



World CONSERVATION

THE MAGAZINE OF THE INTERNATIONAL UNION FOR CONSERVATION OF NATURE

OCTOBER 2009

Last call

Climate and nature

Beyond
Copenhagen

Climate
justice

India's
challenge

Copenhagen

Gate closing

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WORLD CONSERVATION

Volume 39, No. 2
October 2009

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Design: ätta design sàrl, Geneva, Switzerland
Printed by: abp project, Lausanne, Switzerland

Opinions

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Paper

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Your space

I disagree strongly with the comments of Jason Scorse in the April issue of *World Conservation* (page 4). It is far better for food production to be controlled directly by the producers. Free trade disconnects buying from production, interfering with the application of the principle of living within our means. In other words, the best basis for trade in a sustainable world is regional self sufficiency.

Tariffs to protect local producers are a step in the right direction although ideally they need to be part of a far more comprehensive approach.

It is interesting that 76 years ago there were influential people around who recognized the importance of the self sufficiency argument. For instance Keynes in 1933 in a paper on national self sufficiency wrote:

I sympathise, therefore, with those who would minimize, rather than maximize economic entanglement among nations. Ideas, knowledge, science, hospitality, travel—these are the things that should be of their nature international. But let goods be homespun whenever it is reasonably and conveniently possible. And above all, let finance be primarily national.

IUCN is well placed to explore the advantages of this approach and the benefits in terms of sustainable land use, matching population levels to carrying capacity, and replacing military security with environmental security.

Dr Geoff Mosley

Australian Director

Center for the Advancement of the Steady State Economy

The article 'Saving Lives, Saving Money' in the last issue is fantastic. I agree totally with the alignment being argued for. I would add that I also see the coming together of health, environment and risk reduction agendas. In a world of multiplying and rapidly-transmitted risk, we need to work to ensure we're also multiplying resilience. That's why we need to strengthen the UN and strengthen multilateralism and partnerships across all sectors. Organizations that harness the best science like IUCN and WHO have a key role to play in ensuring that we target limited resources to activities that best cushion us from climate shocks.

Alan Searl

UK Mission to the UN in Geneva

World Conservation welcomes your feedback

We'd like the magazine to stimulate debate, so please let us know what you think. Do you disagree with an article? Does it miss the point? What are you or your organization doing? Send your comments to worldconservation@iucn.org

World Conservation is available online. You can post comments on individual articles at www.iucn.org/worldconservation

The road to Copenhagen

When the world is awash with climate science, political debates on emissions targets and round-the-clock media commentary, why is IUCN producing a magazine on climate change? Because we have something critical to say and we need to say it loud and clear—Nature provides solutions.

By conserving the earth's natural infrastructure—the biological diversity and the ecosystems that keep the planet habitable—we can both mitigate climate change and adapt to its impacts. We know it works; we have experience in managing nature to our advantage and we can afford it.

With their potential to absorb and store vast amounts of carbon, the way we manage our forests, wetlands or peatlands will have a bearing on the magnitude of climate change. Conserving nature, as IUCN's President explains on page 8, offers a cost-effective 'bridging' mechanism that can help reduce emissions while the world makes the transition to a low-carbon economy. And if we make the right decisions now about how to address climate change, we can restore and even enhance biodiversity, says leading scientist Robert Watson.

On the adaptation front, natural approaches such as wetland restoration can be cheaper and offer a viable alternative to, or complement built infrastructure such as sea walls. Not only do healthy ecosystems buffer people from extreme weather events, they also provide critical services such as food, medicines and fuel that will govern our ability to cope with the changes and uncertainty ahead.

All eyes are on Copenhagen where the international community will gather for the UN Framework Convention on Climate Change (UNFCCC) 15th Conference of the Parties to try to seal a new climate deal. But as politicians labour through back-to-back negotiating sessions to try to reach consensus before December, the conservation community has a steep hill to climb. It is racing to gather the evidence needed to convince negotiators to put political weight and funding behind ecosystem conservation and management as a critical way to ensure human well-being in the face of climate change. Meanwhile, climate scientists are battling to reverse the false optimism that exists among decision makers about the time frame within which we need to act. Climate change is already having a devastating impact on people and biodiversity, the effects are occurring more quickly and on a far greater scale than expected and the political

pledges made so far fall way short of what's needed.

A touch of realism is needed however over what conservationists can achieve within the international policy arena. That's why IUCN is focusing on two key elements it wants to see in a post-2012 agreement: ecosystem-based adaptation and an environmentally sound and equitable framework for REDD—Reducing Emissions from Deforestation and forest

taking matters into their own hands with sustainable environmental management as their main weapon to tackle climate change.

This issue isn't just about the wonders of ecosystems though. It covers a broad range of subjects and opinions. A senior US climate change envoy says his country is actively working to achieve a strong international agreement; the Maldives' Foreign Affairs Minister addresses the human rights implications of



Degradation. REDD can simultaneously reduce emissions, slow global warming and provide a range of benefits for people and biodiversity. It's a win-win opportunity that the world cannot afford to pass up.

Momentum is building and there is a sense that governments are emerging from collective denial towards a gradual consensus on what needs to be done. But while government engagement and multilateral cooperation are essential to a new deal, civil society including industry, is increasingly at the forefront of climate action. Around the world, whether out of frustration over political apathy, or because their future depends on it, communities are

climate change; a Pacific island nation Environment Minister gives his candid opinion on what developing nations expect from the developed world; we read about India's development challenge; the dilemma facing conservationists over renewable energy, and much more. ■

Face the facts

Climate change is not something that will affect us in 50 years. It's already causing devastating impacts that call for more ambitious targets than are currently being discussed, says IUCN's Chief Scientist, Jeffrey A. McNeely.



The Climate Change Convention seeks to keep global warming below a dangerous level. The most widely used surrogate for warming is the carbon dioxide content of the atmosphere, which has closely shadowed global temperatures over the past several hundred thousand years. Atmospheric CO₂ amounted to about 270 parts per million by volume (ppmv) in pre-industrial times but has now exceeded 385 ppmv, and global temperature has increased by about 0.8°C. The Intergovernmental Panel on Climate Change (IPCC) calls for a 450 ppmv limit by 2050 (which would translate to a global temperature increase of 2°C), though many consider 550 ppmv to be more realistic. A recent poll found that nine out of 10 of climate scientists consider an average rise of 4–5°C by the end of this century to be likely. But the end of the century is the distant future, and the public seems more worried about urgent problems, like the economy.

But wait a minute. We should not be gazing toward 2050 or 2100. The current climate change has already led to devastating impacts around the world.

Already, temperatures in the Arctic have risen by as much as 5°C, fundamentally changing the way of life of Arctic people, threatening species such as polar bears, and posing a threat of a massive release of methane that would accelerate global climate change.

Already, patterns of rainfall are changing, leading to droughts, crop failures and shifting territories for pastoral and farming peoples, often contributing to conflict, as in Darfur.

Already, water flows in many major rivers of the world are declining, including China's Yellow River, the Ganges in India, and the Colorado in the United States. These declining flows have many causes but climate change is widely recognized as an important one. A few major rivers, such as the Brahmaputra and the Yangtze, are increasing their volume, but this is bad news because the new water comes from rapidly melting glaciers, indicating that the glacial flow upon which billions of people in Asia depend is already under threat.

Already, the oceans are becoming more acidic at the fastest rate since the dinosaurs died. Corals and shellfish have been the first to suffer. Pacific oysters in Oregon have failed to reproduce for the past five years, with ocean acidification resulting from increased CO₂ being the primary suspect.

Already, climate refugees are moving from low-lying areas, for example from parts of New Guinea and the island nation of Tuvalu. Some 500,000 people occupying Bhola Island in Bangladesh were left homeless after half of the island became permanently flooded in 2005. In total, 30 million people along the southern coast of Bangladesh have already been exposed to extreme weather, rising sea levels and river erosion.

Already, ecosystems are changing as many species are expanding their range, breeding seasons are changing, and invasive species are spreading more quickly. The migratory patterns of many species of birds were exquisitely

timed to the peak production of insect larvae, but this timing is now disrupted, enabling the insects to prosper, damaging forests and reducing the health of bird populations.

Already, many protected areas are being affected by climate change. In Joshua Tree National Park in the US, the signature species is no longer reproducing due to a combination of increased nitrogen deposition, invasive species and global warming. Recent warm winters in Yellowstone National Park has enabled mountain pine beetles to attack white bark pine forests, which then stopped producing the pine nuts that fed grizzly bears, leading to more conflicts between people and grizzlies. This in turn has led to the highest ever recorded mortality of grizzly bears in Yellowstone.

Already climate change is creating conflict in water-stressed Peru and other Andean countries, as well as in many parts of Africa. Brazil's Amazonian region is being affected by chaotic floods and droughts that are widely considered to be linked to climate change, and the drought in Australia's southeast is seen as a harbinger of things to come.

Plentiful additional examples could be quoted, but these indicate that we are already

suffering significantly from climate change. The target of 450 ppmv for 2050 spells disaster for our planet's capacity to support the societies to which we have become accustomed. Many scientists, led by James Hansen from NASA Goddard Institute for Space Studies in New York, are now calling for a maximum of 350 ppm. The 350 target also has prominent supporters among civil society, including the Dalai Lama, Archbishop Desmond Tutu, and Al Gore. This means reversing our course rather than simply slowing our slide down the slippery slope to a chaotic future.

Our planet has already reached a degree of ecological malfunctioning that the problems can no longer be simply denied, put off for a later date, or studied more intensively. We should do everything possible to convince the negotiators in Copenhagen that far more ambitious targets are required. ■



A bridge to the future

Investing in nature generates very high returns for the economy, society and the environment. It is also a low cost and effective way to stabilize greenhouse gas emissions while the world weans itself off fossil fuels, says IUCN President Ashok Khosla.

Despite growing scientific evidence that our present patterns of consumption and production are leading to massive disruption of the planet's life support systems, particularly our climate and our living resources, most nations continue to drive into the future with only the rearview mirror to guide them. International treaties have been negotiated to slow down this headlong race to self-destruction, but the foot on the accelerator pedal continues to press harder than the one on the brake; the biggest polluters are still the biggest defaulters.

Given the lag times between cause (emission of greenhouse gases) and effect (changes in atmospheric temperatures), the global climate is in for modification no matter how soon the economies of the world reduce their use of fossil fuels and cutting of forests—even down to zero. The legacy of some 150 years of profligate energy and material use will see to that. Much of this change, which will in turn lead to changes in rainfall, sea levels, frequency of natural disasters and other unpleasant

solutions currently being sought by those who have an interest in continuing the status quo.

There are several ways in which we can avoid the worst forecasts becoming reality. Most of them involve an alliance with nature. To achieve the promised post-carbon economy, innovation of technologies is certainly important but the best course is to rebuild the health of the environment. We need a 'bridge' that will deliver some quick results—one that allows ecosystems to absorb more CO₂, increases their resilience and improves the capacity of vulnerable populations to cope with climate change impacts. This bridge means investing in nature. It can lead to quick yet long-lasting results, it does not depend on technological wizardry, and it can provide the best long-term return both in terms of carbon absorption and in securing the livelihoods of millions of people. And we have thousands of years' experience in managing nature. But we need to act now. The longer we wait, the more costly it will be and the sooner the range of options will shrink.

proven over billions of years in favour of an untested, invasive and expensive technology that involves large scale geo-engineering?

But let's not forget the rest of biodiversity and its potential to absorb unwanted CO₂. We know that restored mangroves can capture some CO₂ while helping to rejuvenate fisheries. They also allow coastal ecosystems to recover more quickly from disasters such as tsunamis and storms. Grasslands and rangelands hold great potential. Mixed farming and agro-forestry can help maintain the biodiversity needed to increase the resilience of ecosystems while also storing excess carbon.

Investing in nature and protecting biodiversity is equivalent to buying an insurance policy: the microbes, animals and plants which provide us with clean water, fuel, medicine and food will need some help if they are to survive the rapid pace of change our economic systems have engendered. Biodiversity can do for the planet what a healthy immune system can do for a person: it can help us be more productive and adaptable to change but, if not properly nourished, can make us more vulnerable.

We are currently seeing what could well be the biggest wave of public investment in history in trying to 'manage' the economic crisis. Some of this investment—but not enough—makes sense from an environmental perspective such as improvements in public transport and energy-saving measures. Yet very little attention is given to the most important asset of all. Investing in nature is not a tree-hugger's pipe dream; it is an imperative. It can provide the quick gains we need to build that bridge to the future and make them permanent.

We cannot allow the debates about CO₂ targets, historic responsibility, technology or financing to hide the reality that we are quickly running out of time. Massive investments in nature—in the way we protect, manage and govern it—can't wait if we are to evolve to a decarbonized economy. It does not need rocket science, it is not a substitute for our obligation to reduce emissions, it is about turning existing knowledge into urgent action. And that is what is needed. ■

Ashok Khosla is founder and chairman of the Development Alternatives Group based in India, one of the first civil society organizations to address the issues of sustainable development.

www.devalt.org



phenomena, is widely considered to be unfavourable, if not outright harmful to the economy, to society and possibly to life on earth.

