 million hectares of forest a year. Only half its original cover remains, and that is shrinking fast.

Humans, not just wildlife, stand to lose: 14 of the island's 20 major rivers start in the forest, supplying Borneo's freshwater ecosystems, supporting food security and providing waterways for its peoples. Scientists have also found plants that could help treat diseases such as HIV/AIDS, malaria and even cancer: a compound in a plant called *Aglaia leptantha* kills 20 kinds of human cancer cells.

But there is some reason for hope. In February 2007, the Governments of the three countries that share the island – Brunei, Indonesia and Malaysia – signed an agreement to work together to conserve and sustainably manage the 22 million hectares (twice the size of Jamaica) that make up its wildest area, the mountainous Heart of Borneo. This Heart of Borneo Declaration halted plans for a 1.8-million-hectare oil palm plantation, which would have been the world's largest and done great damage.

But this isn't the end of the story: Borneo's lowland forests, home to a good part of the island's biodiversity, are also at risk from logging and plantations. If deforestation continues at its present rate, they could all be gone by 2010. So the ultimate solution, like countless species in the Heart of Borneo, is yet to be brought to light.

Brought up by the land

Tamara Dean/Fairfaxphotos

Kuku, kuku ika, kuku wehiwehi,
Takina ko koe na, te iho o ika,
Te iho o Tangaroa –
Uara ki uta ra, uara ki tai ra.

Hold tight, hold the fish, hold tight with fearsome power,
You are led along, the essence of the fish,
The essence of Tangaroa –
Desired on the land, desired on the sea.

Maori prayer for abundant fish

AS A SCHOOLGIRL growing up in Mount Wellington, New Zealand, Keisha Castle-Hughes dreamed of becoming a glamorous Hollywood actress. But no one could have expected how suddenly and spectacularly her dream would come true. She had never even acted in a school play when, at the age of 11, she was chosen from 10,000 girls auditioning for the lead role in the independent film *Whale Rider*.

Whale Rider, released in 2002, tells the story of how Paikea, a young Maori girl born into a family of tribal leaders, convinces her grandfather to allow her to become a whale rider herself – despite being a girl – by showing him that she could communicate with and ride a whale, like the tribe's founding ancestor. The film was a surprise hit, winning fans and awards around the world. Castle-Hughes' tear-jerking performance earned her a Best Actress Oscar nomination, making her the youngest actress ever to receive the accolade.

Though for most people New Zealand and its Maori culture are a world away, *Whale Rider* managed to touch global audiences with its universal themes of family struggle, gender equality and the role of tradition in a changing world. More importantly for Castle-Hughes – whose mother is Maori and is affiliated with three tribes, Ngati Porou, Tainui and Nga Puhi – it called the world's attention to the values of a people who have lived in harmony with nature. 'Traditionally, Maori respect nature and their environment as they would an elder or family member,' Castle-Hughes tells TUNZA. 'Many Maori myths and legends preach that we, Maori people, were brought up by the land before we evolved as human beings.'

Researchers believe that the Maori were the islands' first settlers, arriving in double-hulled canoes from East Polynesian islands sometime before 1300, bringing with them taro, yam, paper mulberry and the Pacific cabbage tree. 'Maoris have a sense of kinship with other Polynesian peoples, as many of our gods, myths and legends are the same,' she says. 'We believe that all people of Polynesia originated from Hawiiki, an island that is now extinct.'

The Maori probably also imported their wisdom and attitude of respect for natural resources from those other island cultures. They offer incantations to Tangaroa (the guardian of the sea) before fishing, for example, and the first catch is returned to the water with a *karakia*, or prayer, asking the gods for an abundant catch. Fishing is restricted to certain months to allow stocks to replenish. 'Maori are very conscious of their place within the natural environment. Nature is respected for what it can provide, such as food and materials for clothing and housing,' says Castle-Hughes.

One of *Whale Rider*'s themes is the conflict between upholding traditional values and adapting to modern times. Yet modern cultures need to learn from traditional ones. Making *Whale Rider* changed Castle-Hughes' own attitude toward Maori culture, which she once took for granted but now embraces proudly. 'There has been a resurgence of interest in recent years. I think that all New Zealanders are more able to appreciate the uniqueness of Maori culture.' Did *Whale Rider* have something to do with this? 'Well, it would be nice to think so!'

