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Talking about a revolution: climate change and the media

An IIED Briefing

Mike Shanahan

The paper reviews how the media reports on, and what people think about, climate change in different parts of the world. The issue has never been higher on the media's agenda, yet problems persist in the way it is reported. While the media is not entirely to blame, it can do much to improve its telling of climate change stories.

KEY POINTS:

- There are many criticisms of how the media has covered climate change to date, but many signs of improvement too. For journalists new to the topic, climate change is complex, making training a priority for media outlets.
- The false balance that has been a problem for years appears to be declining but a catastrophe narrative that disempowers people remains. Those supplying the media with information – scientists, politicians and NGOs – share some of the blame. The way they and the media frame climate change will affect how audiences respond.
- Challenges include making stories more relevant to audiences, raising the profile of adaptation and the perspectives of the poor, and reporting on ways to address climate change that bring additional benefits.

The science and the story of our times

Two years before Hurricane Katrina tore across New Orleans, *Washington Post* reporter Mike Tidwell predicted that just such a disaster would strike the city. While no single event can be blamed on climate change, the science suggests that intense cyclones like Katrina will become more common as the planet heats up. The science tells us that climate change is the greatest threat humanity has ever faced. Surely then the media has never had a greater role to play. But one year after Katrina, concerned at the media's potential to make a difference, Tidwell declared: "A revolution is needed and journalists don't make revolutions."

This article asks why. It is based on recent media studies and opinion polls from across the globe. It reveals problems with the media's coverage of climate change to date, as well as reasons for hope. But the science also says time is running out. It says we urgently need a fair and effective global response – and local action by business and individuals in all countries. The media and those it relies on for information still need to raise their game if they are to meet the challenge of telling the story of our times.

David King, the UK government's chief scientific advisor, said climate change is a greater threat than global terrorism, while Nobel Laureate Al Gore equates the need for collective action to that posed by the rise of fascism in the 20th Century. But governments, businesses and people are hardly on a war footing – nor is the media. As recently as November 2007, journalist

Chris Mooney was tracking Cyclone Sidr on his blog some days before it struck Bangladesh. But as he pointed out, there was scant international media coverage of the impending disaster.

True, climate change's media profile has never been higher, and public awareness is rising fast worldwide. But in most nations, coverage of sport, celebrities, politics, the economy and crime dwarfs that of climate change. Polls show that public understanding of the subject is still low, and public action lower still. Nor does the news reach all people equally. According to research by communications consultancy Futerra, in August to November 2005, the highbrow *Financial Times* (circulation: 450,000) had 23 per cent of climate-change stories in UK newspapers, while the *Sun* (circulation: 3.1 million) had just 1.5 per cent.

In parts of Africa, Asia and Latin America the quality and quantity of climate change articles are growing fast in the newspapers read by wealthier urban people, but there little research available on how much information is reaching the poorer communities. James Painter at the Reuters Institute for the Study of Journalism has looked at this question. He showed that the prime-time evening news on the main TV stations in China, India, Mexico, Russia and South Africa made no mention of the IPCC report on mitigation when it was released in May 2007.

Grasping the fundamentals

In poorer countries especially, few reporters are well trained, connected and resourced for the challenge ahead. Globally, apart from a few journalists who have been covering climate change for years, the media has been slow off the mark. Climate change used to be 'just' a science/environment story – never the best funded news desks. And many senior editors are arts graduates, who are unwilling or unable to understand science. But climate change now encompasses the economy, health, security and more. Suddenly science reporters are covering a political issue and vice versa. For many, the topic is new, extremely complex, and easy to get wrong.

Writing in November 2007, Richard Black and Roger Harrabin (who report on climate change for the BBC) told fellow journalists how important it was for them to catch up: "If we do not have a strong grasp of the fundamentals of the climate debate we risk presenting our audiences with a set of opinions which is out-dated, driven by spin or simply wrong." Such a grasp has often been lacking and this has contributed to a big problem: false balance.

Evidence and emotion

On 25 October 2007, more than a million London commuters read the free *Metro* newspaper. The headline on page 4 screamed: “We’re in the biggest race of our lives”. The story was about the UN Environment Programme’s GEO-4 report, which said action on climate change and other issues was woefully inadequate. But instead of quoting a qualified scientist, *Metro* quoted the children’s TV presenter and ‘global warming cynic’ Johnny Ball, who cast doubt on the need to address climate change.

The scientific consensus

“Many leading experts still question if human activity is contributing to climate change,” agreed 56 per cent of those interviewed by pollsters IPSOS/Mori in the UK in 2007. Yet there has been a strong scientific consensus that humans influence climate since 1995, represented by the Intergovernmental Panel on Climate Change (IPCC), the 2,000+ researchers most qualified to comment. In 2007 the IPCC gave its strongest statement yet on climate change. It said human activities were more than 90 per cent likely to be the cause and that impacts could be “abrupt and irreversible”. It added that if urgent steps are taken, climate change could be addressed at reasonable cost. Nearly 200 nations (including, some would be surprised to learn, the United States) have endorsed the IPCC findings. They are based on thousands of published, peer-reviewed studies. For the scientists, the broad arguments about the reality of climate change are over. The media is still catching up.

This is one of many examples of journalistic balance gone wrong. It arises from the media’s need to appear unbiased and tell a story from two sides. And in news terms, conflict sells more than consensus. For years, journalists have been ‘balancing’ science with scepticism, offsetting evidence with emotion. By ignoring the overwhelming scientific consensus (see ‘The scientific consensus’), this effectively instills bias. It serves to confuse and misinform the public and has helped to delay action to address climate change.

Something sinister contributed to this failure. Companies and politicians with vested interests in maintaining the status quo have tried to undermine science and subvert journalism. In doing so, they have eroded public confidence in either. Some of climate-change journalism’s top stories have ‘followed the money’ and exposed these interests (see ‘Upsetting the balance’).

This helped lead to a big shift in climate-change reporting in the US – whose stance on climate change has stalled international action for a decade. Research published in November 2007 by Maxwell Boykoff at the University of Oxford, UK, shows that the majority of US newspaper articles from 1990 to 2004 balanced the view that humans cause climate change with the opposite viewpoint. The good news, he says, is that by 2005 this trend had ended. “While this provides some cause for optimism that media reporting may act as a stronger catalyst for more decisive climate-policy action,” he wrote, “many other challenges remain in ensuring climate science informs climate-decision making.” Among them, is the way climate-change stories are framed.

From denial to despair... to action

Research suggests that complex messages like those on climate change will resonate more with people if they are ‘framed’ to suit diverse audiences – that is told with a strong focus on a certain aspect of the story. The ‘scientific uncertainty’ frame struck a chord with people who don’t want to change, while the “national security” frame might inspire action from the same individuals.

Upsetting the balance

False balance has been most evident in the US, where pollster Frank Luntz famously advised George W. Bush’s Republican Party to “make the lack of scientific certainty a primary issue in the debate”. In 2005, *The New York Times* revealed that a key Bush aide had edited the US Climate Change Science Program report in a way that exaggerated scientific uncertainties. In 2006, the UK scientific academy, the Royal Society accused the giant oil company, ExxonMobil, of funding groups that attempt to undermine the scientific consensus on climate change. Months later, the *Guardian* newspaper reported that a lobby group funded by ExxonMobil offered scientists and economists US\$10,000 plus expenses for articles that would dispute the February 2007 IPCC report’s findings.

The ‘polar bear’ frame appeals most to animal lovers, while the ‘money’ frame will chime with politicians and the private sector (see ‘Polar bears and pound signs’).

But among the most common frames is one that inspires inaction: the ‘catastrophe’ frame. James Painter looked at how the main TV stations in Brazil, China, India, Mexico, Russia and South Africa covered two of the IPCC’s reports in 2007. The first, ‘negative’ report on the impacts of climate change was covered by more stations and in more detail than that the second ‘more positive’ report on tackling greenhouse gas emissions.

In research published in 2006 by Futerra, only 25 per cent of climate change stories in UK newspapers were positive – focused more on solutions than problems. Later that year, the UK Institute for Public Policy Research identified two main ways the media, government and green groups were framing climate change: Alarmism (we’re all going to die) and Small Actions (I’m doing my bit for the planet – and maybe my pocket). It concluded that these narratives are “confusing, contradictory and chaotic, with the likely result that the public feels disempowered and uncompelled to act”.

Polar bears and pound signs

How many people have ever seen a polar bear or would miss it if it went extinct? Environmental groups have long used the polar bear to symbolise climate change, but does this really connect with people? We have been hearing for decades that tigers and orang-utans are on the brink of extinction but they are in a worse state than ever. And there are not decades left to get messages on climate change through.

This underscores the need for journalists to think imaginatively when proposing stories to their editors. The polar bear’s prospects might be less bleak if the discourse focused more on what climate change means for the price of wheat or maize or rice. This is the money frame – the costs and benefits of action and inaction. It is notable that in Futerra’s study of UK newspapers, the *Financial Times* had both most coverage of climate change and the most positive stories. As tackling climate change is increasingly portrayed as a business opportunity, many companies are acting faster than governments.

One of the biggest boosts to public and media awareness of climate change worldwide was the 2006 UK government publication of the Stern Review on the Economics of Climate Change. It said climate change could shrink the global economy by 20 per cent, but that acting now to address climate change would cost only 1 per cent of global GDP. It has been criticised for having too low a discount rate, which essentially means being more concerned about future generations. For others, that adds to the Review’s appeal.

Mike Hulme, then director of the UK Tyndall Centre for Climate Change Research, later warned that: “the discourse of catastrophe is in danger of tipping society onto a negative, depressive and reactionary trajectory.”

What are the alternatives? One is to focus more on the solutions to climate change and ways to adapt to its effects, and less on the frightening statistics – to move from denial and despair to action. Another is to connect in audiences’ minds the emissions in one place and impacts in another, and to share the voices and concerns of the poorest, most vulnerable people who have contributed least to the problem but will suffer most from its impacts.

It is legitimate to point out that while the future looks bleak, change is possible. As David King says: “It is doable, but we will have to bust a gut to make it happen.” While ‘catastrophe’ leaves people feeling helpless, the ‘justice and equity’ frame is empowering. “Most people in the climate change debate focus on how to cut emissions and how to bring the US, China and India into an agreement,” says Saleemul Huq, head of climate change at IIED. “Impacts of climate change on poor countries, and the responsibilities of rich nations to help them, get much less attention.”

Here then is a challenge for the media. If all greenhouse gas emissions stopped this second, there would still be plenty of climate change in store, because of lags in the Earth-atmosphere system. The most vulnerable communities must adapt, and they need financial support to do this. But this aspect of climate change is underreported. The voices of the vulnerable are rarely heard by those in power. In Painter’s study of TV coverage of the IPCC reports in the major emerging economies, such as Brazil, China and India, adaptation “received scant, if any, media attention” despite being mentioned in the title of the April 2007 report.

Mixed messages

Sharon Dunwoody of the University of Wisconsin-Madison says media messages about climate change “seem to change the behaviour of some of the people some of the time, but have almost no discernible effect on most people most of the time.”

Perhaps one reason for this is that while the media informs the public about climate change one minute, in the next it is advertising products or activities that increase greenhouse gas emissions. Journalist George Monbiot set out to examine this by measuring advertising for travel, car companies and polluting heavy industry in the UK’s main agenda-setting newspapers over 10 days in July 2007.

The most adverts were in *The Times*, with 42 pages’ worth (4.4 per cent of the newspaper) and the *Telegraph* with 30.5 pages (7.3 per cent). Monbiot asked each newspaper how much money they made from these ads. The only one that would say was the *Financial Times*. It devoted the least space to adverts (2.75 pages and 0.8 per cent of the paper) yet this accounted for 10.4 per cent of the paper’s income. Money talks. In the US, car and fuel companies have threatened to withdraw advertising from radio stations after they reported on climate change.

This should not be a surprise; nor should it be a given. Growing demand for green products and environmental news is creating a market for alternative media outlets that do not depend on revenue from polluters. If this demand grows sufficiently, the new information outlets could become a source or a challenge to the traditional media.

Reasons for hope

The media’s job is not to change the world. It is up to society to turn bad news into good. But the media does have a role to play in empowering people to make informed choices. Yet public, private and political reactions to climate change are still small relative to what powerful scientific, economic and moral arguments demand.

It has been said that the most important thing in communication is hearing what isn’t being said. In the case of media coverage of climate change, that includes the urgency of adaptation, the costs of acting and failing to, the views of the poor, the vested interests that resist change, and the potential for action to address climate change to bring substantial co-benefits. There are plenty of good-news ‘win-win’ stories to tell, and plenty of ways to improve the way they are told and made relevant to diverse audiences. The media is not entirely to blame. Scientists have long struggled to step outside their circle and this meant many resist telling their stories simply and without jargon – a turn-off for the public. Scientists need to be better at communicating about climate change and environmentalists need to stop focusing on catastrophe in their messages. Communicators can do much more to tailor their messages to audiences.