While it is imperative that our scientists, environmentalists and diplomats work day and night to rectify this state of affairs and bring about global agreements and national policies that will reduce the future causes of global change, it is also now necessary to evolve ways that go beyond the simplistic knee-jerk

Take forests, for example. Better management of the world's forests can have an immediate and significant impact on carbon sequestration. Perhaps the clearest example of what can and should be done lies with proposals like REDD (Reducing Emissions from Deforestation and forest Degradation). Properly managed, degraded forests could capture up to 20% of our current CO₂ emissions. Why would anyone wish to give up a highly successful and benign technology,

Intelligent decisions

If we make the right decisions now about how to adapt to climate change, we can restore and even enhance biodiversity, says Robert Watson.

When biodiversity is mentioned in the context of climate change, it is usually in reference to the devastating effect that our changing climate will have on the species that make up life on our planet as we know it. From the Millennium Ecosystem Assessment to the Convention on Biological Diversity's Ad-hoc Technical Expert Group on climate change and biodiversity, barely a week goes by without a new piece of research showing how a warmer environment will harm biodiversity.

Yet it's becoming increasingly clear that this isn't the whole story: That as we come to terms with the changes we need to make in order to adapt to a changing climate, the consequences for biodiversity are much less straightforward than we might have originally thought.

To begin with, the things we do to adapt to the adverse impacts of climate change could have positive as well as negative outcomes for biodiversity and ecosystem services. The balance will vary from species to species and from ecosystem to ecosystem, but will largely depend upon the precise approach taken and the way in which such strategies are implemented. In most cases though, it should be possible to reduce negative impacts and indeed increase positive impacts, minimizing trade-offs and threats to biodiversity. For example, adaptation activities can restore fragmented or damaged ecosystems and help re-establish critical processes such as water flow or pollination to maintain ecosystem functions. Far from being a hopeless case then, looking at adaptation from this perspective, it is possible to see it as an opportunity to do our best to enhance biodiversity.

Biodiversity is not just a bystander in our changing climate though—it also has a vital role to play in helping us adapt to a changing climate. For instance, coastal ecosystems can help reduce the risk of flooding from storm surges and a diverse agricultural landscape can support productivity under changing climate conditions. Rather than thinking about building sea walls or developing new crops that grow under different conditions, making use of these natural ecosystems as part of an adaptation strategy may prove to be more cost effective, and offer genuine spin-off benefits to the environment, as well as social, economic and cultural benefits to local communities. They may also be more accessible to rural or poor communities than approaches based on hard infrastructure and engineering.

It will be important however to remember that the ecosystems that we will be relying upon to help us cope with climate change in these situations are themselves already under great stress from climate change. If we are to rely on them more, we will need to think about how we can increase their capacity to adapt so that they aren't forced towards unacceptable environmental limits or even to dangerous

water) which would have costs if they were to be provided in another way. Since they're usually treated as externalities by economists, their true value is rarely reflected in decision making. Many methodologies have been developed to estimate the market and non-market value of ecosystem services more effectively though. Making use of these, in frameworks such as the ecosystem approach being



thresholds. To do this, we should be aiming to reduce any environmental stress that isn't related to climate change such as habitat loss and fragmentation, presence of invasive species or lack of pollination insects. We should also adopt conservation and sustainable use practices to help improve the resilience of ecosystems further.

Such an approach to adaptation will not be without risks or consequences—we will still need to consider the risks, long-term implications and full impacts of such an approach as fully as we would with any other adaptation plans. There will also be trade-offs. An ecosystem-based approach to adaptation would mean managing ecosystems to provide particular services over others—giving priority to ecosystems and species of particular ecological, social or economic importance.

Alongside understanding the relationships between different species, ecosystems and services, accounting for the value of biodiversity and the ecosystem it supports will be vital too if we are to cope with climate change and enhance our natural environment. Ecosystem services contribute to the economy by providing goods (such as food) that can be bought and sold, and services (such as clean

developed and implemented by the UK's Department for Environment, Food and Rural Affairs, would enable the true costs of our environment to be reflected in decisions—undoubtedly tipping the balance in favour of safeguarding and enhancing biodiversity.

The threat posed by climate change is serious and will affect our ecosystems in far-reaching and complex ways. But we have choices about the things we do to cope with these changes. If we make the right choices, not only will biodiversity sit centre stage in our decision making, but the true value of our ecosystem services will also be reflected in decisions. In many cases, if we choose the right way to cope with climate change, we will succeed in safeguarding or even enhancing the diversity of life around us. ■

Professor Robert Watson is Chief Scientific Advisor at the Department for Environment, Food and Rural Affairs (Defra) in the UK. He previously served as Chief Scientist and Senior Advisor for Sustainable Development at the World Bank and has held senior positions at NASA and the White House.

Fighting spirit

World Conservation interviewed Frederick W. Pitcher, Environment Minister for the Republic of Nauru, for a Pacific island nation perspective on climate change.

What do island nations expect from the developed world in terms of action to tackle climate change and help in adapting to the impacts?

Pacific small island developing states together form one of the least-heard voices on the global stage, yet are perhaps the most vulnerable to the impacts of climate change. It is therefore apt that we take a more proactive role in pushing the developed world to take action to address climate change.

The unity of the Pacific island nations in their demand for urgent action at the global level was reflected in the historic resolution they submitted on Climate Change and Security which was endorsed by the United Nations General Assembly in June. This went a long way towards implementing the Pacific Forum Leaders' Niue Declaration, committing its members to push for recognition in all international fora of the urgent social, economic and security threats posed by climate change in the region.

Island nations want to see ambitious carbon emission targets. We want to see carbon sequestration protocols that are sustainable and equitable and afforestation and reforestation credits through the Clean Development Mechanism that developing countries can realistically use to fund adaptation. We are also

international response to the causes and consequences of climate change. With the right approach, many of these consequences can be averted or reduced over the course of a generation. The industrial nations—with their expertise, systems and financial resources—can help to manage these disaster risks. But adapting to climatic shocks will need a new business model—one that focuses on prevention and preparedness and that strengthens our capacity to cope with future climate disasters.

If we had the collective courage, we might even agree in Copenhagen to a 95% carbon reduction by 2050, as proposed in the mock

Copenhagen Climate Treaty put forward by the Green Alliance of climate scientists and NGOs such as WWF and Greenpeace. Islands may well push for such ambitious targets, but whether the developed world will take up the challenge and assume responsibility for the health of our planet is something only time will tell and history will judge.

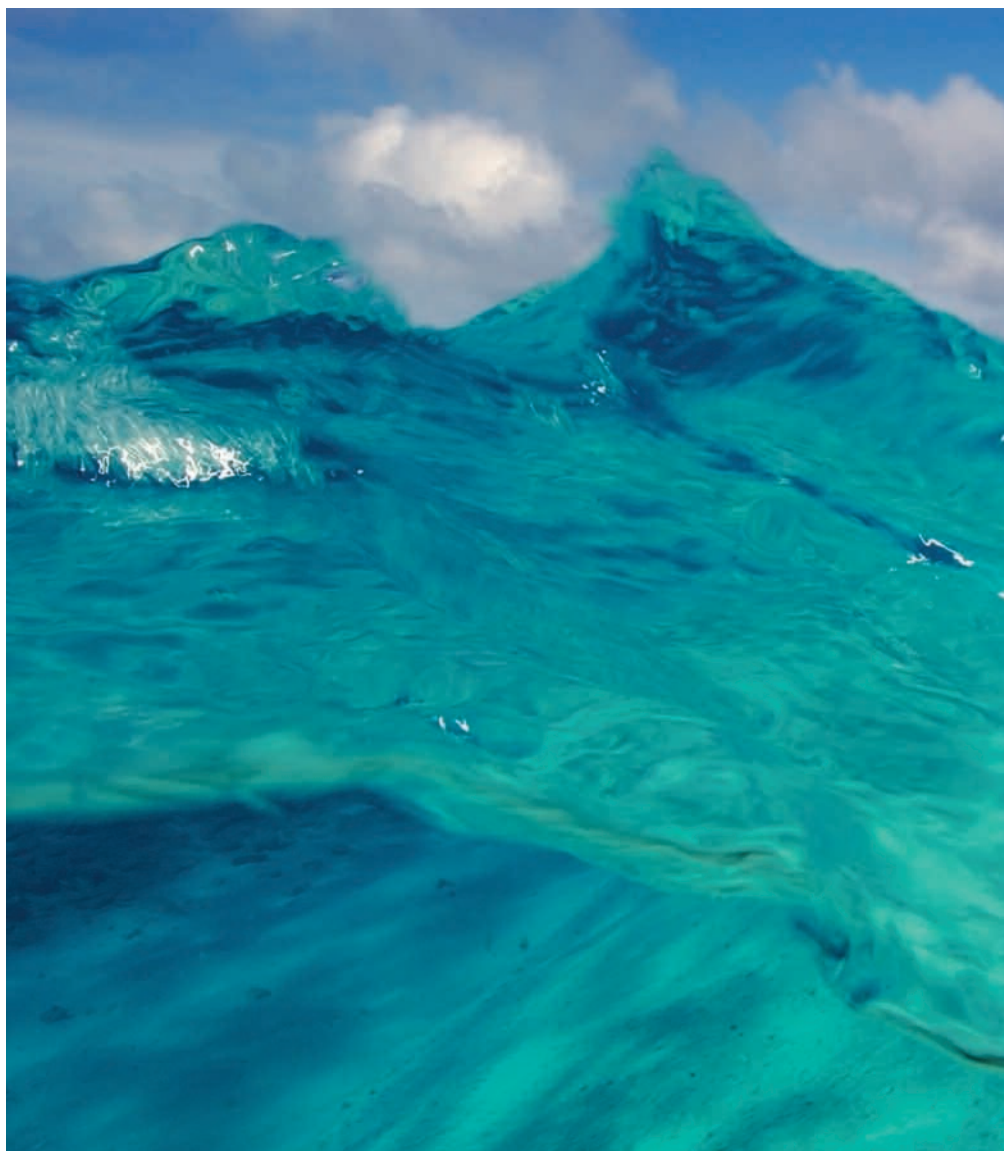
What role does ecosystem management play in increasing the resilience of Pacific islands to climate change impacts?

Nauru is a party to the Convention on Biological Diversity and participates in the important work being done on mainstreaming biodiversity into climate change adaptation

Island nations want to see ambitious carbon emission targets.

interested in recent discussions on implementing the proposed REDD (Reducing Emissions from Deforestation and forest Degradation) carbon trading scheme and expect countries that are the largest carbon emitters to take responsibility for their insatiable demand for industrial growth and the detrimental impact their emissions have on the rest of the world. They must act as responsible world citizens, compensate those who have been affected, and help those who have to adapt to the changing climate caused by their gluttony.

In Copenhagen we hope to see the adoption of a new climate framework that recognizes that all of us, developed and developing countries alike, have to work together now to fix this catastrophe of our own making. Copenhagen presents a unique opportunity for the Pacific island nations to shape the



planning. We're sharing our experience of ecosystem-based adaptation to climate change impacts. Activities include establishing ecological corridors to help species' migration, planting drought-resistant crops and restoring degraded habitats. A major part of our adaptation effort involves increasing carbon sinks through afforestation and reforestation and we have a 20-year programme to rehabilitate our mined-out phosphate lands—more than half of the island.

Nauruans have always relied on their unique ecosystems to sustain their livelihoods and preserve the country's cultural identity and socio-economic well-being. But a century of mining has devastated our unique and fragile atoll environment. We are seeking ways to protect the traditional knowledge and belief systems that we have used to sustainably manage our resources and which enabled our people to live in harmony with their environment for millennia.

On the wider Pacific front, our single most important ecosystem is the ocean we live in. The first observance of World Oceans Day earlier this year allowed us to highlight the many ways in which the vast Pacific Ocean

contributes to our societies. We face considerable challenges in maintaining its capacity to regulate the global climate, supply essential ecosystem services and provide sustainable livelihoods and safe recreation for islanders.

We hope to see the adoption of a new climate framework that recognizes that all of us, developed and developing countries alike, have to work together now to fix this catastrophe of our own making.

Pacific nations are doing their small part by managing access to biodiversity in our territorial waters (most notably fisheries) and by closing high seas pockets to reduce illegal and unmonitored harvesting. The rest of the

world needs to work together to ensure that climate change does not irreparably damage the planet's single largest source of biodiversity—the Pacific Ocean.

With the increased focus on alternative energy sources, what is being done to protect your country's biodiversity from potential adverse impacts?

The Pacific's joint efforts in the field of renewable energy to increase energy security and energy efficiency have been mobilized at the highest level through the Bi-annual Pacific Energy Ministers' Meeting. The Ministers agreed to promote the widespread use of renewable energy in the region. Nauru has committed to 50% renewable energy by 2015 and others have declared even more ambitious targets. The alternative energy sources available to islands are limited but include hydro-power, solar-power, geo-thermal power, wind-power and ocean-power (wave and ocean thermal).