Since her debut, Castle-Hughes has played the Queen of Naboo in *Star Wars: Episode III* and the Virgin Mary in *The Nativity Story*. She next appears in an Australian film – *Hey, Hey, It's Esther Blueburger* – and she's also a new mother: she gave birth to Felicity-Amore in early 2007. What Maori values does she plan to pass on to her daughter? 'Truth, integrity, family, and – like my great-grandfather says – "Only take enough for yourself"!'

Francisco Yera

Holding

My name is Yaiguili, which means 'young and sweet spirit' in the Kuna language. We are an indigenous people in Panama and Colombia, many of us living on the San Blas islands off the coast of northern Panama. Kuna Yala is a self-governing reservation that encompasses this archipelago of 365 islands, 40 of which are inhabited.

My father is Kuna, my mother from Spain, but I was born in Panama City, where my family still lives. My brothers and I grew up in an intercultural environment, but we have always had an affinity for our Kuna culture. As a child I often visited my cousins in Ukupseni – which means 'small beach'. The other kids there used to call me, without disrespect, *mergi* – 'white girl' – because I didn't look like them!

Traditional Kuna culture respects the Great Mother, Mother Earth. She protects us, and we must protect her. According to tradition, two men were sent by the gods Paba and Nana – 'father' and 'mother' – to protect her, never leaving her side when others attacked her. But little by little they forgot to take care of Mother Earth and used her inappropriately, destroying her and her children. She was sad when the men became her enemies, and her tears created tempests causing natural disasters. But Paba and Nana sent Dad Ibe – the sun – to defend the Great Mother, and despatched the two neglectful men to the underworld.

Mother Earth is life: if she dies, people will die too. We are here to be her warriors, to help her produce. Our grandmothers told us this story, but many young people don't want to listen, preferring to travel to the city for a 'better' life than our traditional agriculture and fishing can provide, forgetting their culture and roots. It's not totally their fault: racial discrimination makes young people feel bad about being Kuna, and causes them to turn their backs on environmental problems.

But our traditional resources are in decline. Corals are extremely important to Kuna as home to the fish and other animals like lobster and prawns that we need to survive. But between July and August 2005, rising water temperatures led to coral bleaching in Kuna Yala. About half lost their natural colours and turned white. September is normally the month when corals reproduce, but they are so weakened by the bleaching that they can't produce much larvae for new generations. If water temperatures remain high and corals stay white for too long, they won't recover.

The bleaching also threatens tourism, which is important to us: more than 30,000 people a year visit Kuna Yala to dive, relax and learn about our culture. Fishermen catch enormous quantities of fish, lobster, king crabs and turtles to feed them, but this is too much for the environment, and stocks are suffering.

The Kuna authorities have therefore introduced closed seasons for some marine species. Shellfish, for example, can't be caught from March to May, while the turtle season has been totally closed for about five years. But fishermen ignore the regulations because they know some lodges will still buy

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from them, even if they can't sell to their own communities.

The authorities have also started a fishing register to monitor shellfish catches and enforce good practice, like making sure no breeding female lobsters are taken. Schoolchildren are also learning how to protect marine life – especially turtles – and fishermen and divers are learning how to develop sustainable livelihoods.

Perhaps the most important thing of all is to hold on to our traditional language and culture. Intercultural bilingual education is helping children learn in Kuna, and about Kuna traditions. If they are taught to be proud of their heritage, they are more likely to stay and care for their communities, carrying on the values and knowledge that protect Mother Earth.

Yaiguili Alvarado is a member of OJEWP, an indigenous youth organization that raises awareness of the relationship between traditional culture and environmental conservation.

Calling names

Bob Cave

by Lauren Prince

Daniel Vaulot

It's called the eeriest sound of the Earth. The soulful wail of the indri, Madagascar's largest primate, rises above all others, silencing the cacophony of the forest canopy. I know. I've heard it, and it rendered me speechless too.

Even though it lives in one of Madagascar's oldest natural reserves, Analamazaotra, the indri's fate is tenuous at best. Only an estimated 120 of the primates remain. And it cannot survive in captivity.