For journalists, the main issue is to grasp the complex nature of climate change as it continues to gather new dimensions. Training and access to experts will be key, especially for under-resourced reporters in the poorest countries. With a little time and training, non-scientific journalists can cover climate change well. They need not think it is beyond them. Internet-based sources are becoming increasingly important – and accessible to journalists around the world (see Sources). The emerging role of some of these sites came to the fore in November 2007, when bloggers rapidly exposed climate change hoax that had tricked some sectors of the media (see ‘Bloggers to the rescue’).

Bloggers to the rescue

It must have been music to the ears of the conservative US chat-show host Rush Limbaugh and his millions of listeners. In November 2007, researchers proved that humans were not causing climate change. Rather than fossil fuel burning it was the previously undetected emissions from undersea bacteria that were responsible for the last 140 years’ increase in atmospheric concentrations. Limbaugh and others in the media – including 600 radio stations in the United States – duly spread the word before realising they had been tricked. Hoaxers had created a fake scientific journal, with a fake editorial board, website and authors.

Unlike earlier efforts to confuse the media, this did not originate with an industry lobby group. But before the hoax had time to infect, bloggers identified a suspect called David Thorpe, who later said it was unleashed to expose the willingness of climate sceptics to believe anything that supports their argument. Bloggers helped to stop this hoax in its tracks – before it was widely reported.

New York Times journalist Andy Revkin said this shows “the amazing power of the Web to amplify, and then dismantle, fictions at light speed.” And while few media outlets were tricked, the blogger Gaius warned: “This sort of thing will probably become more common – and more sophisticated.”

Detailed studies of media coverage of climate change that are underway in China, India, Mexico, Vietnam and other nations should reveal much about how journalists there are reporting this

story, and how this affects the public. One encouraging sign came in 2007, when international banking giant HSBC looked at public attitudes to climate change in Brazil, China, France, Germany, Hong Kong, India, Mexico, the UK and US. It found that “it is in the developing economies that people show the greatest concern, commitment and optimism, and in the developed economies that people show the greatest indifference, reluctance and fatalism.”

The end of the story

Mike Tidwell is not the only one to invoke revolution. When the IPCC published its February report, French President Jacques Chirac said: “Faced with this emergency, the time is not for half-measures. The time is for a revolution: a revolution of our awareness, a revolution of the economy, a revolution of political action.”

In September 2007, Björn Stigson, head of the Geneva-based World Business Council for Sustainable Development, warned that to tackle climate change, we need a revolution of society on a scale never witnessed in peacetime. “It will probably get worse before it gets better, before governments feel they’ve got the political mandate to act,” he told the *Financial Times*. “We’re going to have to go into some sort of crisis before it’s going to be resolved. I don’t think people have realised the challenge. This is more serious than what people think.”

The science tells us that a window of opportunity is about to slam shut on our collective fingers. The head of the UN Framework Convention on Climate Change says there are just two years left to negotiate a stronger, fairer global agreement on how to address climate change. Massive shifts in policy and in public behaviour will be necessary to keep greenhouse gas concentrations below a dangerous level and to adapt to the changes that are already inevitable. The media and those it relies on for information will play an increasing role in whether or not a revolution happens and how it plays out if it does. The good news is that the climate is not the only thing that is changing.

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The International Institute for Environment and Development (IIED) is an independent, nonprofit research institute working in the field of sustainable development. IIED provides expertise and leadership in researching and achieving sustainable development at local, national, regional and global levels. This opinion paper has been produced with the generous support of Danida (Denmark), DFID (UK), DGIS (the Netherlands), Irish Aid, Norad (Norway), SDC (Switzerland) and Sida (Sweden).

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A journalist's guide to the Bali climate conference

An IIED Briefing

Mike Shanahan

The 13th Conference of Parties to the UN Framework Convention on Climate Change and the 3rd Meeting of Parties to the Kyoto Protocol will take place in Bali, Indonesia, from 3-14 December 2007. The meetings are some of the most important to date, as negotiators will be discussing the successor to the Kyoto Protocol, whose first commitment period expires in 2012. This briefing gives a quick overview of the Convention, the Kyoto Protocol, the structure and function of the meetings in Bali and some of the main issues that will be on the agenda. It describes key possible outcomes of the meeting and provides reliable sources of further information.

KEY POINTS:

- The United Nations conference in Bali, Indonesia in December 2007 is of major importance as it could shape global climate-change policy for years to come.
- The talks are complicated. They take place in several fora and involve a number of negotiating groups that gather countries with common interests.
- High on the agenda are issues such as: a timetable and process for reaching a global agreement that builds upon the Kyoto Protocol; how to make the Adaptation Fund operational; and measures to reduce deforestation in developing countries in order to limit greenhouse gas emissions.

Why Bali is so important

In mid-2007, Norway's retiring climate-change negotiator Harald Dovland called on his counterparts from around the world to: "Promise me one thing... do your job in Bali."

He was referring to some of the most highly anticipated meetings in the history of climate-change negotiations — the 13th Conference of Parties to the UN Framework Convention on Climate Change (UNFCCC) and the 3rd Meeting of Parties to the Kyoto Protocol — which will take place in Bali, Indonesia in December 2007.

Bali will also host dozens of side events at which nongovernmental organisations, academics, the private sector and others will share information and policy recommendations.

What happens (or doesn't) in Bali could determine the shape of global climate policy for years to come. The negotiations are complicated. They take place in various strands and between different groups of countries that negotiate alone or in groups. This briefing provides journalists who are new to the process with

a rapid overview of the UNFCCC, the Kyoto Protocol, the structure and function of the meetings in Bali, and the countries in, and positions of, the main negotiating groups. It lists some of the key issues that will be on the agenda and sources of more information.

Structure and function of UNFCCC bodies

UNFCCC AND KYOTO PROTOCOL

The UNFCCC was adopted in 1992 with the objective of stabilising atmospheric concentrations of greenhouse gases at levels that will avoid dangerous human interference with the climate system. The Convention aims to achieve this goal in a timeframe sufficient to allow ecosystems to adapt naturally, to ensure food production is not threatened, and to enable economic development to proceed in a sustainable manner.

The 192 Parties to the Convention are divided into two groups: developed (Annex I Parties) and developing (Non-Annex I Parties). The Annex I Parties are further divided into two groups. Annex II Parties are those more advanced industrialised countries that are required to provide funds to support actions in developing countries. The remaining Annex I parties are those with economies in transition to a market economy.

A number of institutions, set up under the Convention, facilitate and monitor its implementation. These include the Subsidiary Body on Scientific and Technological Advice (SBSTA), the Subsidiary Body on Implementation (SBI) and a financial mechanism, which has been entrusted to the Global Environment Facility (GEF).

The UNFCCC's Kyoto Protocol was agreed in 1997. It commits 36 of the Convention's Annex I Parties (known as Annex B Parties) to individual targets for limiting or reducing emissions which, taken together, would reduce overall emissions of six greenhouse gases from these countries by approximately 5 per cent below 1990 levels within the Protocol's first commitment period (2008-12). The Protocol's three main tools for helping Annex B Parties to reach

these targets efficiently are: international emissions trading between countries with targets; joint implementation of emissions-reducing projects; and the Clean Development Mechanism (CDM). The CDM allows Annex-I countries to invest in emissions reductions in developing nations rather than directly reduce emissions at home. Non-Annex I countries do not have legally binding targets to reduce or limit their greenhouse gas emissions during the first commitment period. The Protocol now has 175 parties — notable exceptions being the United States and Australia*.

THE AWG

The AWG gathers Parties to the Kyoto Protocol to negotiate further commitments for the Protocol's Annex I Parties. These would apply after the first commitment period of the Kyoto Protocol ends in 2012. Parties agreed that the AWG would complete its work "as early as possible" and aim to ensure that there is no gap between the first and second commitment periods. The 4th session of the AWG will resume in Bali. On the agenda will be the identification of ranges of emission-reduction objectives of Annex I Parties, and the review of the AWG's work programme, methods of work and schedule of future sessions.

CONVENTION DIALOGUE

The Convention Dialogue was created to allow parties to the UNFCCC to share experiences and analyse strategies for long-term cooperative action to address climate change. It is an open and non-binding exchange of views, information and ideas in support of enhanced implementation of the Convention. It does not open any formal negotiations leading to new commitments. A series of dialogue workshops have covered four thematic areas: addressing development in a sustainable way, addressing action on adaptation, realising the full potential of technology and realising the full potential of market-based opportunities. In Bali, the dialogue's co-facilitators will report on the workshop series to COP13. Among other things, the Convention Dialogue has identified four key building blocks for long-term action to address climate change. They are mitigation, adaptation, technology and finance.

CONTACT GROUPS AND CORRIDORS

After the opening plenary sessions of the COP, COP/MOP, SBSTA, SBI and the AWG, issues that require further consideration will be referred to contact groups, which will meet and report back to the plenary. All interested Parties and observers are able to participate in the formal meetings of the contact groups. However, in order to aid negotiations, often additional informal contact group sessions, only open to the Parties, will also be held. Parties often hold informal bilateral meetings with each other to try and reach agreements on difficult issues.

NEGOTIATING GROUPS

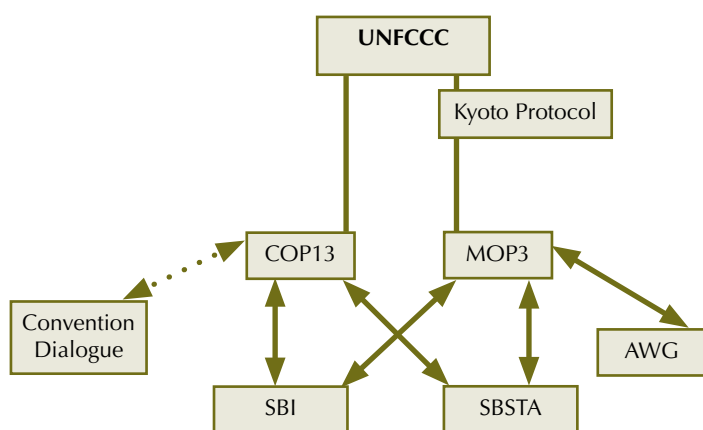
In the UN process, in theory, each country holds an equal vote. However, in reality, there is a big difference in the negotiating power of individual nations. Some have teams of well-trained negotiators, whereas others have individuals who may be meteorologists or technicians without training in negotiating. Rich countries have used this to their advantage in the past by negotiating at length about minor issues — leaving opponents tired out — and then rapidly bringing in key decisions. In addition to country delegations, nations come together in different blocks to negotiate on common interests (see maps).

The **G77/China** brings together 132 countries whose main position is that the rich countries should accept their historical responsibility for climate change and greatly reduce their emissions while allowing the G77/China to continue to develop. Within that group there are some tensions due to the wide diversity among countries and regions. Within the G77/China there are a number of regional and special-interest sub-groups.

The **European Union (EU)**, which comprises 27 member states, negotiates as a unified entity and the **Umbrella Group** brings together non-EU Western nations (Australia, Canada, Iceland, Japan, New Zealand, Norway, Russia, Ukraine and the US).

Kyoto Emission Reduction or Limitation Commitments (% relative to 1990 emission levels)	
EU-15, Bulgaria, Czech Republic, Estonia, Latvia, Liechtenstein, Lithuania, Monaco, Romania, Slovakia, Slovenia, Switzerland, Belarus	-8%
US*	-7%
Canada, Hungary, Japan, Poland	-6%
Croatia	-5%
NZ, Russia, Ukraine	0
Norway	+1%
Australia*	+8%
Iceland	+10%
NB: the US has withdrawn from the KP; Australia has signed the KP but not ratified it*.	

Each year, a Conference of Parties (COP) to the UNFCCC assesses progress in implementing the Convention and negotiates next steps. The Conference of the Parties serving as the Meeting of Parties (COP/MOP) to the Kyoto Protocol takes place at the same time, as do meetings of the UNFCCC's two subsidiary bodies. From time to time, special working groups are established to address particular issues. The Ad Hoc Working Group (AWG) on Further Commitments for Annex I Parties under the Kyoto Protocol, which is currently constituted, is one such example (see below).



SUBSIDIARY BODIES

The SBSTA and SBI each have specific mandates and report to the COP and COP/MOP. The SBI considers issues relating to the implementation of the Convention and its Protocol, such as national communications of greenhouse gas emissions, funding and capacity building. The SBSTA addresses scientific, technological and methodological matters, such as technology transfer, impacts, vulnerability and adaptation to climate change, and methodological issues associated with emissions, such as preparing emissions inventories and addressing land use, land use change and forestry (LULUCF).