We need to address the potential adverse effects on biodiversity through environmental impact assessments and ecosystem management. Hydro-power for example can disrupt river systems and the ecosystems that depend on them. We need to be extra careful given the very fragile nature of our environment. Support is provided through regional agencies and international agencies such as UNEP and UNDP.

We have recently installed a solar grid-connected system and stand-alone solar systems that supply houses and schools. A hybrid photovoltaic system has also been used for powering wireless telecommunication devices and we are undertaking a feasibility study on wind turbines. Both energy sources are non-invasive and should not directly impact our biodiversity.

A newer technology of interest to Nauru is Ocean Thermal Energy Conversion (OTEC). The World's first OTEC plant was trialled on Nauru in the early 1970s and proven to be viable. Since then a number of plants have been built in Hawaii and in India, and although it is still exorbitantly expensive, the technology is appropriate for us and should become a viable energy source in the future. In-depth impact assessments will be needed to ensure that the technology does not adversely affect the reef ecosystem. And it is important that island nations improve power supply efficiencies as part of the international effort to reduce carbon emissions. ■

Frederick W. Pitcher has served as Nauru's Minister for Commerce, Industry and Environment since 2004.



A natural solution

Ecosystem conservation should be at the forefront of global efforts to solve the climate crisis, says United States Deputy Special Envoy for Climate Change, Jonathan Pershing.

Climate change is a clear and present danger that demands urgent action. Rising concentrations of greenhouse gas pollution are already taking their toll on biodiversity, natural ecosystems and the people that depend on them. In 2007, the Intergovernmental Panel on Climate Change catalogued significant physical and biological changes consistent with warming on all seven continents and in marine, freshwater and terrestrial environments. Our most vulnerable

pathway to a clean energy economy. The administration has called for drastic reductions in US carbon emissions—80% below 1990 levels by 2050—and the US Congress is making important progress on comprehensive legislation that sparks a clean energy transformation in our economy and makes possible the creation of new jobs. The US is also taking other steps that will yield the double dividend of growing our economy while protecting our environment. These include strong

US case, such efforts will lead to robust new growth in clean and sustainable economies while reducing the risks of devastating climate change.

One necessary component of any global solution to climate change is a comprehensive plan to reduce deforestation which accounts for approximately 20% of global emissions. The United States underscores its commitment to forest conservation and sustainable management through initiatives such as the Congo Basin Forest Partnership, through which US investments of more than US\$ 100 million since 2002 have helped to train thousands of conservation managers, create an unprecedented State of the Forest report that brings the best of science and research in the region to light and put nearly 48 million hectares of tropical forest—an area the size of California—under improved management planning.

An international climate solution must also galvanize support for helping vulnerable countries prepare for and adapt to the impacts of climate change. Unfortunately, in many cases the countries that have contributed the least to climate change are often the ones most adversely affected by it. Addressing the adaptation challenge requires enhancing not only the resilience of communities but also of the ecosystems and ecosystem services upon which those communities depend. From a conservation perspective, adaptation will include integrated biodiversity inventories, ecosystem vulnerability assessments, and proactive measures that increase the resilience of ecosystems through informed and sustainable management practices.

Climate change is one of the greatest challenges to conservation today. We must keep the protection of our vital natural ecosystems at the forefront as we work to reduce emissions, strive to adapt and come together as a planet to address this daunting but ultimately solvable problem. ■



environments—including drylands, coastal regions, mountain ecosystems and coral reefs—already show significant climate change impacts. These changes will only become more severe in the coming decades unless international action is taken to solve the climate crisis.

An effective response to climate change is a prerequisite for successful protection of many ecosystems, the species that depend on them, and the services they provide for human sustainability. In order to be effective, this response must be global and immediate. It must include ambitious efforts to reduce greenhouse gas emissions as well as strategies to improve ecosystem resilience to ongoing changes in climate.

The United States, under the leadership of President Obama, is taking robust action to combat climate change and to chart a

improvements in fuel efficiency for cars and trucks and a commitment of over US\$ 80 billion in the economic recovery package for clean energy investments, loan guarantees and tax credits.

The climate crisis is a global problem and it demands a truly global solution. The United States is working actively to achieve a strong international agreement under the UN Framework Convention on Climate Change. To advance these negotiations, the US is engaging partners at the highest levels of government through the Major Economies Forum on Energy and Climate. Success, however, will require all countries, developed and developing, large and small, to participate. A concerted effort will be needed to reduce global emissions by 50% or more by 2050, and much further over the rest of the century. As in the

Climate justice

Minister of Foreign Affairs for the Maldives, H.E. Dr Ahmed Shaheed believes it is time for the world to address the human rights implications of climate change.

It is now well established that climate change has deep negative implications for the full enjoyment of human rights. From new health risks to mass migration, from threatened food and water supplies to the disappearance of livelihoods and cultures, global warming undermines a broad suite of internationally-protected human rights.

Taking its lead from the 2005 Inuit Case against the US and the 2007 Male' Small Island States Declaration, the United Nations Human Rights Council recently adopted two Resolutions which state that global warming "poses an immediate and far-reaching threat to people and communities around the world and has implications for the full enjoyment of human rights."

The formal recognition of the relationship between human rights and climate change is extremely important for both areas of policy.

For climate change policy, it demonstrates that climate change has real and measurable human impacts and helps place these in a framework of responsibility, accountability and justice. In particular, a human rights approach helps to highlight the deep injustice of a situation whereby the poor, vulnerable and

powerless in some parts of the world pay unacceptable costs for the pursuit of wealth in more privileged parts.

For human rights policy, the implications of linking the enjoyment of fundamental freedoms with climate change harm are perhaps even more profound.

As many developed countries have argued, it is almost impossible to claim that climate change violates the human rights of people in vulnerable countries. This is because it is legally extremely difficult to connect specific harm in one country (e.g. someone's house falling into the sea in the Maldives) with a specific act in another part of the world (e.g. the decision of an American factory to increase output and thereby emissions).

Such legal subtleties are unacceptable to the Inuit of North America, or the people of the Maldives, the Marshall Islands, Tuvalu and Vanuatu who risk losing their entire homeland and with it their entire culture. Can we tell them that their human rights have not been violated because it is difficult to apportion responsibility? If we have to, it is surely because the law is wrong and not our instincts of equity and justice.

It is perhaps through highlighting the inadequacy of existing international human rights law in the context of the modern, globalized world that the greatest long-term significance of linking human rights and climate change will be found. So how should the world respond to this inadequacy?

First, by confirming that climate change has significant implications for human rights, the Human Rights Council has indirectly drawn attention to a major gap in the international human rights conventions—the lack of an explicit right to a safe and secure environment. Climate change itself does not directly affect human rights. Rather, global warming causes environmental change which in turn affects human rights. Thus, to properly protect human rights—all of which depend on a safe and secure environment—the international community should consider the merits of declaring 'environmental rights' at the international level.

Such a move would have major implications for government policy and accountability and for this reason the idea is controversial. But perhaps climate change, one of the ultimate environmental manifestations of globalization, calls for a renewed focus on the gap between international human rights policy and international environmental policy.

However, the universal declaration of a right to an environment of a certain quality, although helpful in dealing with climate change, would not be enough in itself. It could help individuals hold their governments accountable for environmental degradation but is unlikely to be much help in, say, the case of the Maldives, where responsibility lies beyond the State's borders. For someone in the Maldives to prove that his or her rights have been violated as a result of climate change and to hold those responsible accountable would require a wholesale reconfiguration of international human rights law as it is now understood—essentially, a contract between a State and its citizens. As the International Council on Human Rights Policy has noted, "more than most other issues, climate change throws into relief the inadequacies of the international justice system, given the scale and intimacy of global interdependence that drives the problem and must also drive its solutions."

The Maldives, like all other vulnerable countries, hopes that talk of judicial frameworks, accountability and redress, and human rights violations will become unnecessary as of December when world leaders meet to agree a new post-Kyoto global climate change accord. We hope that the agreement they reach will halt dangerous anthropogenic climate change in its tracks and by doing so, deliver climate justice to the world's poor and vulnerable. However, such an outcome seems unlikely. It is therefore important for those of us who care about the environment and about social justice to consider new approaches such as the ones previously suggested. These approaches may not succeed on their own, but if they generate greater urgency, empower the vulnerable or voiceless and create a sense of accountability among decision makers then they are certainly worth pursuing. ■



The climate change supermarket

If you were given US\$ 100 billion to tackle climate change, what would you spend it on? We asked leading figures from around the world to outline their priorities and show us their shopping list.

Michael Mack is Chief Executive Officer of Syngenta, a world-leading agri-business committed to bringing plant potential to life through innovative research and technology.

With US\$ 100 billion dedicated to addressing climate change, I would invest in maximizing the potential of plants to capture the sun's energy, as well as in mitigating climate impacts on food security. I would invest US\$ 40 billion in the research of new plant varieties that can capture renewable energy from the sun more effectively and use nitrogen more efficiently. In order to protect the biodiversity necessary to breed these new crop varieties I would invest US\$ 20 billion in biodiversity conservation and supporting seed banks. US\$ 20 billion should be invested in helping more farmers employ better farming practices, entailing technology to maximize the yield and quality of every crop planted even with the increase in droughts and floods and irregular temperatures. And finally, I would invest the remaining US\$ 20 billion in regenerating degraded soils and improving land use to support greater carbon storage in soils and vegetation. This brings once-fertile land back into sustainable agriculture production and prevents encroachment onto natural habitats, mitigating carbon emissions from deforestation. ➔



Research into new plant varieties	US\$ 40 000,000,000
Biodiversity conservation and seed banks	US\$ 20 000,000,000
Promote sustainable farming practices	US\$ 20 000,000,000
Soil regeneration and land use improvements	US\$ 20 000,000,000
Total: US\$ 100,000,000,000	
Thank you for your visit	

Nitin Desai is Special Adviser to the UN Secretary General on Internet governance and former UN Under Secretary General for Economic and Social Affairs. He has also worked at senior levels in the Government of India.


The most immediate challenge in coping with climate change risks is to reduce the uncertainty about projections and impacts. We need much more information from parts of the world other than Europe and North America. Adaptation is also an immediate challenge as some changes are now evident. Agriculture, human settlements in coastal zones and water availability are the key areas here. In the longer term we need a new industrial revolution based on low carbon technologies and that requires public support for private inventiveness. Finally we need to assess the risks of catastrophic changes which are not well understood at present. ➔



Strengthen ecosystem observation: land and sea	US\$ 10 000,000,000
Capacity building: adaptation in agriculture, food security	US\$ 10 000,000,000
Adaptation of human habitats	US\$ 20 000,000,000
Low carbon technologies	US\$ 50 000,000,000
Basic research, focus on catastrophic risks	US\$ 10 000,000,000
Total: US\$ 100,000,000,000	
Thank you for your visit	

Joe Zammit is a former physician and founder of an international company that became the market leader in its field. He is now a conceptual artist who currently works in a photographic medium to explore environmental and conservation issues.

US\$ 100 billion is not a lot of money (the US alone is spending more than US\$ 800 billion on its current economic stimulus programme). You therefore have to spend it on things that have a multiplier effect, i.e. every dollar you spend must generate further investment dollars. Of the available options, high quality communications to the general public is the most important. If we can get the public firmly on our side, then through their purchasing habits and their voting patterns they will drive many, many billions of dollars of further investment by industry and through government programmes. But communication must be sophisticated and effective. No more gloom and doom preaching or turgid scientific data. Get people engaged. ➔



World-class communications (conservation organizations)	US\$ 10 000,000,000
Global social status campaign on 'living green'	US\$ 80 000,000,000
Develop 'green rating' for consumer products	US\$ 5 000,000,000
Campaign in China, India, US on nuclear power advantages	US\$ 5 000,000,000
Total: US\$ 100,000,000,000	
Thank you for your visit	

Yolanda Kakabadse is former Minister of Environment for Ecuador. She has served as IUCN President and is President Elect of WWF International.

I would spend it on three major objectives: protected areas, especially in the South where many of them are protected in name only. This should include conserving forests, both within protected areas and outside. Then, on reforestation—it is never too late to restore degraded areas and provide the people who live in and around forests with a viable economic alternative to timber. And then on renewable energy technologies—research and development. We need to ensure that it is transferred to all countries and regions that need it. It is unacceptable that countries like Ecuador which lie on the Equator are not using solar as a major energy source.

Paula DiPerna is Executive Vice President of the Chicago Climate Exchange (CCX) and President, CCX International. Ms DiPerna formerly served as President of the Joyce Foundation, a public policy philanthropy based in Chicago.