Madagascar is sometimes called the Eighth Continent, sometimes the Red Island. Both names tell part of its story. The first pays tribute to its unique wildlife, including the indri. It is enormously rich in species, many of which are endemic – found nowhere else on Earth – including more than 1,000 types of orchid, five out of the world's six kinds of baobab tree, and at least 50 species of lemur.

Humans arrived around 1,500 years ago. They have destroyed 90 per cent of the original forest, felling the trees for timber and slash-and-burn agriculture. Hunting and over-exploitation have helped cause many extinctions, including the disappearance of 17 lemur species, the giant tortoise, pygmy hippopotamus, and elephant bird. Nearly 200 invertebrate species are threatened. There are more critically endangered primates – including the indri – on the island than anywhere else in the world.

This destruction has led to the great island's second name. As the trees that bind Madagascar's red soil to the ground are cut down, it is eroded away. The rivers and streams are literally stained red with its lifeblood.

Madagascar also used to be known as the Green Island, and there are now attempts to make this third name justifiable again. Since 1989, it has benefited from more debt-for-nature swaps than any other country: five of them have allowed it to redeem more than $8 million of its foreign debt in return for devoting an equivalent amount in local currency to conservation. WWF, the global conservation organization, has been a partner in four of these.

That is how I came to hear the indri. I spent three months with three other 20-somethings and a handful of local WWF agents, travelling to villages by 4x4, by bike and on foot to do the fieldwork needed to establish a corridor of forest 70 kilometres long and 10 kilometres wide, enabling wildlife to move between habitats. Local communities are essential to the scheme's long-term success, and WWF is helping them to decide on conservation plans and put them into action. Involving them harnesses their deep connections to nature and underscores the fact that habitat destruction endangers people as well as the loudly lamenting indri.

Lauren Prince was a WWF Global Youth Volunteer in Vondrozo, Madagascar, in early 2007.

Weather beaten

by Birkir Viðarsson

I grew up in Reyðarfjörður, a small village on Iceland's east coast, set on a deep fjord flanked with tall, gracious mountains. The ocean was a few steps from my house: I could smell the salt and hear big rocks charging down the mountainside. Our playground included the fjord, the river and the harbour. I could get lost in nature just 10 minutes from my home. We would trek into the wilderness on our own terms and explore with total freedom.

But I ventured out knowing that the weather here is special, something my parents taught me from an early age. I learned to observe how quickly and dramatically it changed. One moment it could be harsh and unforgiving with wind and sleet, the next benign. And I didn't want to miss any of it.

Our aggressive weather often takes tourists by surprise. When they arrive, they expect flawless beauty, but they find that it's cold, with the rain hitting them in the side of the face because it's so windy. They venture outdoors for one day, but then – worried they might blow into a boiling crater or off a cliff – retreat to their hotels. The truth is that in Iceland, nature might – and probably will – beat you up. Only by embracing and respecting it will visitors be able to appreciate what this country has to offer.

Iceland is a special and beautiful place. Growing up here, I took this volcanic island for granted; no borders, so few people – there are still just 300,000 of us – and so much barren wilderness.

In the past, intimacy with nature was instilled in Icelanders, but fewer and fewer people, especially among those living in the city, now seem to cherish it. The fact that our heat and electricity come from geothermal energy is often held up as environmentally friendly, but the numbers of our cars are increasing. And with the new aluminium smelter operating on the east coast, Iceland will release 50 per cent more greenhouse gases per person than the European average.

Global warming already affects us. I've seen dramatic changes. When I was a child we would sometimes wake to find we couldn't open our door because there'd be snow up to the roof: my father would dig us out. Walls of snow ploughed earlier that morning would dwarf us as we went along the road into the mountains. But now you can drive the whole winter without changing to winter tyres. Summers are longer and warmer, too.

I hope to live in Canada someday, but eventually I'll move back here. I want my children to experience the environment as I did. Even now, living in Reykjavik, I sometimes need to get out of the city. I want to be dwarfed by nature and smell the sea and acknowledge it could crush me – and know that it will still be there when I'm gone.

Birkir Viðarsson is the vocalist for the Icelandic rock band 'I Adapt' and a student at the University of Iceland.

Touring lightly

'You are welcome, as long as nobody can see that you have been here when you leave...'

That's how the islands of Svalbard – far north of the Arctic Circle between Norway and the North Pole – greet their 80,000 visitors a year. It's particularly appropriate as tourism can easily damage Svalbard's fragile Arctic environment. Half of Svalbard's visitors arrive on cruise liners, and so the islands stipulate that they must use less-polluting marine diesel instead of heavy oil.