G77/China



Africa Group



Alliance of Small Island States



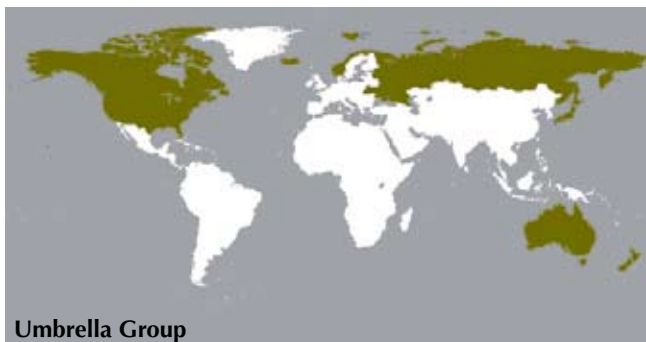
Least Developed Countries



OPEC



European Union



Umbrella Group



Environmental Integrity Group

The **Alliance of Small Island States (AOSIS)** is a coalition of 39 small islands and low-lying coastal countries that share similar development challenges and concerns about the environment, especially their vulnerability to the adverse effects of global climate change, including sea level rise.

The 49 **Least Developed Countries (LDCs)** are the world's poorest countries and are mostly in Africa. Their emissions are tiny compared to those of other countries and they are the least prepared for the changes ahead.

Although most of their members are also part of the G77/China, the LDCs and AOSIS want large developing nations such as China and India to reduce their emissions. This break from solidarity within the larger block is a new development.

The **Africa Group** comprises 50 countries that are seeking to highlight their particular vulnerability to climate change and other issues of concern such as poverty and access to resources.

The **Environmental Integrity Group** (Mexico, South Korea and Switzerland, together with Liechtenstein and Monaco) sometimes intervene as a separate negotiating group to ensure their inclusion in last-minute, closed-door negotiations.

The 13-member **Organization of the Petroleum Exporting Countries (OPEC)** is not a formal negotiating group, but often creates barriers to progress in the negotiations because oil — a major source of greenhouse gases — is the lifeblood of their economies.

Key outcomes in Bali?

BALI ROADMAP

Optimists hope that delegates will agree on which elements need to be negotiated to create a successor to the Kyoto Protocol, whose emission reduction and limitation targets only extend until 2012. A 'Bali Roadmap' would set a timetable for negotiating this post-2012 regime, ideally by 2009 when COP15 will be held in Copenhagen, Denmark. Pessimists fear that countries will adopt a short-term approach and continue to expect each other to make the first move.

The Kyoto Protocol took two years to negotiate, from 1995-97, but only entered into force in 2005. So the next two years will be critical. Two outcomes are possible: a fair and appropriate agreement in Copenhagen, or an incomplete and inadequate one that will do little to protect the climate system and those most vulnerable to climate change.

THE ADAPTATION FUND

The Adaptation Fund was set up under the Kyoto Protocol to support adaptation to climate change in developing nations. It is financed from a 2 per cent levy on the value of credits resulting from emission reduction projects under the CDM. But the fund is not yet operational. Key elements associated with the operationalisation of the fund will be negotiated in Bali.

AVOIDED DEFORESTATION

Deforestation produces 20-25 per cent of global greenhouse gas emissions but the UNFCCC and Kyoto Protocol do not currently include measures to address deforestation in developing countries. This will be an important negotiating point in Bali. Many tropical nations want rich countries to provide financial support and positive incentives to them in exchange for keeping their forests intact. They are calling for early action through support for pilot activities that explore this option before 2012.

IPCC

The Intergovernmental Panel on Climate Change (IPCC) will brief delegates on the findings of its Fourth Assessment Report, whose Summary for Policymakers was published in November 2007. The report is the most comprehensive scientific assessment of climate change to date. It stresses that abrupt and irreversible impacts are possible and says urgent action must be taken.

ACTION FROM CHINA

China has consistently stated that it will not accept binding emissions reduction targets. However, in Bali it may indicate a willingness to consider other types of commitments or steps to reduce emissions — a move that could help to break the deadlock between Annex I and non Annex I countries about future commitments under the Kyoto Protocol's successor.

More information

UNFCCC (www.unfccc.int)

The UNFCCC's official conference website lists full details of the agenda, side events and information for journalists. To request interviews with UNFCCC officials or referrals to delegations, email: press@unfccc.int. When requesting an interview, please indicate which media organization you represent and submit a brief list of questions to be answered.

National Focal Points (<http://maindb.unfccc.int/public/nfp.pl>)

The list of National Focal Points provides contact details of representatives of the Parties to the Convention.

IPCC (www.ipcc.ch)

In November 2007, the IPCC published its Fourth Assessment Report (AR4), a complete synthesis of the latest scientific and economic analysis of the causes of climate change, mitigation and adaptation.

Earth Negotiations Bulletin (<http://www.iisd.ca/climate/cop13/>)

The Earth Negotiations Bulletin (ENB) is a balanced, timely and independent reporting service that provides daily information in print and electronic formats from multilateral negotiations on environment and development. The ENB team will be reporting daily from the meetings in Bali. Journalists can subscribe to free electronic reports by email.

CLIMATE-L (www.iisd.ca/email/climate-l.htm)

The International Institute for Sustainable Development's Climate-L email list is a top source of news about events and publications about climate change.

Post-2012 Policy Options

Various groups have suggested frameworks for post-2012 climate policy. These are available in pdf format:

Forum on Global Climate Strategies beyond 2012:

The Route Ahead

<http://tinyurl.com/37mr9y>

Global Leadership for Climate Action:

Framework for a Post-2012 Agreement on Climate Change

<http://tinyurl.com/325f93>

Tallberg Foundation:

Climate Policy Post-2012 - A Roadmap

<http://tinyurl.com/2sw73t>

*Kevin Rudd, elected Prime Minister of Australia on 24 November 2007, has pledged to ratify the Kyoto Protocol immediately.

The International Institute for Environment and Development (IIED) is an independent, nonprofit research institute working in the field of sustainable development. IIED provides expertise and leadership in researching and achieving sustainable development at local, national, regional and global levels. This opinion paper has been produced with the generous support of Danida (Denmark), DFID (UK), DGIS (the Netherlands), Irish Aid, Norad (Norway), SDC (Switzerland) and Sida (Sweden).

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Flight plan: taking responsibility for aviation emissions

An IIED Briefing

Hugo Kimber, The Carbon Consultancy

Aviation emissions make up less than 2 per cent of the world total, but are rising fast. These environmental costs must be balanced with development gains, however: air travel can hugely benefit poor countries' economies. The good news is that much can be done to curb emissions while keeping those benefits on board. Workable tools and guidelines for passengers, travel providers, government and airlines are waiting in the wings.

A vital area for improvement is the way emissions are reported and calculated. Airlines, travel providers and carbon companies currently report emissions using a hotchpotch of methods, all producing varying results. Basing reports on fuel usage will make standardised ecolabelling possible. With an informed choice, passengers can buy tickets strategically and so encourage airlines to use more efficient technology. Airports can integrate ways of limiting emissions into their daily operations, while governments can invest in better air traffic control. Collective responsibility — and action — could make flying a much more sustainable means of travel.

KEY MESSAGES:

- Airlines need to report actual fuel usage by aircraft to allow for accurate emissions labelling.
- With informed choice based on aircraft and airline emissions efficiency, passengers can encourage the adoption of better aircraft technology.
- Passengers can also choose direct flights, support airlines that maximise passenger load capacity, and carry less baggage on short-haul flights.
- The travel industry can promote surface travel within Europe for trips of 500 kilometres or less.
- Tugs could be used in airports to reduce emissions from taxiing planes.
- The UK needs to work towards putting the Single European Sky initiative into action.
- Governments and the industry should expand airports only if demand is still rising once aviation is bearing its full environmental costs.

Taking the measure of aviation emissions

Aviation emissions still make up less than 2 per cent of global greenhouse gases emissions, but are set to grow exponentially. This is borne out by figures from the Intergovernmental Panel on Climate Change (IPCC), the International Air Transport Association, the World Tourism Organization and figures from UK airports (see 'The sky's the limit' overleaf).

Despite all the available statistics, however, consumers tend to find the data on aviation emissions extremely confusing. This is not surprising, as emissions values are not based on actual reported fuel usage.

As a measurement or value, fuel usage determines the amount of carbon dioxide (CO₂) emissions created by fuel combustion. Aviation emissions are made up of a number of greenhouse gases, of which CO₂ is the largest single component. Carbon emissions are measured in kilograms or tonnes, and reflect CO₂ emissions. The aviation industry calculates its CO₂ emissions using a fixed ratio of CO₂ to fuel weight combusted.⁶ But there are other factors in the calculation: combustion varies according to the weight of the plane (including passengers and cargo), the distance travelled and a range of performance factors. So the industry's CO₂ emissions are usually expressed as a total value or as a value per passenger per kilometre travelled.

The sky's the limit: the rise in emissions

The IPCC estimates that aviation emissions produce 1.6 per cent of total world greenhouse gas emissions.¹ They also forecast an annual growth rate for world aviation of 5 per cent per year to 2015, basing this on a yearly increase in fuel consumption of 3 per cent — figures that reflect the improved efficiency of aviation fuel. The International Air Transport Association (IATA) supports this growth projection in the near term with their 2008 world aviation growth forecast of 6 per cent, and estimates that global aviation emissions make up 2 per cent of all emissions.² Estimates by aircraft manufacturers of future sales also show continued growth for aviation.

Data from UK airports provide further evidence. Passengers travelling through them have risen from 4 million in 1954 to 235 million in 2006. Aviation emissions have been increasing as a share of the total. Between 1990 and 2000, UK aviation emissions grew by 200 per cent while non-aviation emissions for the same period declined by 9 per cent.

Globally, the industry employs a massive workforce, generates substantial commercial benefits and supports up to 8 per cent of world GDP.³ World tourism is a major beneficiary of aviation. The World Tourism Organization (WTO) estimates that world tourism revenues in 2006 were worth US\$735 billion, accounting for 35 per cent of world export services and over 70 per cent in some developing countries.⁴ The WTO estimates there were 760 million international tourist arrivals in 2004, producing aviation emissions of 594 million tonnes of carbon dioxide⁵ from more than 30 million flights.

Some airlines report fuel usage in relation to the number of passengers they carry. In the absence of complete declarations from all airlines, different models are used to calculate the fuel burn of an aircraft and deliver an emissions value per flight and passenger. Either of these values will vary according to the methodology and modelling employed in their calculation. In the UK, the standard for reporting and measurement is set by the Department for Environment, Food and Rural Affairs (DEFRA).⁷ But carbon calculators provided by offset companies are a major source of aviation emissions information, and these are not always consistent with DEFRA values.

A recent comparative analysis⁸ found a 300 per cent difference in reported emissions for the same flight using carbon calculators, and a difference of over 20 per cent using calculators provided by airlines to their passengers.⁹

Efficiency-based purchasing

Once all airlines provide detailed fuel-based reporting of emissions, an accurate comparison of emissions at an industry and per-flight level will be possible. An eco-labelling scheme, like those in use by car and white goods manufacturers, can then be launched. Making the eco-labels easily accessible, through travel agencies and websites, will allow customers to buy tickets on the basis of emissions efficiency.

Currently over 20 per cent of airline seats worldwide are empty during flight, despite moves such as decreasing the number of aircraft flying selected routes. While airlines have become more proactive on capacity issues, through strategic purchasing consumers can also do their bit to accelerate efficiency in the industry.

Passengers can also encourage reduced per-flight emissions by buying direct flights, where possible. Flying via indirect routes can create up to 29 per cent more emissions than flying direct. And if consumers understood the relative emissions values of air and surface travel, they could help cut emissions even further, by choosing rail or coach for trips of 500 kilometres or less — which currently make up 40 per cent of flights within Europe.

Aviation technology has supported advances in fuel efficiency but, unlike the car industry, there is no short-term prospect of alternative fuel cell technology powering commercial aircraft. The future benefits of advanced technology are welcome, but are likely to be outweighed by the substantial expansion in aviation activity (see also 'Efficient flying', opposite).

Voluntary emissions reductions

There are other areas where consumers, along with the travel and aviation industries, can take responsibility for reducing emissions.