My answer is simple and 3 "W"s: work; women; water. One of the reasons why we're not making greater progress is that there is too much advocacy and too little effort on engineering and financial solutions. To me, tackling climate change is mainly an infrastructure challenge. And women, who are especially good at synthesizing complicated challenges, are under-represented in key fields such as engineering, finance and policy making. We need to change this and make sure they play their full role in creating the solutions. I would also place great emphasis on creating new work and job opportunities in an economy dedicated to reducing emissions and energy waste, as well as a complete overhaul of water systems to also reduce waste and establish more equitable and healthy water distribution. ➔

Attract more women to engineering, environmental finance	US\$ 20 000,000,000
Create green employment	US\$ 60 000,000,000
Rebuild water infrastructure	US\$ 20 000,000,000
Total:	US\$ 100,000,000,000
Thank you for your visit	

Professor **Alexander Likhotal** served as adviser to USSR President Mikhail Gorbachev for many years and is currently President and Chief Executive Officer of Green Cross International.

I believe the most pressing priority is to integrate the Development and Climate Change agendas. The fact that our worst fears over climate change are being realized means that our development path has to be put on a sustainable basis on a more urgent note. One way we can also help to reduce poverty is by creating jobs in the renewable energy sector. Green jobs can play a significant role in advancing the economies of developing countries and solar energy use offers immediate large potential to reduce our carbon footprint globally. We must also merge development finance with finance for addressing climate change to reflect a unified sustainable development approach. And the rich countries need to channel significant resources to the developing world to make mitigation and adaptation efforts in developing regions meaningful. ➔

Solar fund, promote technology transfer	US\$ 75 000,000,000
Climate mitigation efforts	US\$ 10 000,000,000
Climate adaptation measures	US\$ 15 000,000,000
Total:	US\$ 100,000,000,000
Thank you for your visit	

Hui Ng and Dan Foa are co-founders of 51give.com – Microfinance for our Future. 51Give is a social venture organization based in Beijing that allows people to lend money via the Internet with a focus on sustainable development.

A little can go a long way in millions of small steps: Create the framework for market forces to thrive in technology investment, consumer adoption and policies for environmental protection. Reduce footprints through micro-carbon solutions in rural and urban areas. Directing money towards social enterprises with People, Planet and Profit as their charter ensures economic prosperity, increased literacy and lower carbon lifestyles. Interconnected, these activities deliver the blueprint for a sustainable world. Engaging developing nations reduces population growth and gives enhanced job prospects. We must share the opportunities and profits to ensure human existence on earth. ➔

Maurice Strong was Secretary General of both the 1972 United Nations Conference on the Human Environment which launched the world environmental movement and the 1992 Earth Summit in Rio de Janeiro, and first Executive Director of the UN Environment Programme.

We need to think in the trillions, I would regard US\$ 100 billion as petty cash. Climate change is the greatest risk to security that we have had to face and we should treat it that way. We are the wealthiest that civilization has ever been and we can afford it. But it's not just a matter of writing cheques; it's a question of priorities. What's needed is a redeployment of resources, not only financial but also talent and research and development, in sustaining our life supports systems. Do we really need to spend so many billions on the military? We should also remove the subsidies spent on fossil fuels and reallocate them to practices that are environmentally sound. In Copenhagen we need a proper deal, not just a papering over of the cracks, a deal that penalises environmental damage and rewards sound practice.

TECHNOLOGY AND FINANCE	
Smart grid solutions in 100 cities	US\$ 10 000,000,000
Support green business management	US\$ 5 000,000,000
Wind, solar, geothermal, non-Uranium based nuclear energy	US\$ 20 000,000,000
Enhanced building materials	US\$ 5 000,000,000
Efficient batteries for automotive industry	US\$ 10 000,000,000
Water waste technologies	US\$ 5 000,000,000
Loans to small businesses, farmers for clean energy	US\$ 10 000,000,000
Research on crops that need limited fresh water	US\$ 10 000,000,000
CONSUMER ADOPTION	US\$ 10 000,000,000
'Green ratings' for products and services	US\$ 1 000,000,000
Invest in firms delivering low carbon products, services	US\$ 9 000,000,000
Create socially responsible companies	US\$ 5 000,000,000
POLICY	US\$ 5 000,000,000
Simplified clean development mechanisms for microcarbon	US\$ 5 000,000,000
Special manufacturing economic zones in China	US\$ 5 000,000,000
Total:	US\$ 100,000,000,000
Thank you for your visit	

Closing the gaps

Funding for adaptation must be urgently stepped up to allow the most vulnerable communities to cope with climate change, says Johan Schaar.



“We no longer trust the weather. Rains start too early and then stop. We used to plant when migratory birds returned. Now we don't know.”

Villagers in Bougoula in Mali tell their stories to members of the Commission on Climate Change and Development (CCCCD). When we look around, we realize that they are mostly women, children and old people. Fifty members of an extended family live in the village, but another 60, mostly men, are away working in Bamako, in neighbouring countries or may even have tried the perilous journey across the Mediterranean. The livelihoods of Bougoula citizens extend far beyond the village borders.

Climate change is happening. Its impacts are apparent as melting glaciers and shrinking ice caps but also as stories told by people around the globe. They are already adapting to a changing environment—there is no other way.

The international CCCCD was launched by the Swedish Government in 2007. Chaired by the Swedish Minister for International Development Cooperation, the Commission's 12 members have studied the needs of adaptation in developing countries through visits to Mali, Cambodia and Bolivia. It has met with villagers, governments and civil society organizations to analyze the needs of new policy action that will help Bougoula and other villages manage the consequences of changing weather and climate.

But during the 18 months of the Commission's work, the world around Bougoula and other villages has changed dramatically. An increase in global food prices and a world recession have undermined the budgets of poor households, leaving no margins with which to feed their children properly and keep them in school. Some of the migrants from Bougoula have probably returned; the money they have sent back home has certainly declined.

Launched at the UN in New York in May, the Commission's report 'Closing the Gaps' outlines recommendations to strengthen the resilience of vulnerable countries and communities. Four particular gaps were identified that must be closed in order for the right action to take place.

The *trust gap*, plaguing climate negotiations and proving an obstacle to any agreement, is caused by industrialized countries' continued increase in greenhouse gas emissions, unmet development assistance commitments and failed trade negotiations. The same countries are calling for efficient and transparent management of any new funds mobilized for climate action.

The attention to global climate models and scenarios and to emissions reductions has led to a *focus gap* vis-à-vis communities like those in Bougoula. We must turn climate change upside-down, from the atmosphere to the people. We must understand their capacity to manage risks and shocks, how to increase this capacity by creating access to assets, including ecosystem services, to health and

education, and to the formal and informal institutions that manage impacts and allocate resources. To build the adaptive capacity of the most vulnerable requires scaled-up investments in human development and policies that enhance options for more diversified livelihoods. Here lie new opportunities for green growth and to build resilience to all crises that threaten the poor.

But there is also an *institutional gap*—between and within institutions. In order to channel resources and build the capacity of

We don't know the price tag of adaptation, only that it will be huge. Ways must be found to effectively mobilize, allocate and manage new financial resources

communities like those in Bougoula on the frontline of climate change, there must be effective links between institutions—from local to national governments and to global institutions. Since climate change has impacts across sectors, institutions at all levels must also be able to interact effectively. There are no sectors at the level of families and households. Institutions must work together to empower them to deal with risks and shocks.

But we also face a *financial gap*. We don't know the price tag of adaptation, only that it will be huge. Ways must be found to effectively mobilize, allocate and manage new financial resources. Those threatened by climate change must be given a seat at the table when decisions are taken. Many vulnerable countries have already started to develop strategies but the resources available for their implementation are only a fraction of what is needed. Arrangements for climate financing are for the long term and must include a blend of private and public funds. And resources must not stay at the national level—they must reach the local council and women's cooperative in villages such as Bougoula.

We have come a long way since the first warnings of dangerous climate change were issued. Our failure to reduce emissions has made adaptation inevitable and urgent. The issue is now a top priority for many governments and the Commission has proposed measures to close the gaps needed for effective action. Success, however, can only be determined by the villagers of Bougoula. ■

Dr Johan Schaar, an IUCN Councillor, is Director of the Commission on Climate Change and Development which is made up of renowned individuals. It is chaired by the Swedish Minister for International Development Cooperation.

www.ccdcommission.org

REDD-y?

A look at what's involved in the emerging approach of Reducing Emissions from Deforestation and forest Degradation.

It may not be the easiest of acronyms to grapple with but REDD—Reducing Emissions from Deforestation and forest Degradation in developing countries—is on the lips of a growing number of environmentalists and policy makers in this critical year of climate change negotiations.

Deforestation and forest degradation contribute up to 17% of human-induced greenhouse gas (GHG) emissions, more than the entire transport sector. According to a UK Government review, without tackling forest loss, it is highly unlikely that we can stabilize GHG concentrations in the atmosphere at a level that avoids the worst effects of climate change. REDD, a relatively new but rapidly-emerging approach that can help achieve the urgently-needed emissions cuts, is gaining increasing attention in the international community.

With climate change impacts more serious than previously thought, there is growing recognition that REDD could offer a 'bridging strategy,' reducing short-term emissions and buying time while the world adapts to a low carbon path. To maximize the effectiveness of this approach, REDD needs to be broadened to include the restoration of degraded forests and enhancement of carbon stocks, alongside conservation and sustainable forest management. This is known as 'REDD-plus' and offers multiple environmental and social benefits including additional carbon storage, biodiversity conservation and adaptation advantages in the form of restored ecosystem services such as watershed protection.

Negotiations are currently taking place on what REDD will look like, how it will be translated on the ground and how it will be incorporated into the post-2012 UN climate change regime. Offering financial incentives to developing countries to reduce deforestation and avoid forest degradation is an innovative and potentially cost-effective way to tackle climate change. It also has clear links to biodiversity conservation and other areas of environmental protection. But there are serious concerns that need to be addressed. Much of them relate to countries' ability to address the complex issues involved in avoiding deforestation and forest degradation. These include the danger of pressures being transferred from one forest to another area and how to measure the amount of carbon conserved in forests and stored through restoration. One of the main challenges is how to incorporate the advances made by the United Nations





Forum on Forests on sustainable forest management into the agreements of the UNFCCC for REDD-plus, particularly considering the difficulty in finding areas of common interest and agreement among the international conventions.

“Tropical forests contain an estimated two-thirds of all terrestrial species. Measures to reduce deforestation and forest degradation are at the heart of the Convention on Biological Diversity (CBD) programmes of work on forest biodiversity and on protected areas,” says Executive Secretary of the CBD, Ahmed Djoghla. “We are pleased to join forces with the UNFCCC to simultaneously address a leading cause of biodiversity loss, and a major source of greenhouse gas emissions. Countries have excellent tools at their disposal: sustainable forest management, conservation and forest restoration all offer multiple benefits for biodiversity and for indigenous peoples and local communities, if applied correctly.”

A key area of debate is how REDD will impact the welfare of the poor. Some mechanisms exist for distributing the benefits among different stakeholders that forest products (timber and non-timber) generate. However, there are fewer mechanisms for distributing the benefits of the services that forests generate, including carbon storage. Many forest nations do not have the necessary legal and institutional arrangements to distribute carbon payments or to ensure fairness and efficiency in such a distribution. Issues such as who has rights over a forest’s carbon stock reflect the level of complexity of REDD negotiations. The capacity that countries need to build depends very much on the finance mechanism that will be agreed under the UNFCCC for the new climate regime (which might include REDD).

With many uncertainties surrounding REDD, there is a clear need for broader, multi-stakeholder consultation and participation to support national decisions—REDD is not something that a government institution can decide on alone. The different players must

be involved, not only in the current ‘REDD readiness’ phase, but also when defining policies and measures for implementation.

“Ghana is in the process of defining what REDD means for the country. Based on that we will have to evaluate the opportunities. Getting ready for REDD is a process that is helping us to review and strengthen our forest governance reforms,” says Robert Bamfo, Head of the Climate Change Unit of Ghana’s Forestry Commission.

If REDD builds on the lessons learned in sustainable forest management over the past 30 years, it will not only help to reduce carbon emissions, but also enhance biodiversity conservation and the well-being of forest-dependent communities. The challenge is to make REDD a viable option by 2012. The negotiations and the debate are gaining momentum. The next few months will be critical in building consensus among all the stakeholders that REDD is a viable and desirable tool in reaching our closely-linked goals of tackling climate change, protecting the environment and reducing poverty. ■

With its extensive network of experts in forest governance and policy reform, its experience in facilitating multi-stakeholder platforms and its direct links to key decision makers in tropical forest countries and at the international level, IUCN is central to the discussions on REDD. It aims to ensure that REDD is integrated into a broader strategy for climate change mitigation and developing actions that: foster forest governance reforms in tropical countries; involve the various stakeholders in consultations for the readiness processes at the national level; and promote adequate measures for the fair and transparent distribution of REDD benefits. IUCN is focusing on the design of a ‘pro-poor’ REDD approach.

A preemptive strike

How can we identify and help those species that are most susceptible to climate change?

Many of us have seen heart-wrenching images of starving polar bears clinging to rapidly-melting ice sheets but how many of us realize that this iconic species is just one of thousands of animals and plants for which climate change could sound the death knell?