Ecotourism – a fast growing part of the world's largest industry, which seeks to minimize impact on the environment and safeguard local interests – is particularly relevant for islands. Many are marketing their natural wonders and unspoilt beauty because tourist income is becoming essential to their economies. Indeed conservation organizations, including The Nature Conservancy, encourage eco-tourism as a way of benefiting both the environment and local communities. The latter often get much needed income from the tourists, but people only pay a visit if natural wonders are preserved.

Islands everywhere, from the Scottish Shetlands, through Greece's Ioanian islands, the Indian Ocean's Maldives and Nicobars, around Tasmania, across the Pacific to Vancouver Island, or in the Caribbean, are promoting their natural wonders and inviting ecotourists – those with the lightest footprint – to enjoy them.

The tiny Caribbean island of Dominica is just one example. Just 47 by 26 kilometres, with high mountain peaks and near pristine forests, it has an abundance of rivers and streams but few roads. Home to over 175 bird species, including two endemic species of parrot, it has obvious attractions for birdwatchers. It also markets itself as the 'whale-watching capital of the Caribbean' and offers a submerged volcano to divers.

Nihiwatu – a prize-winning resort on the Indonesian island of Sumba, which traditionally exported sandalwood – will, from April 2008, be powered by locally produced biofuel from coconuts, and recycle both water and waste. Its managing director, Claude Graves, has established a foundation to coordinate community projects designed to generate prosperity while preserving the environment.

The Ogasawara Islands – dubbed the 'Japanese Galapagos' – have no airport and can be reached only by a 25-hour boat journey from Tokyo, and then only in good weather. Yet visitors come to marvel at its flora and fauna. Measures ensure that they must be accompanied by nature guides, so that they can enjoy activities ranging from whale-watching to diving without causing any damage.

Yet is there something ironic in flying halfway across the world to be an ecotourist? Is it necessary to travel so far to find islands? Greece boasts the world's longest coastline thanks to its estimated 6,000 islands, while the Philippines are made up of 7,000 of them. And there are 30,000 squeezed in between Sweden and Finland, about the same number as are scattered across the vast Pacific Ocean. With islands dotted around every continent and so many as yet unspoiled, ecotourism may entail thinking globally, but visiting locally.

Frances Whitfield

www.flickr.com/photos/lallisig

Islands and the sun

Caroline Taylor/UNEP

Samsø Energy Academy

Islands need renewable energy more than most places. Few have their own reserves of oil, gas or coal, which are expensive to import thanks to the cost of transport. Small islands, especially in developing countries, do not have the demand to justify building large electricity-generating plants, whether run on fossil fuels or nuclear power. Renewables – distributed free by nature and exploitable on a small scale – fit the bill.

Fortunately, many islands are well blessed with them. Winds blow more steadily at sea, so islands are well placed to exploit them. The sea itself can be an important resource. Wave power, as it develops, may be particularly useful; so could ocean thermal energy conversion – which uses cold deep-sea water to evaporate warm surface water, generating steam that can turn turbines – if it becomes economically viable. And tropical islands have abundant solar power, hilly ones may have good hydropower potential, and volcanic ones can tap geothermal energy.

Much is already happening: a report on islands smaller than 500 square kilometres found that they get a quarter of their energy from renewables, and a fifth use them for more than half of their electricity. Ninety per cent of Fiji's electricity comes from hydropower. A third of households on Barbados have solar water heaters, and the island uses sugar-cane waste for biofuel and solar power to dry crops and distil water. The French island of La Désirade generates more than 70 per cent of its power from the wind, sometimes producing a surplus to send to neighbouring Guadeloupe.

On a smaller scale, solar panels are being used in Kiribati to power rural health centres and radio-telephone sites; a hybrid

Small is VULNERABLE

by Juan Hoffmaister

The storm has passed. I check the horizon and wonder when the next one will arrive – and whether we will be prepared. Living in Fiji has made me aware of how very vulnerable islanders are.

I was there for three months working with the United Nations Development Programme (UNDP) to see how people are addressing issues like deforestation, coastal management and biodiversity loss – and how these relate to the ever more frequent extreme storms that batter the islands. Deforested coastlines leave people unprotected from savage seas and weather, while warming waters threaten corals, habitat for the fish people eat.