Carbon offsets Airlines, tour operators, travel agents and consumers have so far seen carbon offsets as the primary method for reducing the impact of emissions. Offset schemes have operated as a voluntary pollution tax on aviation, with the proceeds supporting a wide variety of projects to save and store carbon emissions. These offsets represent only a small fraction of total aviation emissions, however and, while the approach raises awareness, this has been undermined by a lack of standards and extravagant claims about the 'carbon neutral' benefits they confer on purchasers. The net result is that offset schemes can often be used as a means to abdicate responsibility, and continue with 'business as usual' emissions.¹⁰

A wider voluntary response is needed to reduce emissions. The travel industry should focus on delivering emissions ecolabelling using existing national guidelines for reporting, and avoid presenting offsets as their main aim.

Airport management Using tugs to bring aircraft to the runway would have a significant impact on cutting aviation emissions. For an Airbus A320 on a flight of 500 nautical miles (nmi), taxiing in and out equates to 9.1 per cent of total flight emissions. For a Boeing 747-400 on a 3000nmi flight, the value would be 2.2 per cent of the total emissions. Airport size and congestion levels would need to be factored in for the figure to be completely accurate.

Weight restrictions Passengers can reduce emissions by carrying less baggage, especially on short-haul flights. On

the main short-haul route from the UK to Spain, which accounted for 34 million passenger movements in 2005, if each passenger had carried 5kg less in baggage, they would have saved between 54,400 and 68,000 tonnes of CO₂. The higher figure is the equivalent of 2,950 aircraft flights from London to Malaga.¹¹

A related consideration is average human body weight. In some countries, such as the US, standard passenger weight has increased significantly. If average weight continues to rise, this will result in reduced fuel efficiency per passenger kilometre.

What governments can do

Many people see governments as responsible for reducing emissions from all sources. In the UK, recent increases in Air Passenger Duty have helped to create the impression that the government is taking responsibility for the impact of aviation emissions via taxation. A lack of clarity over the use of tax revenues compromises this notion, but there are a number of areas where government could act in the meantime.

Emissions trading Government action on emissions centres on the European Emissions Trading Scheme (ETS), a mechanism for pricing carbon and trading emission allowances throughout the EU. Under the guidelines of the UN Framework Convention on Climate Change, non-domestic aviation is not included in national emissions accounts. Countries outside the EU, notably the US, show few signs of supporting a global extension of the ETS or the incorporation of international aviation into national carbon accounts. While there are a number of taxation and regulatory mechanisms available to the UK government as a national response to emissions reduction, any unilateral action on taxation might prompt some airlines to move operations offshore, and may lead to difficulties with prevailing global aviation agreements.

Airlines take differing views of the ETS and its impacts. At this point, it is also difficult to assess these impacts in terms of any reduction benefits derived from including aviation in the scheme. What is clear is that supporting an EU-wide programme is desirable, although the ETS will

Efficient flying: keeping emissions low

How a plane is used, along with the efficiency of the aircraft itself, largely determines the fuel and emissions efficiency of a flight. Newer aircraft tend to be more efficient than older ones, but this is not the only criterion on which efficiency calculations are based.

Seating The number of seats on a plane will determine its maximum passenger load and, assuming a constant average load factor, the plane with the most seats will deliver the lowest per flown seat emissions, even allowing for incremental fuel weight and usage for the flight. Maximising seat capacity ensures the total emissions of each flight are divided among the largest number of passengers. The underlying reason for the favourable per flown seat emissions of low-cost carriers is not just their high load factor, but also the fact that passenger seating is maximised, enabling more passengers to travel on each flight.

Direct vs indirect The importance of direct flights relates not just to distance flown, but the need for two landing and takeoff cycles (LTOs) in one journey. The LTO requires a large amount of fuel for this part of any flight and the use of direct flights between two points ensures that less fuel is used and thus fewer emissions are created. The use of point to point travel as opposed to hub and spoke (a system in which flights from a number of points arrive at, then leave from, one common point) helps to reduce emissions.

Load factor An airline with a low load factor on a route will create higher per seat emissions than a competitor with similar aircraft and seating capacity. The total flight emissions are divided among fewer passengers.

Engine type, altitude, air traffic control, cargo weight and a range of other factors will also help to determine actual emissions per flight. Many of the factors affecting fuel consumption cannot be determined easily, and in many cases are factors over which consumer purchasing may have less effect than routing, seating and load factor.

Example: the Airbus A380

The new Airbus A380 has been designed to improve fuel efficiency per seat for long-haul flights. It can carry more passengers than any other commercial aircraft and this delivers greater fuel efficiency and lower emissions per seat. The actual benefits will depend on the number of seats on board and load factor. If the plane is configured for upwards of 500 passengers it will clearly deliver a better per passenger performance than if it is mainly configured for first and business class travel with, for example, 300 to 400 seats.

In addition, the A380 is designed for long-haul point to point travel, which may require an increase in short-haul flights to those large airports from which the A380 will predominantly operate. The A380 may be the most efficient long-haul aircraft per passenger seat, but it will not really be possible to assess its full benefits until it has commenced operations with a number of airlines and seating configurations, load factors and when the downstream effect on short-haul flights has been assessed. This represents the challenge for efficiency-based purchasing, and also highlights the need for fuel usage reporting so that a choice can be made, and real benefits and performance can be assessed in the light of actual data rather than anticipated benefits.

only cover commercial flights within the EU from 2011, and all flights to and from the EU starting in 2012. In the meantime, the government needs to focus on those areas where it can make a difference.

Charges based on aircraft utilisation — that is, aircraft type, the distance flown and the number of passengers carried — would be an incentive for greater energy efficiency. They would also provide a simple mechanism for assessing the carbon cost of aviation in the interim period before aviation is included in the ETS.

Single European Sky Today's system of air traffic control is estimated to generate an additional 12 million tonnes of carbon emissions annually — more than four years' worth of domestic UK aviation. The IPCC suggests that the benefit from more efficient air traffic control could be between 6-12 per cent of total annual aviation emissions.

The 'Single European Sky' is an initiative to restructure European airspace use to reduce flying time and so improve air traffic efficiency. The initiative enjoys support from both the aviation industry and scientists. Given the UK government's aspirations to be a leader in global climate change action, promoting the Single European Sky as a priority would be logical and desirable.

Limiting airport expansion The government should avoid expansion of UK airports until the full environmental cost of aviation is borne by the industry and passengers. This is the approach recommended by the 2006 Eddington Transport Study, put together for the UK government by former BA chief Sir Rod Eddington.

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1. IPCC (1999) *Special Report: Aviation and the global atmosphere*. IPCC, Geneva. This figure will have increased since 1999. The 1.6 per cent figure is for aviation as a percentage of global greenhouse gas emissions, and not just CO₂. The aviation CO₂ figure as a percentage of total CO₂ emissions from human sources is 2 per cent. See www.ipcc.ch.
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9. Part of the difference in reported emissions is down to radiative forcing, a measure of the impact of a change in atmospheric composition on climate. The total warming effect of CO₂ emissions from aircraft in flight is 2.7 times greater than the effect of these emissions alone. Aircraft also produce water vapour and particles as 'contrails' that trap heat. There are considerable uncertainties in the science, however, so this issue is only touched on here.
10. Reid, H. and Roe, D. (2007) *The Trouble with Travel and Trees*. IIED Sustainable Development Opinion. IIED, London.
11. This figure was calculated by taking total air passenger movements, CO₂ per kilogram of baggage as an emissions value modelled over a Boeing 737-500 by the University of Manchester for The Carbon Consultancy. The number of flights as an equivalent from London to Malaga uses DEFRA per seat values based on distance flown and assumes DEFRA 737-400 capacity at 75 per cent load factor.

CONTACT:



Climate, Carbon, Conservation and Communities

An IIED/WWF Briefing

2007

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The growing market for carbon offers great opportunities for linking greenhouse gas mitigation with conservation of forests and biodiversity, and the generation of local livelihoods. For these combined objectives to be achieved, strong governance is needed along with institutions that ensure poor people win, rather than lose out, from the new challenges posed by climate change. This briefing paper explores the opportunities from and limitations to carbon-based funds for conservation and development. It highlights mechanisms that may help secure benefits for climate, conservation and communities.

Carbon: linking climate and conservation

With climate change riding high on the political and economic agenda, more and more attention is being paid to different mechanisms for offsetting, reducing and preventing carbon releases into the atmosphere. The UK's 2006 *Stern Review on the Economics of Climate Change*¹ estimated that land use change – and deforestation in particular – is responsible for 18 per cent of global emissions.

Yet so-called “avoided deforestation” or “reduced emissions from deforestation and degradation” (REDD) projects are not yet recognised under the Clean Development Mechanism (CDM) of the United Nations Framework Convention on Climate Change (UNFCCC) during the first commitment period (2008-2012) of its Kyoto Protocol.

The exclusion of standing forests from the CDM stemmed from a number of concerns, including:

1. the risk of deflecting attention from the need to curb industrial emissions
2. technical issues relating to whether forests can deliver robust carbon benefits. For example, forest carbon stores can succumb to disease, fire or logging, making them less than permanent, with a risk that emissions from forest conversion are often displaced to other locations.

Discussions on the development of a new post-2012 Kyoto framework have reignited debate on whether to include REDD projects. This is in large part due to the increasing recognition of the significance of emissions from deforestation and also to the technical improvements in monitoring carbon stocks – for example through better satellite imagery. There is growing international consensus that any future agreement under the UNFCCC to combat climate change must include measures seeking to reduce deforestation in tropical countries. Limiting global warming to 2°C above pre-industrial levels will mean that all major sources of potential reductions in emissions,

including those from deforestation and land degradation, will need to be considered.

The WWF Energy Task Force concluded that curbing emissions from land use change is a key part of tackling climate change while the *Stern Review* stated that “curbing deforestation is a highly cost-effective way of reducing greenhouse gas (GHG) emissions and has the potential to offer significant reductions fairly quickly”. In addition to deforestation, the UNFCCC Subsidiary Body for Scientific and Technological Advice acknowledged that forest degradation needs to be addressed when developing mechanisms to reduce emissions from land use.

Along with climate change, biodiversity loss is another environmental issue of international concern. The Millennium Ecosystem Assessment (MA) highlights how biodiversity underpins the delivery of a range of “ecosystem services” on which human well-being depends but is being degraded at an unprecedented rate. Although the complex links between biodiversity loss and climate change are not yet well understood, there are some clear overlaps:

1. Land conversion contributes to GHG emissions and has been identified by the MA as a major driver of biodiversity loss.
2. The MA estimates that by the end of the century, climate change will be the main driver of biodiversity loss.

Efforts to tackle climate change are thus becoming increasingly entwined with efforts to address biodiversity loss. A common solution appears to lie in efforts to curb carbon emissions through forest conservation. This should be good news for biodiversity conservation. For a number of years, conservation organisations have been lamenting the decline in available funding. Carbon funds, however, are growing at a phenomenal rate, and offer the potential to make up some of the shortfall.

KEY MESSAGES:

- The new generation of carbon funds must address the need for a sustained reduction in carbon emissions, while also building good governance and strengthening the resilience and adaptive capacity of ecosystems and local communities in the face of increased vulnerability to climate change.
- To tackle climate change effectively, we need to “join the dots” between biodiversity loss, local livelihoods and land use changes such as deforestation.
- There is a strong need for credible standards that link curbing emissions with forest conservation to ensure they provide robust carbon benefits while incorporating biodiversity conservation and benefits to local communities.
- Conservation-based strategies that address carbon emissions, which include afforestation, reforestation and curbing deforestation, must be made robust.
- Forest carbon stores are vulnerable to disease or fire, and carbon-emitting activities can be displaced elsewhere.

Forest carbon thus provides a tool for mitigating climate change and financing forest conservation.

It is vital, however, not to overlook local development issues. An effective, sustainable approach demands an examination of the overlap between the *three* areas. For instance, can forests provide robust carbon benefits? Will the growing volume of carbon funds invested in land use improvements for climate purposes take biodiversity conservation into account? **And what are the implications for local communities living in and around areas earmarked for carbon sequestration?**

Different mechanisms for linking carbon emissions and biodiversity conservation

Carbon trading

Under the Kyoto Protocol, industrialised countries in Annex B to the Protocol are able to address emission reduction obligations through three mechanisms:

1. trading carbon credits with other Annex B countries (emissions trading)
2. offsetting emissions through investment in emission-reduction projects in other Annex B countries (Joint Implementation)
3. offsetting emissions through investment in emission-reduction projects in developing countries (CDM).

In addition to these so-called “compliance” mechanisms, a “voluntary” carbon market has emerged through which individuals and organisations can choose to offset their carbon emissions for various purposes, often linked to individual or corporate responsibility. These include:

1. government-led mechanisms such as the New South Wales GHG Abatement Scheme
2. schemes run by specialist carbon brokers and/or retailers.

Carbon funds operate like any project-based investment fund: a set of partners invests in the fund, the fund invests in a portfolio of emissions-reducing projects (for example, renewable energy and energy efficiency projects) and the fund manager or broker sells the carbon credits generated, with profits going to investors.