With climate change set to become one of the major drivers of species extinctions this century, we need a way to predict which ones will be hardest hit so that we can take preemptive conservation action. But obtaining the information quickly enough is challenging, persuading policy makers to act on it is another matter.

"Climate change is affecting species right now," says Wendy Foden of IUCN's Species Programme. "And conservation decision makers and practitioners currently have few tools and little technical guidance on how to incorporate the impacts of climate change into their plans and actions. We urgently need to work out what makes a particular animal or plant susceptible to climate change and make that information widely available."

Scientists from the IUCN network have come up with a set of biological traits such as life history, ecological requirements and genetic make-up that can make species vulnerable to climate change. Plants and animals in trouble include those which have highly specific habitat or food requirements, or are slow movers. Assessments of species using these criteria could then be used, for example, to set priorities for designing appropriate protected areas. Creating connected networks of protected areas using conservation corridors is critical to help species adapt and move in response to changing climate.

One bird at great risk is the Black-breasted Puffleg (*Eriocnemis nigrivestis*) restricted to a very small range in north-west Ecuador and already listed as Critically Endangered on the IUCN Red List of Threatened Species. It has been declared 'climate-change susceptible' based on its biological traits. These include its habitat specialization, restriction to a climate change susceptible habitat, a narrow and high altitude range and an extremely small population size. All this is compounded by ongoing population declines because of deforestation.

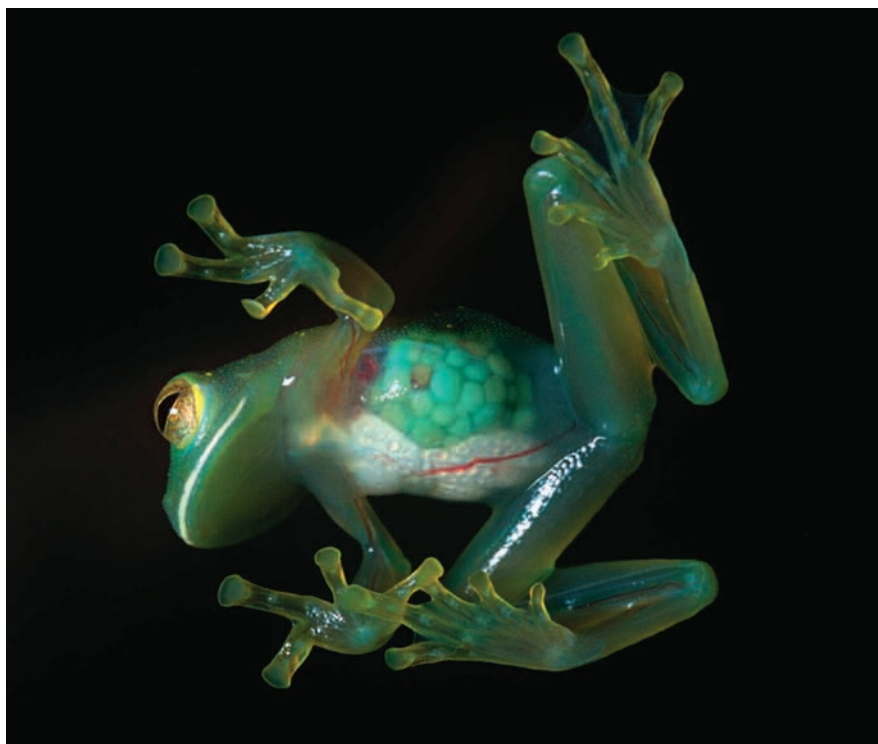
The Rancho Grande Glass Frog (*Cochranella antisthenesi*) lives in a small forested area of Venezuela. It has been classified as Vulnerable due to habitat loss but is also likely to be susceptible to climate change

impacts because of the likelihood of infection by chytrid fungus which is affecting many amphibians. Any future dispersal by the frog to suitable areas is blocked by human activity. In southern Africa, climate change is causing population declines of the Quiver Tree *Aloe dichotoma*, a long-lived species found in the Namib Desert. Mounting evidence suggests that desert ecosystems may be more sensitive to climate change than previously suspected.

It is of course impossible to assess all known species for their susceptibility to climate change, so IUCN and its partners are looking at some of the better known groups: birds, amphibians and corals. This will give an

All of this information will feed into the IUCN Red List which has evolved into the world's most authoritative inventory of the global status of plants and animals. The Red List provides experts' assessments of species' extinction risk, classified in various categories of threat severity. It also serves as a vast compendium of information on why species are threatened, their ecological requirements, where they live and conservation actions that can be used to prevent their extinction.

Next steps include working with TRAFIC, the wildlife trade monitoring network, and IUCN's Specialist Group network to use the new Species Climate Change Vulnerability



indication of what climate change is doing to biodiversity in general. Preliminary results suggest that as many as 35%, 52% and 71% of these groups respectively have traits that make them particularly vulnerable to climate change impacts. Ongoing work by the IUCN group includes identifying which of these species are likely to be exposed to large climatic changes. The species most at risk of extinction from climate change are susceptible species occurring in areas of large climatic change and where they are already under pressure from other threats.

Assessment tool to examine the vulnerability of species used by people in Africa's Albertine Rift region and of medicinal plants in the Eastern Himalayas. This will help guide climate change adaptation strategies both for biodiversity and human development in these regions. ■

www.iucnredlist.org

www.iucn.org/species

Two for the price of one

The two 'competing' climate objectives of mitigation and adaptation can be reached simultaneously, and focusing on water resources will help. Mark Smith explains.

There has been a divide between those striving to reduce carbon emissions and those working to adapt to the impacts of climate change—each camp sees the other as a rival for funds and attention. But it doesn't have to be this way. Why do we need to argue about whether to prioritize mitigation or adaptation when we can do both at the same time and at a lower cost than many believe? The answer lies in that most precious of commodities—water.

Given the level of uncertainty and confusion that exists in the climate arena, how can the environmental community best help governments plan their response to climate change? We can show them that the climate-related events they all fear—from hurricanes to floods, drought to sea level rise—all have water in common. Water links the climate system with our human ecosystem and should be central to the debate over how to most effectively tackle the climate crisis.

Because the climate impacts on water are so widespread, much climate change adaptation translates into water adaptation. By 2025 almost half of the global population is projected to live in water-stressed areas. But taking the right steps now to implement effective water governance that maintains well-functioning watersheds can increase the resilience of both communities and economies. Healthy wetlands and watersheds can also store

significant amounts of carbon and are therefore an important ally in climate change mitigation.

Securing water supplies needs a two-pronged approach: increasing supply and decreasing demand. The most effective

Water links the climate system with our human ecosystem and should be central to the debate over how to most effectively tackle the climate crisis.

approaches work to maximize nature's infrastructure such as wetlands, floodplains and mangroves and use economic incentives to reduce domestic, industrial and agricultural consumption and waste.

Wealthier nations can try to buy their way out of water problems. But energy intensive desalination plants and costly pipelines to re-distribute fresh water from one side of a country to another are not the answer. The solutions must lie within the communities who live with water shortages on a daily basis. Their lives and livelihoods depend on how they manage their dwindling resources. Those most burdened by climate change must have clearly

defined rights and strong incentives to decide how they can most responsibly use water. But they need help in the form of fair and effective government and policies that link global lessons with local needs. Coordinated decision making demands multi-level communication and a platform for negotiation.

One such platform already exists that can provide a model for water resource managers. The UN Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation (REDD) helps local authorities in the developing world secure their own renewable natural resources (boosting local adaptation) while reducing emissions (for global mitigation). Could a similarly strategic and cost-effective investment not work for water?

The time has come to integrate the adaptation and mitigation agendas. A coordinated focus on water will reduce people's vulnerability and strengthen national resilience in the uncertain times we face. Integration is starting to happen. It began in Istanbul earlier this year at the Fifth World Water Forum and should be cemented in Copenhagen in December. ■

Dr Mark Smith is Head of IUCN's Water Programme.

www.iucn.org/water



Ocean swell

Why is marine conservation being sidelined in the international climate debate when the oceans can play a significant role in tackling climate change? *World Conservation* investigates.

Despite their enormous importance for regulating the climate and their sensitivity to the impacts of climate change, the oceans receive scant attention in climate change policy. While evidence mounts about the scale and seriousness of the impacts, marine conservationists are striving to ensure that science-based recommendations are given a voice in the international climate change arena.

The oceans are a major carbon sink, taking up significant amounts of anthropogenic CO₂ and by storing it for hundreds of years, act as a buffer to more severe climate change. But this ongoing absorption drastically changes the oceans' chemistry and makes them more acidic. Ocean acidification has adverse effects for calcifying organisms such as coral reefs and is threatening entire ecosystems as well as the people who depend on them.

Other climate change impacts on the marine environment include increasing seawater temperature that triggers sea level rise and more intense extreme weather events, coral bleaching and species migration. Melting sea ice could open up new shipping routes which may increase the spread of invasive species and make new areas accessible to natural resource extraction. Climate change is adding additional pressure to the existing stresses on the marine environment such as overfishing, unsustainable coastal development and pollution.

So the pressure is on to boost the ability of marine ecosystems such as coral reefs, mangroves and seagrass beds to acclimatize to changing conditions as healthy ecosystems are more capable of helping people adapt to climate change. Increasing their resilience is key.

Coral reefs provide income, food and coastal protection for millions of people and support multi-billion dollar industries such as tourism and fisheries. But they are among the world's most vulnerable ecosystems and the first to feel the effects of climate change—a fifth of them have already been destroyed. One of the most serious effects—bleaching caused by increasing water temperatures—is leaving entire reef systems barren.

“By better understanding and managing stresses on corals such as unsustainable and destructive fishing practices or unregulated coastal development, we can increase the chance of coral survival, even as climate change warms the oceans,” says Tom Laughlin of IUCN's Marine Programme.

A growing threat to our oceans is the eagerness of the world to find quick technological

‘fixes’ to absorb or store carbon through large-scale manipulation of the marine environment. Interest in geo-engineering has been fuelled by several prestigious prize announcements which encourage the development of a viable technology to remove greenhouse gases from the atmosphere, and by the growing markets in carbon offsets. But there are serious concerns among the environmental community that these technologies will be put into practice without full knowledge of the risks involved.

Among the concerns is ocean fertilization which involves adding iron sulphate to patches of the ocean to create phytoplankton blooms that absorb atmospheric CO₂ and sink to the deep sea. Knowledge about the environmental impacts of ocean fertilization is however still limited and there are fears it could alter the structure and function of marine ecosystems. The results of the latest iron fertilization experiments have dampened hopes of the oceans' ability to sequester significant amounts of CO₂. The safety of storing CO₂ dioxide captured from industrial plants and power stations in old oil fields under the seabed is also in question. Conservationists are urging extreme caution with marine geo-engineering proposals—there is so much uncertainty and much more research is needed before these methods can be declared ecologically safe. They say reducing emissions should remain the main focus of attention.

Ocean-based renewable energy sources such as wind, wave or tidal power can help reduce greenhouse gas emissions but these too present a new suite of ecological problems. Migratory birds collide with wind turbines, whales, dolphins and many other species can be disrupted by the noise of wind power generators and important habitats can be destroyed by energy infrastructure.

“We still have so much to learn about the marine environment and potential harmful effects of climate change on biodiversity,” says Carl Gustaf Lundin, Head of IUCN's Marine Programme. “The scale and depth of the changes being felt in the oceans may far outstrip the ability of species to adapt. What's more, the climate change sensitivity of only very few species has been studied, and many more remain undiscovered, so it's difficult to predict what the future might hold for marine biodiversity.”

Central to efforts to generate a stronger voice for marine conservation is Dan Laffoley, IUCN's World Commission of Protected Areas

Vice Chair for Marine. He is frustrated that the oceans are only playing a marginal role in the UNFCCC talks—the current negotiation text, which it is hoped will be adopted in Copenhagen in December does not mention the oceans. But, he says, marine conservation is slowly drawing more attention outside the negotiation rooms.



“The marine community must do its part in quantifying the benefits provided by the oceans so it can be a plausible partner in adaptation and mitigation mechanisms set up by governments in Copenhagen,” he says.

Dr Laffoley believes Marine Protected Areas (MPAs) should be at the forefront of the debate about the role of oceans in climate change mitigation and adaptation. “The role of MPAs in reducing the impact of overfishing and other stress factors on the marine environment cannot be overstated,” he says. “A stronger network of MPAs would mean that oceans are in a better position to survive and thrive despite the impacts of global warming.”

Despite the apparent neglect of marine conservation issues in the global discourse, there has been some significant progress. In May this year at the Manado Ocean Conference in Indonesia, a special high-level

session was held aimed at pushing ocean issues up the agenda at the UN climate talks. The Manado Ocean Declaration underscored the need to build resilience in the oceans as a key strategy to confronting climate change and the importance of marine protected areas in helping people adapt to climate change, bolster the oceans’ productivity and protect vulnerable biodiversity.