I've watched the people of Fiji adapting to the reality of climate change. As communities realize that warmer oceans mean fewer fish – and that more storms threaten to erode coastlines, damage houses, destroy crops and contaminate water supplies – they have started finding ways to protect themselves.

Mangroves and corals, for example, provide natural protection against storm surges and are important fish nurseries. Communities are now protecting mangroves with the help of non-governmental organizations and other groups, creating nurseries and replanting in areas destroyed by storms or urbanization. And on Fiji's Viti Levu island, some business owners and many coastal communities, worried about tourist damage to local coral reefs, are working with the Locally-Managed Marine Areas (LMMA) network on a regeneration programme. Tourists are taken on 'reef walks' to admire coral heads attached to racks and placed on the reef to provide a spawning population, and are asked to sponsor corals. I visited coastal villages there, where community leaders are also supporting traditional knowledge and bringing

Samsø Energy Academy

Caribbean Energy Information System

solar-wind system powers a school in the highlands of Papua New Guinea; and coconut oil is being used to fuel cars in the Cook Islands and Vanuatu.

Of course, harnessing renewable energy also takes skill and money, and small island developing states can be short of both funds and trained people. Non-governmental organizations and governments can provide help with both.

Meanwhile Samsø, a 114-square-kilometre island in the Kattegut off Denmark's Jutland Peninsular, is well on the way to becoming the world's first energy-independent, carbon-neutral island. All the electricity consumed by its 4,300 people comes from the wind, and most of its heating comes from solar panels, hay and biomass. Its ferries and most of its cars still run on fossil fuels, but this is offset by surplus energy sold back to the mainland. In future, the island plans to run all its vehicles on rapeseed oil or hydrogen generated by wind power. Iceland only gets 0.1 per cent of its electricity from fossil fuels; the rest is produced by hydroelectric and geothermal power. Wave power is coming online in the Faroe Islands and on Islay and Orkney in Scotland. Indeed, Islay plans to use its wave power to make hydrogen; Iceland wants to do the same using hydropower.

The Shetland Islands aim soon to export wind-generated electricity to Scandinavia and Ireland through undersea cables. Orkney hopes to do the same once it has tidal power systems up and running. And Samsø's experiment has been so successful that the island has installed offshore wind turbines to produce power to sell to the mainland.

Renewables are beginning to turn the tide, allowing some islands to supply energy to continents, rather than the other way around.

conservation practices to traditional fishing grounds.

Fijians are also having to rethink basic practices, like building houses that are more storm resistant, and planting crops tolerant of erosion and extreme rainfall. And they are having to consider desalinizing seawater to cope with droughts that affect important export crops like sugar cane.

But it's not only about coping with climate change: people also want to improve their standards of living. Balancing economic and social needs with those of the environment is tricky on an island, where resources are naturally scarce. Development goes hand in hand with tourism, urbanization and changing consumption patterns. While these may have economic benefits, they put additional pressure on the islands' resources.

So Fiji's people are looking for new ideas. Ecotourism is a possibility, but there are others too, like fair-trade fishing and payment for environmental services – where governments and international donors pay villagers to protect valuable resources like watersheds, forests and biodiversity. Other countries can help by sharing appropriate technologies, such as for renewable energy and waste management.

The South Pacific's young people are facing challenges their parents never dreamt of. Each decision they make affects what will be left for future generations. Maybe their best hope is for a shift in awareness about how natural resources are consumed and managed. By working to protect resources and provide a stable future, islanders have the opportunity to show the world how a lifestyle that balances social, environmental and economic needs is not only possible but necessary.

Juan Hoffmaister, Tunza Youth Advisor for North America, 2005-2007.

tuvatu/Flickr

Rising Ranongga

The people of mountainous Ranongga, in the western Solomon Islands, suddenly found their home several metres higher and bigger after an earthquake in April 2007 lifted the entire island higher out of the sea. Close to the epicentre of the 8.0 magnitude earthquake – which caused a tsunami in the Solomons – Ranongga was pushed upwards by the lifting of the western section of the Indo-Australian plate, yet two other islands less than 10 kilometres away were unaffected. Now its shoreline extends more than 70 metres further than before, and the reef which ringed the island is high and dry on the newly formed beaches. The reef's vibrant colours, which made the island a popular diving spot, are now bleached by exposure to the sun.