3. individual carbon-offset projects run by NGOs.

This voluntary market is growing rapidly, is largely unregulated and is often confused with official “compliance” mechanisms by consumers. Although many schemes purport to offer sustainable development benefits in addition to carbon offsetting, some have been criticised for lack of transparency, accountability and rigorous carbon measurement systems. There is a strong need for voluntary emission reductions to be verified against clear standards to ensure that they provide a robust carbon benefit, alongside any additional co-benefits they promote.

A number of means exist through which investments in these compliance or voluntary mechanisms can link payments for carbon emissions with biodiversity conservation:

1. Individual projects can be designed to meet CDM criteria, registered with the CDM and sold on the international market. Sellers include government agencies, conservation organisations and community groups. CDM projects are intended to secure firm carbon reductions and also contribute to sustainable development, and have to meet certain standards to be eligible.
2. Outside the CDM, retailers may invest in a portfolio of projects for sale to individuals or organisations on a “pay as you go” basis – for example, planting trees to offset emissions from air travel.
3. The Climate, Community and Biodiversity Alliance – a partnership convened under the Center for Environmental Leadership in Business – has developed a set of standards for land-based carbon projects that simultaneously address climate change, support local communities and conserve biodiversity. WWF helped develop the Gold Standard to measure sustainable development benefits (including biodiversity) of offset projects,

but this does not currently include forestry projects. Both are applicable to the compliance and the voluntary markets.

4. The World Bank BioCarbon Fund is an example of a carbon fund specifically aimed at projects in forests and agro-ecosystems, with a view to securing climate and biodiversity co-benefits.

Conservation funds

Because of concerns over biodiversity loss, conservation organisations have long invested in projects that tackle tropical deforestation through the various sources of funding available to them. These include official development assistance, corporate donations, contributions from philanthropic foundations and member donations. Funding for conservation is likely to increase significantly if projects that reduce emissions from deforestation and degradation are accepted under the second commitment period of the Kyoto Protocol, which is expected to start by 2012.

Estimates of likely revenue streams vary widely, depending on which costs and benefits are included and which carbon pools and mitigation options are assessed. One review noted that as much as US\$43 billion could flow into developing countries for conservation if REDD projects are approved.² A recent World Bank report³ estimated that forested land could be worth between US\$1,500 and US\$10,000 per hectare if returns to forest land were funded through the carbon market. The top-end value is based on a price of US\$20 per tonne of carbon, which was the price within the Emissions Trading Scheme at the time the report was written.

Meanwhile, substantial conservation funds are already beginning to emerge alongside the carbon market. For example:

- As part of its £800 million Environmental Transformation Fund, the UK Department for International Development recently announced a £50 million UK contribution to a new fund to help conserve the Congo Basin rainforest.
- The World Bank is developing a Global Forest Alliance to address key international forestry challenges, including climate change mitigation. Linked to this, a new funding mechanism – the Forest Carbon Partnership Facility – is proposed to generate payments for efforts to reduce emissions from deforestation and to build national capacity to establish baselines, analyse drivers and monitor impacts of measures to reduce emissions from deforestation and degradation.

Other proposals also exist for various forms of conservation trust funds. The Brazilian government, for example, has called for the establishment of an international trust fund to which industrialised countries make voluntary contributions and which can be used to provide compensation for slowing or preventing deforestation.⁴

Conservation-based strategies to address carbon emissions

A wide range of forest-based projects can help reduce, prevent or offset carbon emissions. These include:

Afforestation

- large scale commercial plantations
- smaller scale tree planting schemes
- agroforestry
- community woodlots

Reforestation

- large scale plantations on deforested land
- tree planting on degraded land
- forest restoration

Slowing or preventing deforestation

- establishment, expansion or enforcement of protected areas
- sustainable forest management.

To date, afforestation and reforestation projects have attracted relatively little investment, with the bulk of carbon funding going towards industrial and energy projects. Under the CDM, for example, only one such project has been registered. This is largely

to do with problems of guaranteeing the “permanence” of forest stock and of “leakage” or “displacement” – that is, displacing the carbon-emitting activity elsewhere.

Dialogue within the UNFCCC is beginning to move away from the term “permanence” towards “time bound sequestration agreements”, whereby a resource owner commits to maintaining carbon stocks for an agreed period. Issues around displacement can be reduced through setting national and, where appropriate, regional targets (rather than a project-based approach) and gaining broad participation of countries with significant forest areas to avoid the potential risk of displacement between neighbouring countries. “Additionality” refers to the requirement that activities under the CDM project should be additional to those which would have happened without the carbon finance. This is a problematic concept with all CDM projects and is not specific to forests.

One criticism of many forestry projects is that the biodiversity value is the primary reason for the project and that, therefore, the activity would have taken place even without carbon finance. Projects can demonstrate “additionality” if they face barriers that cannot be overcome without carbon finance or when the activity without carbon finance is not financially the most attractive and, therefore, will not happen on its own.

Under the current CDM, assessment of “additionality” generally focuses on establishing whether a reforestation activity is economically viable without the CDM. The issue of economic viability is relevant to REDD projects, as the economic incentives to convert forests are often greater than the incentives to conserve or manage them responsibly. However, this is a complicated area. Overcoming concerns relating to “additionality” requires careful control to ensure that only projects proven to meet these requirements receive finance.

Who benefits from conservation-carbon projects?

Conservation-carbon projects have different implications for different stakeholders – national governments, conservation NGOs, private companies and local communities. Overall, the carbon trading market is dominated by large-scale projects with little community ownership and benefit. Large-scale monoculture plantations are an efficient way of sequestering carbon, due to their rapid growth rates and minimal management regimes, but they have negative impacts on biodiversity and ecosystem functioning. They present high barriers to entry for poor producers because they are capital intensive and scale dependent. These producers may also lose access to land that is designated for a plantation or other carbon-related activity. As noted by the Center for International Forestry Research (CIFOR), “A number of countries have targeted ‘degraded areas’ for CDM plantations. In many cases, however, these may be lands held under traditional common property systems that are used by local people for a variety of purposes.”⁵

With potentially high rates of return from carbon offset projects, opportunities are being seized by powerful elites, while local communities often lack the secure tenure and resource rights to stake their claim. In Uganda, for example, a project entailing the planting of trees for carbon offsets in Mount Elgon National Park has been criticised for ignoring local people’s land rights and exacerbating the conflict between the park authorities “guarding” the trees and adjacent communities claiming rights over the land.⁶

Projects aimed at reducing deforestation appear to have greater long-term potential for attracting investment, but again the likely distribution of costs and benefits raises concerns. It is estimated the largest income flows would accrue to only a few countries. The *Stern Review* reports that eight countries are responsible for 70 per cent of emissions from land use change (Bolivia, Brazil, Cameroon, Democratic Republic of Congo, Ghana, Indonesia, Malaysia and Papua New Guinea), with Brazil and Indonesia

accounting for 20 and 30 per cent respectively.⁷ A framework which also includes incentives for maintaining low levels of deforestation would expand the number of countries that could benefit from a forest carbon market, such as India, and also reduce the risk of transnational displacement.

Concerns have also been raised that benefits are likely to be captured by government ministries, private companies and conservation NGOs. Local communities will likely bear a disproportionate share of the cost in terms of restrictions on resource use while reaping little of the benefit. Simply increasing investment in forestry through funding for carbon storage and sequestration is unlikely to generate more sustainable forest management or greater benefits to biodiversity and poverty elimination, without first addressing critical governance issues.⁸ A few of the common pitfalls are outlined below.

Reducing emissions from deforestation, by reinforcing protected areas without the full participation of local communities, could be a form of “protectionism by the back door” and reopen decades of discussion on the livelihood and poverty impacts of protected areas. For these schemes, the Overseas Development Institute highlights two key concerns for local, forest-dependent people:⁹

1. How will incentive or payment schemes be targeted to ensure that the benefits reach those whose livelihoods are affected by changes in land use practice?
2. How will displacement be addressed and what are the implications for local resource rights and livelihood needs?

These concerns are echoed by the Forest Peoples Programme (FPP), which fears states may use REDD funds to reinforce state and private sector control over forests and revert to a “guns and guards” approach to forest protection. FPP also highlights the risk of REDD funds fuelling land speculation and the appropriation of community land – either by external actors or by more powerful individuals within a community.¹⁰

Connecting carbon, conservation and community benefits

While there are certainly risks to local communities from the rapidly growing interest in carbon conservation, there are an increasing number of fledgling schemes that could benefit local communities and generate income streams in areas with very little alternative economic potential, particularly where explicitly designed to do this.

Little attention has been paid to such “bottom-up” approaches to date, but some good examples exist of projects which provide both carbon and biodiversity benefits.¹¹ The BioCarbon Fund portfolio includes a number of community-based projects. In Niger, for example, local communities enter into a partnership agreement with a private company to grow *Acacia senegalensis* for the production of gum arabic.

Plan Vivo is a good example of a scheme specifically designed with community benefits in mind, and supports small-scale initiatives with local communities that can be used to generate tradable carbon credits. One is a Community Carbon Project in the N’hambita community in the buffer zone of the Gorongosa National Park, Mozambique. The project improves the livelihoods of this very poor community by introducing agroforestry systems that provide income from carbon finance and a range of other benefits such as fruit, timber, fodder, fuelwood and improved soil structure. The community also benefits from improved organisational capacity, education and awareness about forest stewardship and conservation, and the introduction of novel income through beekeeping, cane rat production and craft making.

The Forest Stewardship Council (FSC) provides accreditation for sustainably managed forest products, which takes into account the

rights of indigenous people, local communities and workers. FSC requires that:

1. The legal and customary rights of indigenous peoples to own, use and manage their lands, territories and resources are recognised.
2. Forest management operations enhance the long-term social and economic well-being of forest workers and local communities. FSC's principles and criteria provide an example of how local community benefits can be linked to forest conservation.

Next steps: Beyond carbon conservation?

The urgent need to reduce carbon emissions is generating exciting new initiatives. While these offer a big increase in investment flows for conservation, there are a number of critical concerns. Our preliminary review suggests the need to understand the role of biodiversity and impacts on local communities of carbon management within these initiatives: in their prioritisation of projects, and in the process of agreeing to include "avoided deforestation" as a legitimate carbon reduction approach. These new mechanisms have yet to include the lessons from the past few decades of biodiversity conservation and sustainable forest management. As yet, they pay scant attention to governance issues, and the rights of poor local people, particularly those with limited livelihood diversification options and those critically dependent on forest resources.

It is vital that biodiversity, social and cultural values are taken into account in the design and implementation of afforestation/ reforestation (A/R) and REDD projects. The concept of High Conservation Value Forests (HCVFs) aims to ensure that forests of outstanding and critical importance are maintained, given their high environmental, socio-economic, biodiversity or landscape values. The aim is to identify HCVFs and ensure that management decisions are consistent with maintaining those attributes of high conservation value. The concept was originally developed within the Forest Stewardship Council certification process, but is increasingly being used by timber purchasers, land-use planners, conservation advocates and within policy debates. It would provide useful elements to incorporate in standards for A/R and REDD projects to ensure that these values were respected and maintained.

Encouraging innovation through a "seed-bed" approach by supporting small-scale projects is part of the answer, as is greater attention to rights, equity and livelihoods within all initiatives. Equally important is to recognise that sustainable resource management mitigates climate change through reducing carbon emissions, and also helps local communities adapt to the effects of climate change.

In Vietnam, for example, tropical cyclones have damaged the livelihoods of those living near the coast, and climate change is likely to increase the frequency and severity of such tropical storms. Since 1994, the Vietnam National Chapter of the Red Cross has worked with local communities to plant and protect mangrove forests in northern Vietnam. Nearly 12,000 hectares of mangroves have been planted, and the benefits have been remarkable.

Although planting and protecting the mangroves cost US\$1.1 million, it has saved US\$7.3 million per year in dyke maintenance. During the devastating Typhoon Wukong in 2000, project areas remained unharmed while neighbouring provinces suffered huge loss of life, property and livelihoods. The Vietnam Red Cross estimates that 7,750 families have benefited from mangrove rehabilitation. The mangroves are also a reservoir for carbon sequestration and family members can now earn additional income from selling crabs, shrimp and molluscs while increasing the protein in their diets.¹²

In Sudan, local farmers harvest gum from gum arabic trees. The trees seed themselves naturally on farmland, and the farmers leave the seedlings to grow for five years until they can be tapped for gum. Local people are also selecting varieties with greater resistance to drought and hotter temperatures, both associated with climate change. These activities enhance livelihoods, help local people adapt to a changing climate, sequester carbon in tree growth and support good land management and biodiversity conservation.¹³ The UNFCCC Adaptation Fund will expand the number of such projects.