“IUCN has been urging governments to massively scale up actions now to put MPAs in place throughout the oceans as part of the solution to the impacts of climate change. This Declaration should provide an important boost for efforts in coastal areas as well as in the more remote open ocean and deep seas,” says Laffoley.

IUCN sees several priorities for the months ahead. These include increasing awareness of the role of the oceans in climate regulation and

as a life support system. More research is needed to quantify marine carbon sinks and their possible inclusion in carbon management strategies. Although ocean acidification is being slowly integrated in discussions under the UNFCCC, the ramifications need to be highlighted and the call for significant emissions reduction made stronger. Climate change adaptation measures must incorporate improved management plans for coastal ecosystems so that they can help vulnerable communities adapt to adverse climate change impacts. ■

www.iucn.org/marine



The sky's the limit

Protected area systems are powerful tools to combat climate change and their potential is yet to be realized. Nigel Dudley and Trevor Sandwith examine the evidence.

Strategies to combat climate change identify the need to halt deforestation, use natural ecosystems to sequester carbon and help society adapt to changing conditions. Protected areas can help meet these objectives. Acknowledgement by the Intergovernmental Panel on Climate Change that protected areas can help link mitigation and adaptation efforts and recognition of ecosystem-based approaches to adaptation by the UN Framework Convention on Climate Change (UNFCCC) should provide impetus to the greater deployment of protected areas in future.

Protected areas in their various forms—national parks, nature reserves, wilderness areas and so on—can help in two ways: mitigating climate change by sequestering carbon in organic matter and adapting to impacts of climate change by maintaining ecosystem functioning and the services upon which millions of people depend.

As climate change progresses, healthy natural ecosystems can help buffer human societies against its impacts. Natural disasters are growing in number and severity, from about 100 disasters per decade in the 1940s to almost 2,800 in the 1990s because extreme climatic events are increasing and land shortages are forcing people onto disaster-prone areas like floodplains. The World Bank estimates that every dollar invested in effective disaster reduction saves seven dollars in costs incurred by disasters. Protected mountain forests, coastal reefs, mangroves and other ecosystems buffer human communities against potentially disastrous events like avalanches, flooding and tidal surges.

Agricultural systems, water supplies and health services are also under pressure. Protected areas provide a suite of services such as pure water (a third of the world's 100 largest cities draw drinking water from forest protected areas), genetic material for crop

a risk that the solutions they offer will be lost if they decline in quality. Managers need to develop additional conservation strategies such as building connectivity, providing routes for species to move as climate shifts, addressing extreme weather events and maintaining ecological integrity. A big challenge will be management in the face of increased uncertainty, for example in dealing with invasion by alien species or increased frequency of fires. Many management responses require new skills and new tools. In a crowded planet, any expansion of protection needs social safeguards and more stakeholders involved in decision making than in the past. Protected area systems that recognize and involve local communities, indigenous peoples, the private sector and other conservation stewards in a mosaic of conservation actions are more likely to increase the resilience of ecosystems and people in a changing world.

Meeting the challenges will require careful coordination. In particular, the UNFCCC and the Convention on Biological Diversity (CBD) must work closely together to maximize the opportunities provided by protected areas. Key meetings of the UNFCCC in 2009 and the CBD in 2010 offer potential for agreement.

IUCN has a critical role in ensuring that the potential of protected areas is fully realized. PACT 2020 (Protected Areas and Climate Turnaround) is a major initiative coordinated by IUCN across its secretariat, regions and commissions. It aims to increase awareness and understanding of the role of protected areas in climate change mitigation and adaptation; to ensure that protected area systems play an appropriate role in national and regional responses; and to provide the necessary tools and guidance. An authoritative publication being prepared for a Protected Areas and Climate Change Summit in Spain in November 2009 will send a strong message to Copenhagen in December. ■

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Over 312 gigatonnes of carbon are already stored in protected areas according to the UNEP World Conservation Monitoring Centre (UNEP-WCMC), or 15% of global carbon stocks. This may prove to be an underestimate as we learn more about sequestration in marine and freshwater ecosystems. Protected areas are important particularly where habitat destruction would otherwise cause carbon loss. Research by The Nature Conservancy found that carbon in protected areas in Bolivia, Venezuela and Mexico was worth US\$ 39–87 billion in avoided global damage costs.

breeding to meet changing environmental conditions, pharmaceuticals for emerging diseases and nursery grounds for marine and freshwater fisheries.

But protected areas are not a panacea. Many still leak carbon due to illegal logging, land clearance and poorly-managed fires. UNEP-WCMC studied several tropical protected areas and found forest loss to be much lower than elsewhere but still significant, perhaps as much as 3% of the emissions from tropical deforestation.

Protected areas themselves face new pressures due to climate change and there is

The missing link

Ecosystem management is playing an important role in disaster risk reduction efforts as climate change increases the number and intensity of extreme events across the globe.

For years the disaster risk management, development, environment and climate change communities have laboured in isolation from each other. It is now well recognized that they share the same objectives: sustainable development, human well-being and human security. Healthy ecosystems are critical to achieving all three goals.

The frequency and intensity of climate-related events such as storms, floods, fires and droughts are increasing. These events are not in themselves disasters; it's the combination of vulnerable and ill-prepared communities exposed to natural hazards that results in disaster. Poor communities are disproportionately affected by disasters, seriously hampering economic development while climate change accelerates ecosystem degradation that in turn triggers more disasters.

The Global Assessment Report on Disaster Risk Reduction: Risk and Poverty in a Changing Climate, published this year by the United Nations, provides compelling evidence about the increasing risk of disasters worldwide and shows how climate change exacerbates the underlying causes of this risk. Main drivers include poverty and vulnerable rural livelihoods dependant on natural resources, poor governance and environmental degradation which reduces the capacity of ecosystems to support and protect people. Three quarters of the world's poor live in rural areas and depend heavily on natural resources for their livelihoods.

Vast populations are living in vulnerable areas such as flood plains, exposed coastal zones or steep hillsides and in poorly-built urban settlements—and these numbers are growing. Between July 2008 and June 2009, a total of 314 disasters caused by natural hazards affected more than 41 million people, killed more than 13,000 and incurred economic damage of more than US\$ 53 billion. Last year, in Haiti, the successive hurricanes and storms affected more than 800,000 people and caused losses estimated at US\$ 900 million, 15% of the country's GDP. Environmental degradation is indisputably a factor that puts lives, livelihoods and incomes at risk.

But disasters are opportunities for change. A gradual shift in focus is taking place from reaction to prevention, and sustainable ecosystem management is starting to become more prominent. Intact forests, wetlands and coastal mangroves are essential for the food supplies and livelihoods of local populations, helping to enhance their resilience to external shocks.

They also act as buffers to extreme weather events through slope stabilization, flood abatement and coastal protection, with certain limitations depending on the intensity of storms. These natural buffers can be less expensive, easier to maintain in the long term and more effective than engineered structures such as

Secretary-General for implementation of the Hyogo Framework for Action (HFA). She leads the secretariat of the UN International Strategy for Disaster Reduction (ISDR) which, guided by the HFA, works with UN agencies, governments and NGOs to build the resilience of nations and communities to disasters.



dykes or concrete walls. This was dramatically demonstrated by Hurricane Katrina in 2005 when the dyke system failed to protect New Orleans. As a result, dams are being torn down and wetlands are being restored along the Mississippi basin.

Switzerland long ago recognized the value of 'protection forests' in reducing damage from avalanches and landslides and woodland is now a key part of the country's disaster prevention plan. Other countries are slowly catching on. Indonesia's National Action Plan for Disaster Risk Reduction includes a series of measures to encourage sustainable ecosystem management.

"Our ability to adapt to climate change may be measured by our ability to avert the humanitarian consequences associated with extreme climate events and related risks. We have the tools to reduce disaster risk and these include sustainable ecosystem management. By degrading our ecosystems we are losing our life support systems and our ability to withstand extreme events. We need to urgently accelerate investments in national and local level actions, and ensure more effective coordination with climate change adaptation interventions," says Margareta Wahlström, United Nations Special Representative of the

While international cooperation is increasing, the real change is being spurred by the people who experience disaster or have to live with the threat of it. Disaster risk reduction, climate change adaptation and ecosystem management all fold into one at the ground level with the simple goals of securing livelihoods and human well-being. The most successful interventions must use a combination of approaches and involve local communities as stakeholders and land stewards.

Greater effort is needed also to improve communication and coordination between the various communities. Despite some progress, the role of ecosystems in reducing risk is not yet well understood and the challenge for the conservation community is to improve the hard data and examples that demonstrate their true value in improving people's lives. It is then up to decision makers to implement disaster risk reduction policies that are ecologically, economically and socially sustainable. ■

Melting mountains

Nick Hunt looks at what climate change has in store for a region already ravaged by conflict.



The name Kashmir invariably conjures up two very different images. The first is that of a green paradise nestled in the Himalayas, famed for its apples, apricots, saffron, and the Raj-era houseboats serenely floating in Srinagar's Dal Lake. The second is that of a war-torn hellhole split between India and Pakistan, a source of unending antipathy and conflict between the two nuclear-armed states. Today, a third image jostles for attention—that of a region shortly to feel the full impact of climate change which will have enormous implications for the people and their environment.

The glaciers that water the Valley of Kashmir, like glaciers across the Himalayan range, are melting at an unprecedented rate. The Himalayas contain the largest store of fresh

The Himalayas contain the largest store of fresh water outside the polar ice-caps, feeding rivers upon which up to two billion people depend.

water outside the polar ice-caps, feeding rivers upon which up to two billion people depend. But despite the enormity of the threat—or perhaps because it is simply too overwhelming—the governments of South Asian countries are doing little in the way of mitigation. In the case of conflict-racked Kashmir, this lack of preparation is especially pronounced. Until very recently, the region has been too politically unstable to allow scientists to monitor glacial retreat, essential to formulating a response to future environmental change.

"There is a dearth of information in India," says Professor Syed Hasnain of The Energy and Resources Institute (TERI). "We have no data on temperature, humidity, rainfall, greenhouse gases or Asian Brown Cloud (the drifting South Asian smog that could be a factor in raising temperatures). Various models suggest that heat is being generated by this, but we have to establish a scientific link."

In August 2008 I joined Hasnain on a visit to the Kolahoi glacier which lies just a few miles from the Line of Control that separates Indian from Pakistani-controlled Kashmir. The purpose of the expedition was to assess the glacier's suitability for inclusion in an index of benchmark glaciers spanning the Himalayas from east to west, part of a long-overdue attempt to monitor the rate of decline across the range. After two days on foot over difficult mountainous terrain, what we discovered was even grimmer than expected. The glacier's accumulation area—where snow packs down to form new ice—appears to have almost entirely converted into ablation, which would mean it has entered a state of irreversible melting. According to the inhabitants of the nearby village of Aru, in 1985 the glacier's snout stretched half a mile further down the valley.

"This is the headwater for Kashmir," says Dr Ghulam Jeelani from the University of Kashmir, who accompanied the expedition. "If glaciers like Kolahoi disappear, Kashmir could go from being a water-rich area to an area of water stress." At its present rate of decline, Jeelani believes this particular glacier could vanish in a mere 10 years.

Kolahoi itself might be doomed, but by studying its decline, TERI will gather much-needed information on exactly why glaciers are

Of particular concern is the formation of large, unstable lakes of melt-water, which can burst their banks without warning and devastate downstream populations.

melting—and what can be done to counter the effects. Although this case corresponds to an overall pattern of glacial retreat throughout the Himalayas, glaciology is a complicated business, and many local climatic factors must be taken into account before future impacts on the environment can be predicted with any accuracy.

At the moment, we can only guess what the future of Kashmir might hold, based on scenarios elsewhere in the Himalayas. Of particular concern is the formation of large, unstable lakes of melt-water, which can burst their banks without warning and devastate downstream populations; these glacial lake outburst floods have frequently occurred in Bhutan and Nepal. Hasnain estimates some Indian rivers could initially see their flow increase by up to 30%, leading to widespread flooding, followed by severe water shortages as the glaciers that feed them disappear. This would have an enormous impact on the water systems of Kashmir and the human cost would be immense if the valley's fertile fields and orchards withered. As for geopolitics, it's impossible to say how climate change might impact on the region's intractable conflict, but experts like Dirk Messner of the German Development Institute have identified South Asia as a zone of major potential conflict as local and national players compete over diminishing water resources.

"In India, glaciology has not received the attention it deserves," said TERI director R.K. Pachauri, who also chairs the Intergovernmental Panel on Climate Change, at a 2008 summit in Delhi. "We've been ignoring it at our peril. Adaptation measures are crucial now."

It may be too late for Kolahoi, but if TERI's expedition opens the eyes of governments and instills an appropriate sense of urgency, potentially catastrophic upheavals may yet be mitigated. Authorities in India and Pakistan must put politics aside and wake up to the disaster looming over their shared

environment. If climate change strips Kashmir of its paradise and water shortages hit this already deeply troubled and divided territory, it could make past disturbances look like child's play. ■

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Troubled waters

World Conservation looks at how climate change is affecting the energy sector and why energy producers need to pay greater attention to natural resource management.