Middle Earth?

She stood only a metre high, and died 18,000 years ago, aged about 30, but the discovery of a hominid skeleton on the Indonesian island of Flores is bidding to revolutionize our understanding of how humans evolved. Evidence is building up that she is from a different, miniature and previously unknown human species, which evolved in parallel with *Homo sapiens* and only died out a remarkably recent 13,000 years ago. Some scientists disagree, arguing that she is more likely to have been a 'normal' human affected by a disease; but recent research has largely settled the matter by establishing that the bones of her wrist had evolved very differently. The species has been named *Homo floresiensis* but is popularly known as the Hobbit.

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Diarmuid Hayes

Youthful heritage

Bull Island is barely 200 years old, but is celebrated as a priceless part of the world's natural heritage. An undistinguished-looking flat slab of land in Dublin Bay a kilometre wide and 5 kilometres long – largely taken up with a golf course – Bull Island is the only UNESCO biosphere reserve within the boundaries of a capital city. Formed by an accumulation of sand when two sea walls were built to improve shipping channels at the turn of the 19th century, it is unique in Ireland because three separate landscapes – mudflats, salt marsh and dunes at all stages of growth – have developed during its short existence. The island now supports a huge variety of bird life, with large concentrations of over-wintering wildfowl and waders, and raptors including kestrels, peregrines, merlins and the short-eared owl.

Warming island

New tourist destinations are one thing, but Uunartoq Qeqertoq is something else. This mountainous island, with rugged slopes plunging steeply down to the sea, was thought to be the tip of a peninsula halfway up Greenland's almost uninhabited east coast. But when a glacier that connected it to the mainland melted, it was revealed to be totally surrounded by sea, acquiring its name, which means Warming Island in Inuit. Now a Californian company is offering cruises to visit it. Named by the *Oxford Atlas of the World* as 'Place of the Year' at the end of 2007, it has become a symbol of the melting of the Greenland ice sheet, which, the US Geological Survey predicts, will reveal many more such 'new' islands.

jeffshea.com

7 island wonders

No life on 'Mars'

It may be the world's largest uninhabited island, but the really striking thing about Devon Island is not of this world at all. For its mountainous land, surrounded by the chilly waters of the Arctic between Canada and Greenland, is most important for its resemblance to Mars. Some 39 million years ago, a giant 2-kilometre-wide meteorite crashed into it, blasting a crater 23 kilometres across. This Haughton impact crater, as it is called, is thought to be the spot on Earth that is most like the Red Planet. Known as 'Mars on Earth', and well preserved by the cold, dry climate, it is used as a test site for possible future missions to our neighbouring planet. Researchers have been visiting the island to conduct surveys and collect information for the past decade.

Colin Russell

Wikimedia Commons

Survival of the flightless

Inaccessible Island, as its evocative name suggests, is one of the world's remotest inhabited islands. It rises from the South Atlantic off Tristan da Cunha with sheer cliffs that make access difficult. And this 137-metre-high extinct volcano is also the only home of the world's smallest flightless bird, the Inaccessible Island rail. While other flightless island birds, such as the dodo, have died out with the arrival of human and animal predators, the rail has survived the cattle, sheep and dogs brought to its home in the 19th century. Inaccessible's limited wildlife ranges from little to large; the wandering albatross, the bird with the largest wingspan in the world, lives there too. Indeed, the island's combination of land and sea birds led to it being designated a World Heritage site in 2004.

Sunny standard

Best known for its sunshine and beaches, the most remarkable thing about the Caribbean island of Barbados is how it looks after its 281,000 people. Year after year it scores higher than any other developing country, even those with far greater resources, in the United Nations Development Programme's official Human Development Index, which assesses national well-being, measured in health, education and standard of living. Ranked at number 31 among the world's 177 nations, Barbados even surpasses some developed or oil-rich ones, including the Czech Republic, Poland and Kuwait. Its secret: investing in human development – especially health and education, on which it spends 15 per cent of its government budget, or 6 per cent of its gross domestic product.

Stephen Ridgewell

Islands – nature's laboratories

Stuart Franklin/Magnum Photos

not just sun, sand and sea