The wise development of carbon funds offers a major opportunity to respond to climate change in ways that blend mitigation and adaptation. However, for these new carbon funds to succeed, they must bridge local and international interests, and engage with local people to ensure these partnerships for sustainable forest management are transparent and accountable. They need to deliver tangible livelihood benefits, maintain biodiversity and ensure long-term gains from forests, rather than rapid disbursement of funds.

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The authors acknowledge with thanks the input and ideas from colleagues in WWF and IIED.

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An IIED Briefing

How we are set to cope with the impacts

Hannah Reid and Saleemul Huq, IIED

Climate change is now very much with us, and for the poorest of the poor the implications are particularly daunting. These often remote or marginalised communities are so burdened they will struggle to meet the coming challenges. Adaptation – learning to cope with rising temperature and other effects of climate change – is a difficult but essential task for these vulnerable millions. This briefing paper defines climate change adaptation and shows why it matters, who needs to adapt most, and what shape adaptation must take across a range of scales and sectors.

What is adaptation and why does it matter?

Within the science community, there is now broad consensus on the reality of human-induced climate change. The expert panel of scientists who make up the Intergovernmental Panel on Climate Change (IPCC) conclude, in their Fourth Assessment, that it is 90 to 99 per cent likely that the rise in global atmospheric temperature since the mid-19th century has been caused by human activity. The report predicts that the average global temperature may rise by about 3 degrees Celsius by the end of the 21st century, while sea level could rise by as much as 59 centimetres. Some projections point to summer sea ice in the Arctic disappearing completely by the year 2100. Heatwaves and periods of heavy rainfall are “very likely” to become more frequent, but tropical cyclones, though they may become more intense, could be less frequent.

There is now clear scientific evidence that climate change is real. But what can we do about it? In essence, there are two types of response. The first, mitigation, involves reducing emissions of greenhouse gases to slow or stop the process of climate change. The second, adaptation, is learning to cope with the temperature increases, floods and higher sea levels associated with climate change. (See the box on the back page for a range of concepts and terms associated with adaptation.)

The spotlight is now on adaptation for two reasons. First, people are realising that some climate change impacts are inevitable. Even if emissions of all greenhouse gases were to stop immediately, average temperatures would continue to rise for some time because of lags in the Earth’s natural processes. As a result, adaptation and mitigation are not

alternative strategies but rather, complementary ones: both need to be pursued together. Secondly, while scientists are clear on the need to reduce greenhouse gas emissions to stop global warming, action on the ground by politicians, businesses and individuals has been slow. Inadequate mitigation therefore makes the need to adapt to climate change impacts all the more pressing.

Who needs to adapt most?

Climate change is a global problem, so all countries must work to reduce their greenhouse gas emissions and learn how to cope with the impacts of climate change. Developing countries, however, have relatively small greenhouse gas emissions, so mitigation is less important for them. Adaptation is more relevant for poorer nations because of their relative vulnerability to the impacts of climate change, which stems partly from geographic location in areas such as drought-prone sub-Saharan Africa or flood-prone Bangladesh. These countries’ adaptive capacity is also lower than that of developed countries because of their limited financial resources, skills and technologies and high levels of poverty. Reliance on climate-sensitive sectors such as agriculture and fishing is also high.

The IPCC recognises the entire continent of Africa to be one of the most vulnerable to climatic variability and change because of multiple stresses, such as poverty, and its low adaptive capacity. Of Asia, the IPCC says that coasts, in particular the crowded mega-delta regions of South, East and Southeast Asia, will be at greatest risk from flooding from the sea and, in some delta regions, from rivers. The panel also cites small islands in both the tropics and higher latitudes as especially vulnerable to

the effects of climate change, sea level rise and extreme events. Least Developed Countries (LDCs) are also identified by the UN Framework Convention on Climate Change (UNFCCC) as among the most at risk from climate change, and as such receive support to identify their most urgent adaptation needs through National Adaptation Programmes of Action (NAPAs).

How is adaptation shaping up?

International strategies

Developed countries that are party to the UNFCCC are required to help countries most at risk from the effects of climate change meet the costs of adaptation. A fully conceived, integrated and functioning regime for adaptation, however, has yet to emerge. Progress has been made on identifying vulnerable countries and regions and adaptation options, and there has been some capacity building to prepare for adaptation, but few adaptation measures are in place. In part this is due to limited funds. The costs of adaptation are likely to be high, running at several billion dollars a year for developing countries alone.

Adaptation funding

Several financial mechanisms to support adaptation exist under the UNFCCC and the Kyoto Protocol, particularly in developing countries. The following four funds contain a total of over US\$310 million to date:

1. The Least Developed Countries Fund has already supported the development of National Adaptation Programmes of Action (NAPAs) and will likely assist the Least Developed Countries (LDCs) to implement their NAPA projects. It is based on voluntary contributions from wealthy countries.
2. The Special Climate Change Fund is for all developing countries and covers adaptation and other activities. It is also based on voluntary contributions.
3. The Adaptation Fund is meant to support “concrete adaptation” activities. It is based on private sector replenishment through the 2 per cent levy on Clean Development Mechanism projects (which channel carbon-cutting energy investments financed by companies in developed countries into developing countries), plus voluntary contributions.
4. The Strategic Priority on Adaptation contains US\$50 million from the Global Environment Facility’s own trust funds to support pilot adaptation activities.

A number of bilateral funding agencies in countries including Canada, Germany, the Netherlands, Japan, the United Kingdom and the United States have allocated funding for adaptation activities, including research and some pilot projects. To date, bilateral donors have provided around US\$110 million for over 50 adaptation projects in 29 countries.

Adaptation to climate change needs to be mainstreamed into development policy and practice at international and regional levels. For example, meeting the Millennium Development Goals will become even more difficult as climate change bites. Ensuring that adaptation is a part of international agreements is also important. For example, the ecosystem approach advocated in the Convention on Biological Diversity in many ways demonstrates good adaptation practice. Investment projects from bilateral or multilateral institutions and the private sector need scrutinising and modifying to ensure they are both “climate proof” and “climate friendly”.

Towards climate-screened investment

Climate change is not high on the agenda of most international donor organisations and governments. The International Monetary Fund and World Trade Organization, for instance, give it short shrift in their projects. As much as 50 to 65 per cent of development aid in Nepal was given to climate-sensitive sectors.

Clearly, international donor agencies need to assess the extent to which their investment portfolios in developing countries might be at risk from the effects of climate change, and take steps to reduce that risk. Several bilateral and multilateral development agencies and NGOs recognise this and are starting to take an interest. At least six donor agencies have screened their existing projects to assess how they rate in factoring in climate risk and addressing vulnerability to that context, and to identify opportunities to incorporate climate change explicitly into future projects.

National strategies

Climate risks need to be integrated into national development projects and strategies. In most developing countries this will require greater institutional capacity. With a few exceptions, most national policymakers are largely unaware of potential impacts of climate change in different sectors. As we have seen, the LDCs are currently preparing NAPAs, which alongside other national strategies and plans could help bring knowledge on climate change impacts and adaptation into national policy and planning processes.

While mainstreaming climate change risks into development policy (such as Poverty Reduction Strategy Processes) and practice is needed, this demands a more strategic approach. Ensuring a country can adapt well to climate change goes well beyond the need to ensure that individual projects are “climate proof”. Vulnerability can be reduced or increased by the choice of development path, and each country needs its own plans and institutions to ensure adaptation is both mainstreamed into development and factored in at a strategic planning level – both of which demand funding.

Local strategies

Because the poor will suffer most from many adverse climate change impacts, adaptation at the local level is essential. Climate change models at the local (and often national) level

are not very accurate. But a community that is vulnerable to current climate variability is likely to be vulnerable to future climate change, so it is not always necessary to wait for more accurate local forecasts to start building adaptive capacity. Strengthening community institutions to help them provide social safety nets and develop new coping mechanisms is a key way forward.

Adaptation in different sectors

Many developing countries have a good core of professional planners and managers operating in key sectors, but they are usually unaware of the potential impacts of climate change on their respective sector. Climate risk assessment needs to be incorporated into development activities by all of these professionals.

Agriculture and food security

This sector is at great risk from climate change in most developing countries. The IPCC states that in many African countries and regions, agricultural production, including access to food, is projected to be severely compromised by climate variability and change. Adaptation activities include using drought-resistant crops, introducing new farming techniques and diversifying income sources. India and Mali, for instance, are known for their strong agricultural professionals, and integrating climate change concerns into policy and planning is quite advanced in both, but in other countries less progress has been made.

Water resources

The IPCC states that in Africa by 2020, “between 75 and 250 million people are projected to be exposed to an increase of water stress due to climate change”. The amount of knowledge on climate change impacts varies according to region, with more in South Asia than in Africa. For example, Bangladesh is renowned for the quality and strength of its water resource managers. Professionals involved in planning and managing for irrigation, flood management and drinking water provision need to incorporate climate change risk management into their regular practices for designing water structures and measures.

Coastal zone management

This is an important sector in South Asia (Bangladesh and India in particular) as well as in the Gambia, Senegal and Tanzania in Africa. Planning for sea-level rise and vulnerability to storms and cyclones are both important. Coastal cities such as Alexandria in Egypt, and Banjul in the Gambia, will be particularly vulnerable.

Disaster management

Climate-related disasters such as floods, cyclones and droughts are recurring problems for developing countries. In most countries, institutions and plans to deal with early warning, relief, rehabilitation and recovery exist. Some are quite successful (such as the cyclone warning system in Bangladesh), but many are inefficient and unlikely to be able to cope with future disasters exacerbated by climate change. Strengthening national and local capacity in disaster risk reduction and disaster management by working with existing structures (such as the Comprehensive Disaster Mitigation Programme in Bangladesh) is essential.

Community-based adaptation: Cavite City, the Philippines

As a coastal town, Cavite City is very vulnerable to tropical cyclones, drought and sea level rise. Current climate-related problems include coastal erosion, siltation and sedimentation, storm surges and urban flooding, saltwater intrusion into water resources and degradation of water quality. Poor people, especially fishers and shellfish farmers, are affected most. Some autonomous adaptation has already occurred, including:

- Accommodating sea level rise by building houses on stilts
- Strengthening the physical structure of houses
- Moving to safer places during calamities
- Placing sandbags along the shorelines
- Borrowing money from relatives or acquiring high-interest loans from money lenders
- Engaging in alternative income-generating activities locally or in other areas
- Changing occupation.

Such strategies, however, are inadequate and not effectively integrated into local development plans. The government has also instigated adaptation activities, including relief assistance, resettlement and shoreline protection. These have reduced the vulnerability of coastal households, but are inadequate and costly. Adaptation strategies proposed by local people are mostly non-structural measures such as policy and institutional reforms regarding coastal zone management, property rights, micro-finance/insurance schemes disaster risk management, fisheries/aquatic resource management and community-based adaptation. Local capacity development was also deemed important, as was improving knowledge management.

Health

The potential impacts of climate change on human health are huge but poorly understood. Christian Aid estimates that 182 million people in sub-Saharan Africa will die of climate change related diseases before the end of the century – yet health professionals have little understanding of what health impacts to expect, and how to cope with them.

ADAPTATION TERMS AND CONCEPTS

Adaptation to climate change: Actions to reduce the vulnerability of a system (such as a city) or population (such as a coastal village) to the negative impacts of anticipated human-induced climate change. Adaptation to climate variability involves taking action to reduce vulnerability to short-term climate shocks. Often adaptation to climate variability will also result in adaptation to climate change. Adaptation activities can be of different types, from the purely technological (such as sea defence construction), through behavioural (such as shifts in choice of food or recreation), managerial (such as changes in farming methods) and policy (such as planning regulations).

Adaptive capacity: Inherent capacity of a system or population to cope with climate impacts or climate change. This can include financial, technological, knowledge or institutional capacity. The poor often have lower adaptive capacities. **General adaptive capacity** is dependent on the state of development of a country, system or community, and is boosted along with any progress in development. **Specific adaptive capacity** is a function of a country, system or community's awareness and knowledge of climate change impacts, as well as its coping capability.

Adaptation deficit: Lack of adaptive capacity to deal with climate variability and climate change. A useful starting point in addressing adaptation can be to tackle the adaptation deficit before embarking on new adaptation activities.

Autonomous versus planned adaptation: Autonomous adaptation occurs without any specific planning. Planned adaptation occurs in anticipation of potential climate change.

Climate change risk: Additional risk to investments (such as buildings and infrastructure) and actions from potential climate change impacts.

Climate-proofing: Making additional investment to reduce or eliminate climate change risks. This is often the same as adaptation to climate change.