It's true that we generally don't value something until it's gone. But how can we neglect something as fundamental as water? With climate change leading to rapidly-dwindling fresh water supplies and competition between users intensifying, all sectors of society need to pay attention to sustainable natural resource management. And this includes energy companies.

Energy security in terms of generation and distribution depends on healthy ecosystems. Lakes, rivers, marshes and coastal lands deliver a wide range of services that support energy production. Natural river flows are critical to hydropower production, thermoelectric cooling, extraction and refining of oil and, increasingly, biofuel production. Other services provided by nature such as climate regulation, coastal protection and flood control are also important to the energy sector, protecting infrastructure such as power plants, pipelines and electricity cables.

"These ecosystem services are not being properly valued or factored into decision making about water use," says Nadine McCormick of IUCN's Energy, Ecosystems and Livelihoods Initiative. "But energy companies are starting to see their vulnerability to climate change. Each unit of energy is becoming increasingly water intensive with the expansion of unconventional oil extraction and renewable options such as hydropower and biofuels. Meanwhile, many countries already face severe water scarcity."

Climate change increases the risk of disruption to energy generation as well as reduced output. Changes in rainfall patterns affect growth rates of crops used for biofuels and cause fluctuations in hydropower. The efficiency of hydropower generation can also be reduced through dam siltation caused by increased run-off from deforested land, and other poor land use practices.

Problems also arise when energy production alters local conditions and contravenes environmental regulations. Electricité de France (EDF) came close to disconnecting one of its nuclear plants from the Rhone River as the temperature of the water discharged by the reactor cooling system exceeded 25°C, the maximum allowed under France's environmental laws. In Canada restrictions have been placed on the amount of water that oil sand developers can take from the Athabasca River. In the US, several communities have stalled the development of ethanol plants due to their high water demands in areas where aquifers

are already threatened. And on the Tana wetland in Kenya, a bioethanol development has been stopped because of concerns about unsustainable water extraction affecting wildlife and livelihoods.

The environmental community is urging energy companies to see themselves as part

of the 'bigger picture' and play an active role in integrated water resource management. Joppe Cramwinckel, Sustainable Development Lead at Shell International says his company recognizes the intricate relationship between energy, water and climate change. "The increase in global energy demand is putting an



ever-greater strain on the world's ecosystems and water supplies. The challenge is to generate the data and analysis tools to manage these risks and make smarter strategic decisions. For example, wetlands and peatlands

Energy security in terms of generation and distribution depends on healthy ecosystems.

sequester considerable amounts of CO₂ and act as a sponge to store water but we need to be able to quantify these services and incorporate them into decision making." He says Shell is building in-house capacity to assess the risks that climate change presents to investment

opportunities and has looked at issues such as future ice conditions in the Arctic, the future tropical cyclone risk in Oman and future water level of the Caspian Sea.

Nigel Jollands, Head of the Energy Efficiency Unit at the International Energy Agency (IEA) says that one of the most cost-effective means of reducing the environmental impact of energy supply and demand is through energy efficiency. "The IEA is urging all countries to significantly upscale their activities to promote energy efficiency. And to help countries in these efforts, the IEA has identified 25 priority policy measures. What is needed is urgent worldwide implementation of these measures."

Troubled waters lie ahead unless the multiple demands placed on natural resources are recognized and valued. This includes the

increasing water needs of the energy sector as well as ecological demands necessary to maintain the overall sustainability of the water system. Innovative solutions from energy companies based on lessons from nature can help ensure that we leave enough water in the global well for future generations to draw on. ■

The World Business Council for Sustainable Development has produced a report *Water, Energy and Climate Change: A contribution from the business community* which outlines policy recommendations from business to climate negotiators and policy makers.

www.wbcsd.org



On the ground

Communities around the world are tackling the climate challenge head on using natural resources to adapt to changing conditions. Here are some examples.

PALESTINIAN TERRITORIES STRENGTH IN DIVERSITY

Agriculture in the Palestinian territories is very important economically, socially and culturally. Faced with changing climatic conditions, people there are adopting new farming methods to try to secure their food supplies and livelihoods. "Growing field crops for human and farm animal consumption is already a marginalized activity that is fraught with problems. Most of the traditional local varieties have been replaced with new ones which are not suited to drought conditions and many small farmers have experienced crop failure year after year," says Buthayna Mezayed of IUCN's West Asia office. "These farmers are now working with research institutions to conserve the remaining local varieties, develop new drought-resistant strains and improve their farm management systems according to changing conditions." The rainy season comes two months later than it used to so farmers are planting crops later to ensure a full harvest. Another method being used is growing the same crop of vegetables in different places and at different times to ensure greater availability throughout the year.

NIGERIA FROM CRISIS TO CHANGE

The Komadugu Yobe River, part of the Lake Chad basin in northern Nigeria, is characterized by sporadic rainfall and frequent drought. The people here are poor and the population has doubled in three decades. At the same time, flow in the Komadugu Yobe has fallen by more than a third due to dam construction, water abstraction for irrigation and climate change. The river itself is severely degraded, and with it the services from wetland ecosystems that communities have relied on. Livelihoods have been devastated as a result and conflict has arisen. But crisis has led to change. Governments and local stakeholders, including dam operators and farming, fishing and herding communities, have agreed on a new management plan to rebuild the natural infrastructure to sustain the region's livelihood and development needs. "Resilience is now strengthening with communities acquiring the skills to cope with an uncertain future," says James Dalton of IUCN's Water Programme. "By rebuilding ecosystems, they are securing the assets needed to make their livelihoods less vulnerable to climate change."

TANZANIA A COMMON SENSE APPROACH

In Tanzania's Pangani Basin, climate change is making water scarcity worse. To adapt, authorities enlist representatives of competing water users—farmers, hydropower, fishers, residents and ecosystems alike—to help decide how to allocate water. Combining a local sense of who needs what, when and where with scientific data on how much water is available now and might be available under climate change scenarios, the collaborators are piloting a new and flexible approach to decision making. They are learning to allocate water within the limits of the river's flow, including to ecosystems in the basin that store water, regulate flows and support livelihoods. Better water governance will reduce pressure on ecosystems and start to make communities and the economy in the Pangani less vulnerable to climate change.

HONDURAS THE OLD WAYS CAN BE THE BEST

In remote villages of hilly southwest Honduras, local farmers have an age-old trick to protect their crops from hurricanes. Thousands of farmers have readopted traditional, ecosystem-based farming techniques which have significantly improved their livelihoods and reduced the impacts of natural disasters. Crops are planted under dispersed native trees whose roots anchor the soil. Vegetation is pruned to keep competition to a minimum, provide nutrients to the soil and conserve soil water, while terracing reduces soil erosion. These methods have proven highly resilient to extreme weather events such as droughts and intense rain during el Niño and la Niña events. When hurricane Mitch passed almost directly over the villages in 1998, there was very little destruction in the region, while elsewhere eroded soil and rocks crashed into houses and roads.

GUATEMALA HIGH-LEVEL ACTION

In the high-altitude watersheds of the Coatán and Suchiate rivers, straddling the borders of Guatemala and Mexico, environmental degradation and climate change are raising the risk of devastating flash floods caused by tropical storms and hurricanes. Population density is high and environmental degradation has limited people's livelihood options. In 2005 tropical storm Stan caused flooding and mudslides that led to an estimated 2,000 deaths and damages of up to US\$ 40 million. The disaster propelled communities into action. With the support of IUCN's Water and Nature Initiative and other organizations, they organized themselves into 'micro-watershed councils' to coordinate watershed management among groups of villages. People have become aware of the effects of unsustainable environmental management. They have identified the different demands on water and defined priorities for managing and restoring watersheds that meet their development needs. Farming systems have been diversified, including terracing of degraded slopes and reforestation is taking place with the introduction of agroforestry. Empowerment of community-owned institutions is making these watersheds more secure and livelihoods less vulnerable to climate change.

India's challenge

Leena Srivastava believes India should not have to sacrifice its economic growth for the sake of 'unfair' commitments to reduce greenhouse gas emissions called for by industrialized countries.

India, in recent times, has come under tremendous pressure to make commitments to reduce its greenhouse gas emissions. The arguments are essentially two-fold: One, that the country's emissions are likely to increase substantially in the future thereby offsetting any gains (thus far invisible) that may arise from actions of the developed world to mitigate emissions. The second argument essentially centres on the competitive disadvantages that industry in the developed world may face if key developing countries like India do not assume emission reduction targets.

Both the above arguments are flawed. By shifting the focus to the future, the Annex 1 (industrialized) countries are shying away from their historical responsibilities and are refusing to be held accountable for the damage that they have already inflicted on the earth's climate system. The uncertainty of the future is starkly apparent in the unanticipated financial crisis that the world is going through. What we need to develop is a mechanism by which historical responsibilities are fixed in a dynamic manner, integrated over the lifetime of the greenhouse gases and weighted by their populations. Countries should then be required to assume commitments that are proportional to their historical responsibility, as defined above, in contributing to the problem of climate change. Such a mechanism would be fair and equitable and provide the

space needed by countries such as India to develop in a responsible manner.

The argument on competitive disadvantages that may be inflicted on industry in the Annex 1 countries is untenable as the UN Framework Convention on Climate Change holds countries accountable (and not sectors) and expects that the countries which gained at the cost of the climate system would pay the costs of addressing the problem created—the philosophy behind the 'polluter pays' principle. As such, Annex 1 countries could not realistically have expected the corrective actions to be free! Nor should they expect those countries which did not create the problem to be altruistic and help create a level playing field now when none existed earlier! It is the poetic justice of time that is providing a small window of opportunity to the less developed countries to nurture their growth—this opportunity cannot be encumbered by bearing, once again, the burden of the rich.

India has, undoubtedly, been experiencing a rapid rate of growth. But in this growth story the world tends to forget that the experience is still recent and the base, on which the growth is being measured, small. India's per capita income is currently approximately US\$ 2,400 and is expected to be less than US\$ 5,000 even by the year 2020. Even its per capita energy consumption level is a mere 350 kgoe (kilogrammes of oil equivalent) and will

increase to 800 kgoe by 2020. Compare this with an average world per capita income of US\$ 8,755 in 2005 (US\$ 30,000 for OECD countries) and an average per capita energy consumption of 1,800 kgoe (5,000 for OECD countries) for 2005. Some of this increase in energy consumption would be to fuel the annual growth of 8% that India is targeting for this period, despite the efficiency improvements that are inevitable. Some of the increase would also be to bring the millions of people who are currently out of the energy net into the supply chain. India today has around 650 million people who burn traditional biomass for cooking and about 400 million people who have no access to electricity in their homes or for work.

Despite the low levels of energy consumption that India has, its current low levels of access and infrastructure development offers a great opportunity to ensure a shift to a low carbon pathway. We estimate that nearly 80% of India's infrastructure needs up to 2030 are yet to be put in place. Key elements of this include the infrastructure to meet mobility needs and for power generation. On mobility, the government has a difficult choice—encouraging public transport would not only affect industrial growth (nationally and globally) through its impact on the automobile sector, but would also increase the financial burden on its scarce budgetary resources that would be called upon to support a larger public transport infrastructure. For meeting the demand for electricity-derived services, India needs to quickly acquire experience with large-scale solar-based technologies to serve the urban populations and with Decentralized Distributed Generation solutions at a national level. One critical element to support this transformation would be developing and managing 'smart' grids. The challenge here, of course, is how can India achieve this while keeping costs sufficiently low for those 400 million people with no electricity connections to gain access? Instead of feeling threatened by the growth opportunity of India, Annex 1 countries should enthusiastically participate in its transition to a low carbon path! ■

Dr Leena Srivastava is Executive Director of TERI, India's Energy and Resources Institute.

www.teriin.org



The dilemma

Clean energy does not always mean green energy and when biodiversity is threatened by renewable energy projects, environmentalists face a difficult dilemma.

Many countries focused on reducing their greenhouse gas emissions are showing a keen interest in renewable energy. But environmentalists are concerned that the portrayal of low carbon energy sources as 'clean' is leading to the implementation of renewable energy projects without a full assessment of their other ecological impacts.

Anyone interested in sustainability is keen to support renewable energy, however, conservationists know that it can create a whole new suite of problems for ecosystems and biodiversity. No energy source is entirely 'biodiversity-neutral': nuclear power has obvious waste-disposal problems, the manufacture of solar cells can create hazardous waste, hydropower alters freshwater ecosystems and wastewater from geothermal plants affects aquatic ecology. The transmission lines, roads, and other infrastructure associated with all 'clean' power projects can have extensive impacts on ecosystems.