Limits to adaptation: Adaptation can considerably reduce the adverse impacts of climate change but cannot eliminate them. Hence there are limits to adaptation. Some places may also become permanently beyond adaptation, such as coastal areas inundated by sea level rise.

Maladaptation: Action or investment that enhances vulnerability to climate change impacts rather than reducing them. Removing maladaptations is another good starting point in addressing adaptation.

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A vital approach to the threat climate change poses to the poor

Saleemul Huq and Hannah Reid, IIED

Helping the millions of poor people at greatest risk from climate change to adapt to its impacts is a daunting task. One new approach that deserves greater support is community-based adaptation (CBA). This briefing paper outlines the concepts behind CBA, shares some early lessons learned, and calls for greater networking, information sharing and support for CBA activities.

The Intergovernmental Panel on Climate Change's (IPCC) latest report states clearly that climate change is already having discernable impacts. These are disproportionately affecting poor communities — especially those in poor countries.

These impacts are set to intensify, yet the poorest communities are unable to cope with current climatic (and other) shocks, let alone any future risks related to climate change.

It is vital that these communities are helped to adapt to climate change. Some international funding is being made available to support such work, but simply providing governments of poor countries with aid does not mean that it will reach the poor and most vulnerable.

Such communities are often marginalised, remote and receive limited services or support from their governments. Reaching the hundreds of millions of people in them will be an immense challenge for any international or national funding mechanisms.

Community-based adaptation

One approach to the problem that deserves greater support is community-based adaptation (CBA), which can be viewed simply

as an additional (though fairly new) layer of community-based development activities, practices, research and policies.

CBA begins by identifying the communities in the developing world that are most vulnerable to climate change. These are generally very poor, depend on natural resources and occupy areas already prone to shocks such as floods or droughts.

Once a community's vulnerability has been established, using the best available science on climate change impacts, the process of engagement with the communities can begin.

Lessons from the field

CBA is a very recent development but a number of early lessons have already been learned from the limited set of CBA activities done around the world so far. They include:

1. To do any good, outsiders must first gain the trust of the communities they want to help. Normally this would mean spending a long time with the community. But if trusted local intermediaries (e.g. NGOs, community groups or government bodies) are available, it is best to start dialogue with them before moving to the communities themselves.
2. Climate change is an esoteric and initially confusing concept to many. Communication about it must use a community's own language and terms they can understand. This means not only translating scientific texts into local languages but also giving up on the written word altogether and using traditional means of communication such as art and theatre, or modern methods such as video.

KEY MESSAGES:

- **Poor communities in poor countries are most vulnerable to climate change and are already feeling its impacts, but have contributed least to the problem.**
- **Helping them to adapt to climate change is vital, but identifying steps to take and ensuring that this information reaches communities at risk is a major challenge.**
- **Community-based adaptation (CBA) is a tool for achieving this. Important lessons are already emerging from the few pilot projects that have begun.**
- **It is important now to support as many CBA activities as possible and to share the experience and knowledge gained.**
- **IIED and its partners are creating an online CBA network and other opportunities to share knowledge of what works.**

Case study – Cavite City, the Philippines

Cavite City is surrounded by three bays and so is at risk from rising sea levels and tropical cyclones. Other threats linked to climate change include erosion, sedimentation, flooding and saltwater intrusion into groundwater. Poor people are most at risk due to their vulnerability to climatic events and social, economic, technological and institutional factors.

Many autonomous adaptation tactics have positive outcomes, but they are inadequate and not effectively integrated into local development plans. They include accommodating sea-level rise by building houses on stilts; reinforcing the physical structure of houses; moving to safer places during crises; placing sandbags along the shorelines; and engaging in alternative income generating activities.

Some government strategies (relief assistance, resettlement, shoreline protection, etc.) have reduced the vulnerability of coastal households, but the measures are inadequate and costly.

Consultations revealed that communities feel they only have poor to fair human, physical and financial capacities to face the threat of climate change. People expressed significant concern over climate risks, and proposed several adaptation strategies, many of which were non-structural, capacity-building measures. They include:

Improved knowledge management: such as community-based monitoring of changes in coastal areas for input into vulnerability and adaptation assessments; creation of community early warning systems; and documentation, sharing and promotion of traditional knowledge, skills and practices that enhance adaptation.

Policy and institutional reforms: such as developing an integrated coastal zone management plan that includes land and sea use zoning, alternative livelihood development and eco waste management; and providing secure property rights and micro-finance/insurance schemes that enhance the adaptive capacity of vulnerable groups.

Capacity development: through raising awareness; participatory risk and adaptation assessment and planning; alternative livelihood development and creating a multi-sectoral integrated coastal zone management body.

3. When the cooperation of the local intermediary and the community has been obtained, the process of identifying what adaptations are appropriate can start. This requires initial learning about the community's indigenous capacities, knowledge and practices of how to cope with climate hazards in the past. New activities, technologies or practices can then be introduced.

4. Once set up, an adaptation project looks much like any standard development project (e.g. for water harvesting in drought conditions) rather than a stand-alone response to climate change. The difference lies not in what the intervention is but in the inputs to the intervention. It is not what the community is doing but why and with what knowledge. The adaptation element introduces the community to the notion of climate risk and then factors that into their activities. This makes them more resilient both to immediate climate variability and long-term climate change. It should be noted though that the few existing CBA projects are so new that they have hardly been tested for resilience to climate variability let alone to climate change.

5. One important feature of the lessons from CBA so far is that learning itself requires practice. It is not possible to learn the theory of CBA in a university or training workshop and then apply it in the field — the learning comes from the practice itself. Adaptation is a classic case of learning-by-doing or 'action-research'.

6. The theory and practice of CBA are in their infancy but both are likely to grow very rapidly. It is important now to allow as many pilot activities to be carried out as possible and to share the experience and knowledge gained from them. This is a major challenge of networking in real time between practitioners, policymakers, researchers and funders — and the communities at risk.

First steps to sharing and networking

The above lessons were among those shared at the 2nd International Workshop on Community-Based Adaptation in Dhaka, Bangladesh in February 2007.

Delegates heard about communities adapting to heat waves in mountainous areas of India; floods in Bangladesh and Nepal; drought in Kenya; soil salinity in Sri Lanka; and health problems in Zimbabwe (see: <http://www.bcas.net/2nd-cba/index.html>).

Those present also formed the CBA Network to promote the sharing of knowledge on CBA activities from across the world. The web-based network will be up and running later in 2007 (contact beth.henriette@iied.org for details).

Community-based adaptation is also discussed at the two-day Development and Adaptation Days event held each year during the conference of parties to the UN Framework Convention on Climate Change (see: <http://www.iied.org/CC/COP12.html>).

Climate change and cities: why urban agendas are central to adaptation and mitigation

Hannah Reid and David Satterthwaite

Cities could hold the key to slowing and eventually stopping global warming. Most greenhouse gas emissions are generated from producing the goods and services used by middle- and upper-income urban consumers. Keeping global warming within safe limits demands far more energy-efficient urban buildings and production systems and urban lifestyles that are far less carbon-intensive. It is up to high-income nations — the biggest contributors to greenhouse gas emissions past and present — to show how such a transformation can be combined with high living standards. However, urgent action is also needed in the urban areas of low- and middle-income countries, both through mitigation to curb greenhouse gas emissions, and adaptation to the serious risks that climate change brings.

Getting mitigation into the urban plans of all nations

Per person, greenhouse gas emissions are 25 to 50 times higher in many North American cities than in most cities of low-income nations. The responsibility of high-income nations to rapidly reduce such emissions is clear. Demonstrating how to have a high quality of life without generating high greenhouse gas emissions is a priority. Well-governed cities are an important part of this – with support for increasingly energy-efficient homes, workplaces and transport systems. So much of what makes cities special as centres of culture, social innovation and entertainment need not be energy-intensive.

Does this need for ‘low-carbon’ urban development apply in Africa, Asia and Latin America? In one sense no, because most of their urban centres have much lower greenhouse gas emissions per person – and the priority response to climate change must be for protection from its likely impacts. But how these regions’ cities develop will be one of the main influences on future greenhouse gas emissions. Unless the world’s wealthiest nations demonstrate

that successful cities with a high quality of life can drastically reduce their greenhouse gas emissions, nations such as Brazil, China and India are unlikely to act on this.

Constraints on adaptation in cities

Most of the cities at greatest risk from climate change are in Africa, Asia and Latin America and the Caribbean. Many lack protective infrastructure. Most lack funding to take needed action.

There are two issues here. The first is the limits to what adaptation can do to protect natural resources and cities, towns and villages from the impacts of climate change. Adaptation only buys a little time – protecting against climate-change impacts that cannot be avoided. Efforts to adapt will become increasingly ineffective with no international agreement on keeping total greenhouse gas emissions within safe limits. And no international agreement will be reached unless high-income nations (including the US) agree to major reductions – to allow lower-income nations to expand their economies and increase consumption levels. The future of many major cities on the African or Asian coast or on many small islands is in doubt if no such international agreement is reached soon. Bangladesh, China, Egypt, India, Indonesia, Thailand and Vietnam are among the nations with the largest urban population within the low-elevation coastal zone.

The second issue is that many city governments lack the competence and capacity to adapt, and have huge infrastructure backlogs. In Asia, Africa and parts of Latin America, it is common for half a city’s population to live in informal settlements, lacking piped water supplies, paved roads, sewers, storm drains, and household waste collection. Many such settlements are on floodplains or coasts, next to rivers or on unstable slopes, leaving their inhabitants at greatest risk from storms and floods. City

KEY MESSAGES:

- High-income nations have generated the bulk of greenhouse gas emissions past and present. It is up to them to show how far less carbon-intensive lifestyles and production systems can be combined with high living standards.
- Low- and middle-income countries house three-quarters of the world’s urban population. Most of the global growth in population in the next few decades will be in cities and smaller urban centres in low- and middle-income nations, so how they develop will be a major influence on whether total greenhouse gas emissions can be reduced.
- Urban areas in low- and middle-income countries have a large and growing proportion of the world’s population most at risk from the storms, floods, heat waves and freshwater shortages that climate change is bringing or will bring. The earlier that adaptation to reduce these risks can be incorporated into city investment and development plans, the lower the unit costs.

governments often refuse to provide infrastructure for these settlements and to bulldoze them when they can. Thus, city politicians and civil servants have antagonistic relationships with the very people who are most at risk – yet who also provide the city with a cheap and flexible labour force, and urban businesses and consumers with a vast range of goods and services. Without fundamental changes in the way that city governments work with their low-income populations, effective adaptation to climate change is impossible.

The risks of climate change: an urban perspective

The human and economic costs of storms and floods in urban areas have grown rapidly over the last few decades. Some 95 per cent of deaths from disasters over the last 25 years have been in low- and middle-income nations, where very few businesses or households have insurance. The precise contribution of global warming to the rapid rise in deaths, injuries and loss of property from urban disasters is not known. But almost all the growth in natural disasters since 1950 has been in storms, floods and droughts — whose frequency or intensity climate change is likely to increase. Already, 2007 is the worst year on record for extreme weather events.

Many cities will face more intense rainstorms and hurricanes/cyclones/typhoons. Coastal cities are inevitably more at risk from sea-level rise, but perhaps the greatest threat they face is combined storm surges and high tides. Rising sea level may cause water tables to rise and undermine building foundations or lead to saltwater entering valuable groundwater sources. Many cities further inland face serious problems with flooding, as they are beside rivers or in the foothills of high mountains and vulnerable to the effects of more intense precipitation or snowmelt.

Most cities will experience more heatwaves and worsening air pollution. Many city economies will suffer as agricultural production in surrounding countryside is hit by storms, floods or constraints on water availability. The amenities of many coastal resort towns will be compromised by flood damage or loss of beaches. Warmer average temperatures can extend the range of disease vectors and increase risks from diarrhoeal diseases. While some changes may provide positive opportunities, these will require adaptation.

There is a profound unfairness globally in who generates climate change and who is at risk. Tens of millions of people in Asia and Africa have homes and livelihoods threatened by climate change, yet have made very little contribution to global warming. Would the US government oppose an international framework to reduce emissions if Washington DC, New York and Los Angeles faced risks comparable to those facing Alexandria, Dhaka, Mumbai and Bangkok today?

Priority for action

The earlier action is taken to reduce greenhouse gas emissions and begin reducing vulnerability to climate change's impacts, the lower the costs. Urban centres need a planning and investment framework that breaks the link between growing incomes and rising emissions. This demands housing and office buildings designed to need less heating, cooling and artificial

light; an environment where walking, bicycling or public transport becomes the norm for all income groups; and industry, commerce and services committed to and capable of cutting energy requirements and wastes.