Biofuels are being promoted in many nations. Unfortunately, biofuel proponents often underestimate the environmental and social consequences of unsustainable biofuel crops and processing methods. "Biofuels represent a threat to biodiversity. Many countries are destroying natural habitats or putting pressure on biodiversity to make way for biofuel crops. This can and should be limited," says Jean-Christophe Vié of IUCN's Species Programme. "We should not accept the assumption that global energy consumption will increase. Much of the energy we produce today is wasted so the priorities are to reduce our consumption wherever possible and improve the efficiency of existing production and distribution."

The proliferation of wind farms on land and at sea is causing serious problems for bats and birds. Collisions are not the only problem; bats can also be killed by internal bleeding caused by changes in air pressure around the turbine blades. Growing numbers of dead bats found underneath wind turbines in the US and Europe has led to concerns that research into the siting of these structures is not sufficiently rigorous—some wind farms have been erected along bat and bird migration routes.

Professor Paul Racey, co-chair of IUCN's Bat Specialist Group says that good progress has been made in surveillance and monitoring, but governments and energy companies are not acting on the information. "In many

places, the authorities are so concerned with meeting their targets for renewable energy that they're not taking any notice of the impacts on bats. But it all depends on the will of the country," explains Prof. Racey. "In Germany for example, some wind turbines are shut down at certain times to minimize the impact on bat populations." Fortunately, he says, the issue is an emerging priority for some key environ-

and plankton, there are many other ecosystem services that are in need of immediate attention, he adds. "BC Hydro's environmental priority is to achieve the long-term goal of no net incremental environmental impact, so the company has programmes to encourage consumers to conserve electricity and programmes to measure and reduce environmental effects on air, land and water. The company works



mental organizations. He and his colleagues are working on mitigation measures to deter bats from areas around wind farms.

"We do face a dilemma and there is no easy fix," says Prof. Racey, "but we have to work through it by getting conservation groups, energy companies and government agencies around the same table. There are signs that the energy sector is more willing to engage in the debate than was the case 10 years ago."

Dr Scott Harrison is a Senior Environmental Specialist with BC Hydro, one of North America's leading providers of hydro-electric energy and a Liaison Delegate to the World Business Council for Sustainable Development (WBCSD) where BC Hydro co-chairs the Ecosystems Focus Area. He says BC Hydro and other WBCSD companies recognize that biodiversity underpins the supply of ecosystem services and that all businesses interact with, and depend on, these services.

Although society is currently focused on carbon, which is linked to one ecosystem service: natural carbon sequestration by plants

within the WBCSD to implement the Ecosystem Services Review Tool and to make ecosystem valuation an integral part of planning and decision making by business, governments and consumers."

Given that energy consumption is set to double by 2030, both the environmental community and the business community must find ways to assess and manage the trade-offs between energy and biodiversity. Conservationists are racing to gather the necessary information about the impacts and make sure it feeds into the decision-making process. Dr Harrison is optimistic that global discussions about greenhouse gases will lead to greater awareness about the links to biodiversity, ecosystem services and sustainability. "When society sees the value in using resources sustainably, people can use existing mechanisms, such as adaptive management and structured decision making to integrate social progress, economic development, and ecological resilience." ■

Beyond Copenhagen

IUCN's Deputy Director General, William Jackson looks at what the coming years hold for the conservation community in relation to climate change.

While the world has been slow to act on climate change, IUCN and other conservation organizations have long known about the dangers and have been working to make our natural systems resilient. The tide is finally turning and our challenge, as momentum builds, is to make sure that biodiversity concerns are incorporated into all efforts to mitigate climate change and adapt to the impacts we cannot now avoid.

We hope politicians will do the right thing in December—make the necessary commitments to reduce emissions and act immediately. We hope they will ensure sufficient means and financing for mitigation and adaptation, especially for the world's poorest, and adopt nature-based solutions in the new global framework. But we need to look beyond Copenhagen at what our priorities are for the coming decade.

We'll be taking a keen interest in how the REDD mechanism evolves. Will issues of benefit sharing and governance mechanisms be sufficiently addressed? Will they form part of a post-2012 climate change regime? We'll also be looking at how ecosystem-based adaptation (EbA), which is included in the negotiating text for Copenhagen, unfolds. IUCN will continue to work, along with its partners, on EbA and REDD, feeding lessons learned on the ground into international policy.

Tackling climate change is not simply the remit of the UNFCCC and government Parties. The links between climate change and biodiversity call for action by many other international agreements. The Convention on Biological Diversity (CBD), for example, needs to address the role of biodiversity for both sequestering carbon and adapting to climate change. It especially has a mandate to address the challenges of conservation and sustainable use of biodiversity in the face of climate change. The conventions on wetlands and desertification deal with habitats whose effective management will also contribute to adaptation. The CBD Conference of the Parties in Japan next year will be critical in ensuring that a new strategic plan for the convention fully responds to the challenges of climate change. Given limited resources and time, we must generate more effective coordination across these international policy instruments and make sure they are fully implemented.

We want to see that efforts to revitalize the global economy take advantage of the opportunity to decarbonize it using financial

instruments such as carbon markets that will provide models for broader payments for ecosystem services. And as the world moves towards alternative energy sources including biofuels, we'll be helping to set standards to safeguard against any negative impacts on biodiversity.

Climate change cuts across all areas of IUCN's work, in terms of policy, field work and research, with several key focus areas: We'll be working to mainstream gender and rights-based approaches into a post-Kyoto world. Our colleagues in the Marine Programme will be focusing on the role oceans play in the carbon cycle as well as in adaptation and mitigation. The Water Programme is striving to make sure freshwater management and conservation are central to adaptation. We'll be examining the potential of carbon sinks such as mangroves, peatlands and wetlands in mitigation. The protected areas and species communities will be working to connect the world's protected areas so that they can best help species adapt

to changing conditions and ensure that ecosystems continue to provide critical services.

Our 'to do' list may be daunting but we can take comfort in the fact that we're no longer labouring alone in the wilderness. We're seeing an unprecedented level of cooperation across sectors and organizations and there's a sense that the world is finally coming together to work towards the ultimate goal of a healthy and sustainable planet. ■



In brief

A snapshot of just some of the many projects and initiatives on climate change involving IUCN, its Members and partners.



The Climate Change and Coral Reefs and Marine Working Group (CCCCR) aims to bridge the gaps between science, management and policy to enhance the resilience of coral reefs and the societies that depend on them.



Last year IUCN and WWF launched a global Ecosystems and Livelihoods Adaptation Network (ELAN). This will link the science, practice and policy of ecosystem management and help to build resilience in developing countries.



IUCN's Islands Initiative addresses integrated management for marine, coastal and terrestrial ecosystems for the conservation of island biodiversity and the sustainable development of island communities who are on the frontline of climate change. IUCN also hosts the Global Island Partnership (GLISPA) which identifies ecosystem-based adaptation as one of its priorities over the next few years. IUCN and GLISPA partners are supporting countries in the UNFCCC negotiation process and are looking at implementing activities at a national level.



IUCN, UNDP, UNEP and the Women's Environment Development Organization have come together to create the Global Gender and Climate Alliance. The goal is to ensure that climate change policies, decision making and initiatives at the global, regional and national levels respond to the specific needs of women.



In the Mediterranean region, fires and other human-induced disturbances are exacerbated by climate change and require a landscape-wide planning response. IUCN, WWF, FAO and many regional partners agreed in April 2008 on a common position—the Athens Statement on climate change adaptation in Mediterranean forest conservation and management with a special focus on increasing resilience against major disturbances. One example of how the recommendations included in the Statement are being implemented is IUCN's contribution to the revision of the National Forest Fire Strategy in Lebanon.



Mangroves for the Future (MFF), a coastal ecosystem conservation project for sustainable development initially focused on the tsunami-affected countries in the Indian Ocean region but has also included a focus on climate change adaptation. The project works on management of coastal ecosystems as natural infrastructure to increase resilience to natural disasters. IUCN is also working with partners in the Pacific to implement the Pacific Mangroves Initiative.



IUCN examines the links between social and ecosystem vulnerability and develops policy guidance to address climate change mitigation and adaptation from a perspective of rights and equity. Understanding social vulnerability is critical for helping indigenous peoples and local communities build their resilience to climate change impacts. Support to the poor must build on traditional and local knowledge and means for adaptation. It is important to ensure that communities have a voice in the climate debate and policy decisions at all levels.



A series of regional workshops are being held to build capacity of IUCN staff and Members in relation to climate change, including in North Africa and Asia. These examine how countries can influence the international climate negotiations, present common positions and use ecosystem management to adapt to climate change.



IUCN's Water and Nature Initiative works to integrate climate change considerations into Integrated Water Resource Management including looking into the role of floodplain storage and upper watershed restoration in adaptation. Multi-stakeholder processes are being used to improve governance of water resources.



Several regional partnerships have been launched to coordinate environment and disaster reduction actions including 'Vulnerability and Resilience: Learning Lessons and Integrating Ecosystems into Assessment and Response'. This project aims to improve IUCN's capacity to assess and address the impacts of climate change and disasters on vulnerable communities.



IUCN leads a Climate Change and Development project in Eastern Africa that assesses the vulnerability of local communities to the impacts of climate change and looks for alternative livelihood options to increase resilience including through forest landscape and watershed restoration.



Through its Energy, Ecosystems and Livelihoods Initiative IUCN supports the transition to energy systems that are ecologically sustainable, socially equitable and economically efficient while making full use of the best available technologies and policies.



IUCN, the International Institute for Sustainable Development (IISD), the Stockholm Environment Institute and Intercooperation have developed and are applying the Community-Based Risk Screening Tool Adaptation and Livelihoods (CRiSTAL), designed to help project planners and managers integrate climate change adaptation into community-level projects.



Asia's Mekong Region, shared by Cambodia, China, Lao PDR, Thailand and Viet Nam, is facing serious water governance challenges. The Mekong Region Water Dialogues promote transparent decision making in the Region by enabling wider stakeholder involvement in water resources governance.



In Bangladesh IUCN has piloted a number of communications materials aimed at raising awareness of climate change among school children. They have created Rana Bhai, a frog who acts as a climate change ambassador, appearing on stickers, posters and books promoting climate change adaptation messages.

Off the shelf

A selection of IUCN publications related to climate change.



TRAINING MANUAL ON GENDER AND CLIMATE CHANGE

Edited by Lorena Aguilar

Established in 2007 by IUCN, UNDP, UNEP and WEDO, the Global Gender and Climate Alliance (GGCA) aims to ensure that climate change policies, decision making and initiatives at the global, regional and national levels are gender-responsive. The GGCA has developed this training manual to increase the capacity of policy and decision makers so that climate change mitigation and adaptation efforts are gender-sensitive.

2009



RIGHTS-BASED APPROACHES: EXPLORING ISSUES AND OPPORTUNITIES FOR CONSERVATION

Edited by Jessica Campese; Terry Sunderland; Thomas Greiber and Gonzalo Oviedo

The links between human rights and biodiversity and natural resource conservation are many and complex. 'Rights-based approaches' (RBAs) to conservation are a promising way forward but also raise many new questions. This publication gives an overview of key issues and questions in RBA. Rights and social justice-related policies of major international organizations are reviewed and case studies and position papers describe RBAs in a variety of contexts.

ISBN 978-979-1412-89-6, 2009



ENVIRONMENTAL GUIDANCE NOTE FOR DISASTER RISK REDUCTION: HEALTHY ECOSYSTEMS FOR HUMAN SECURITY

Edited by Karen Sudmeier-Rieux and Neville Ash

Investment in sustainable ecosystem management can offer cost-effective solutions to reducing community vulnerability to disasters. This publication provides guidance on the benefits of, and ways to integrate environmental concerns into, disaster risk reduction strategies at the local and national levels.

ISBN 978-2-8317-1164-5, 2009



ADAPTING TO GLOBAL CHANGE: MEDITERRANEAN FORESTS

Edited by Pedro Regato

This book, in English, French and Spanish, provides an overview of the Mediterranean forest conservation and management challenges posed by climate change. It addresses relevant issues such as forests' vulnerability to climate change and past climate change responses which may guide future policies and actions.

ISBN 978-2-8317-1098-3, 2008



CHANGE: ADAPTATION OF WATER RESOURCES MANAGEMENT TO CLIMATE CHANGE

Edited by Ger Bergkamp; Brett Orlando and Ian Burton

Climate change is here and will be with us for the long term. The challenge facing water professionals is how to make decisions in the face of this new uncertainty. This book outlines a new management approach that moves beyond technical quick fixes towards a more adaptive style that is inclusive and innovative.

ISBN 2-8317-0702-1, 2003



Go to Copenhagen with the latest technology

One of the best technologies to reduce CO₂ turns out to be one we already have – photosynthesis

Major reductions in global greenhouse gas emissions are necessary if we are to avoid disastrous climate change. Given that deforestation and forest degradation account for up to 17% of man-made global greenhouse gas emissions, conservation and sustainable management of forests is a good place to start. We believe that Reducing Emissions from Deforestation and forest Degradation can help achieve this goal if it is based on good social and environmental principles and fully integrated into broader strategies aimed at achieving deep cuts in carbon emissions from fossil fuels.

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