If initiated now, such action need not draw resources from other pressing tasks. In most African and Asian cities and many in Latin America, 33-50 per cent of the population lack good provision for water and sanitation and live in illegal settlements. Close to a billion urban inhabitants live in very poor-quality, overcrowded shelters. It is difficult to see action on climate change as a priority. But there are three good reasons for taking action now:

- Modest adjustments to investment by choosing low-carbon technologies can, over time, bring much lower greenhouse gas emissions, even in cities with booming economies. The concentration of people and production in cities facilitates many actions to keep down energy requirements and support waste reduction and recycling.
- Much of what needs to be done to reduce risks from climate change also reduces other risks. For instance, better drainage systems protect health and reduce risks of flooding and waterlogging, and good health care systems should support disaster preparedness and rapid post-disaster response.
- Much adaptation does not require additional government spending but is achieved by changing incentive and regulatory frameworks that influence individual, household, community, company and corporate investments. This includes adjustments to building regulations, land use plans, pollution control and waste management.

Investments in adaptation must work with low-income groups. This means fully involving them in plans to reduce flooding and other risks. Relocating those living in informal settlements should be avoided wherever possible. Instead, upgrading programmes should be favoured, in which governments work with the inhabitants to combine improved infrastructure — for instance, for water, sanitation and drainage — with risk reduction. Low-income groups may be prepared to move from hazardous sites, but only if they are involved in decisions about where to move and how the move is organized. The capacity and willingness of governments to offer them safer, well-located sites they can afford is obviously the key to success here.

These adaptations are not easy: most will face opposition from powerful vested interests. In addition, too many policy makers at national and city levels see climate change as an environmental or global issue that is not their concern. Too many climate change specialists focus on reducing greenhouse emissions or generating funding 'for adaptation', with little understanding of what constrains effective local adaptation and how this can be addressed.

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Critical list: the 100 nations most vulnerable to climate change

Saleemul Huq, IIED, and Jessica Ayers, London School of Economics

Well over a billion people in 100 countries face a bleak future. In these, the nations most vulnerable to climate change, resilience has already been eroded by entrenched poverty, degraded or threatened environments and other problems. The harsher, more frequent natural disasters that are predicted could tip them over the edge into chronic famine or forced migration. Yet these are also the countries that have contributed least to climate change. It is vital that their voices and views be heard in the negotiations to determine the post-Kyoto climate regime. Equally importantly, the countries emitting the most greenhouse gases must redress the balance by establishing robust mitigation programmes and by supporting adaptation.

Pinpointing the vulnerable

The Fourth Assessment of the Intergovernmental Panel on Climate Change (IPCC) states that the impacts of human-induced climate change are likely to be felt in poor countries and poor communities first. The IPCC highlights the following as being particularly vulnerable:

- Small Island Developing States (SIDS)
- Africa
- Mega-deltas (particularly in Asia)
- The polar regions.

The UN Framework Convention on Climate Change (UNFCCC) also recognises SIDS and Africa as being particularly vulnerable, and adds to this the Least Developed Countries (LDCs). The countries making up these three groups are shown in the diagram.

As this shows, there is considerable overlap between the groups. For example, a number of SIDS — which are physically vulnerable because of their location on small low-lying islands or coasts — are also

socioeconomically vulnerable LDCs. Many African countries are also LDCs, and as noted by the IPCC, 'Africa is one of the most vulnerable continents to climate variability and change because of multiple stresses and low adaptive capacity' (our emphasis). These conditions are mutually reinforcing: a low level of development constrains adaptive capacity.

Taken together, these countries form one group of 100 nations, collectively housing well over a billion people. However, their CO₂ emissions (excluding South Africa's) account for only 3.2 per cent of the global total, compared to 23.3 per cent for the US, 24.7 per cent for the EU, 15.3 per cent for China and 4.5 per cent for India (see table below).

It is abundantly clear from this data that this group of 'Most Vulnerable Countries' (MVCs):

- Makes up a significant number of Parties to the UNFCCC and the Kyoto Protocol (and a more significant proportion of the 131 'G77' countries)
- Emits a tiny proportion of the total amount of greenhouse gases from human sources and a negligible amount relative to the emissions from the major emitting countries.

KEY MESSAGES:

- Human-induced climate change is likely to have the heaviest impact on small low-lying island and coastal states, African nations, Asian mega-deltas and the polar regions.
- The 100 most vulnerable countries have contributed the least to total global carbon emissions.
- If the highest-emitting nations fail to introduce strong mitigation measures, the most vulnerable countries will suffer catastrophic impacts over the longer term.

Highest and lowest: CO ₂ emissions, 2002			
Country/Region	Total emissions (1000 tonnes)	Total of global emissions (%)	Per capita emissions (tonnes)
LDC, SIDS and Africa*	791,456	3.2	2.2
LDC, SIDS and Africa	1,155,363	4.67	2.3
India	1,105,595	4.5	1.1
China	3,783,231	15.3	2.9
US	5,773,401	23.3	19.9
EU	6,117,989.5	24.7	8.4
Global	24,756,694	100	4

*Excluding South Africa

So while these countries and their people (particularly the poorest communities within them) will suffer severely over the next decade or two from the impacts of climate change, they bear minimal responsibility for creating the problem.

The need for strong mitigation and adaptation support

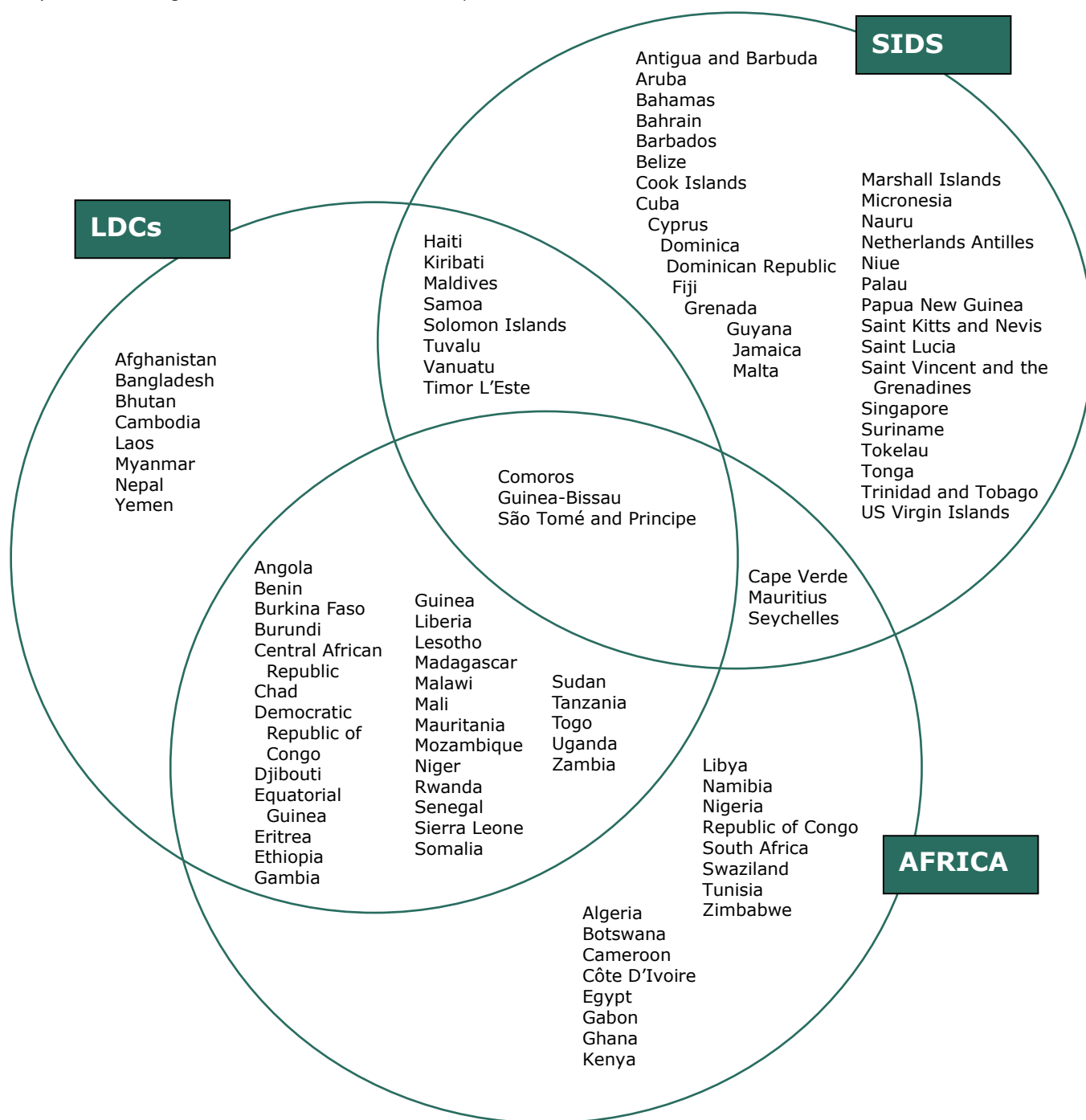
If during that time the countries and regions emitting the most — primarily the US, EU, China and India, as shown in the table — fail to introduce strong mitigation measures, the impacts on the MVCs over the longer term could be catastrophic. In the case of SIDS, some may be completely inundated and disappear altogether. In other cases, the lack of capacity to cope with the impacts of climate change may result in the forced migration of tens of millions of people, for example from the low-lying and densely populated delta and coastal regions of Asia and Africa. In the near term, these countries will need substantial funding for adaptation, running into tens of billions of dollars a year.

The December 2007 negotiations under the UNFCCC in Bali, Indonesia, are meant to lead towards a new, global climate regime. The Bali talks are of critical importance to this very large and significant group of most vulnerable countries.

It is therefore essential that their voices, views and perspectives be heard — and incorporated — in the post-2012 climate change regime negotiations.

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Counting the cost of climate change in Namibia

Hannah Reid (IIED), James MacGregor (IIED), Linda Sahlén (Umeå University)
and Jesper Stage (Göteborg University)

When most of a country's wealth is in the wild, shifts in natural systems can wreak havoc with its economy. Namibia is a case in point. Its natural legacy underpins much of the national bank balance — and also leaves it highly vulnerable to the impacts of climate change. In fact, research suggests the impacts on natural resources alone could reduce the country's GDP by 1 to 6 per cent. The need to mainstream climate change into national policies and planning is clear, not least because the poor will be most affected. Employment opportunities could shrink and wages fall, with incomes for unskilled labour dropping by 24 per cent in a worst-case scenario. So along with 'climate-proofed' policies and activities, Namibia needs a strategy to deal with displaced farmers and farmworkers. But it is up to industrialised nations — the most responsible for climate change — to help Namibia and other vulnerable countries cope with the impacts and plan for a climate-constrained future.

Vulnerability to climate change

The realisation is growing that poor nations will suffer most from the effects of climate change. This vulnerability stems partly from their location in areas such as drought-prone sub-Saharan Africa or flood-prone Bangladesh. Their capacity to cope with climate change is also low because of limited financial resources, skills and technologies and high levels of poverty. And they rely heavily on climate-sensitive sectors such as agriculture and fishing. Namibia is very dependent on natural resources: some estimate that up to 30 per cent of its GDP is reliant on the environment.

Ironically, it is also these poor nations that have contributed least to climate change. Data covering 1950 to 2000 from the Climate Analysis Indicators Tool, developed by the World Resources Institute, indicates that African countries contributed 4.6 per cent of cumulative global carbon emissions during that period. Today their share of emissions is just 3.5 per cent of the total. Namibia was in fact estimated

to be a net sink for carbon dioxide in 1994 due to the large uptake of CO₂ by trees. The country contributed less than 0.05 per cent to global CO₂ equivalent emissions in 1994, even when this carbon sink is excluded from calculations.

Increasingly, countries are recognising the need to assess the likely impact of climate change on their desired development pathways, and to ensure all policies and activities are 'climate-proof'. While climate change clearly must be mainstreamed into policies and planning, the way this will happen is less clear.

The forecast for Namibia

Temperatures in Namibia have been rising at three times the global mean increases reported for the 20th century. The rise in temperature predicted for 2100 ranges from 2 to 6°C. Particularly in the central regions, lower rainfall is expected, while overall rainfall is projected to become even more variable than it is now. Even if rainfall changes little from today's levels, hotter temperatures will boost evaporation rates, leading to severe water shortages. Poor rural pastoralist and dryland populations will be affected most. Extreme events such as drought are likely to become more frequent and more intense.

There may be less plant cover and productivity on grassland and savannah in response to relatively scant rainfall and more evaporation. Grassy savannah may also become less dominant as desertification occurs in some areas, and shrubs and trees benefit from higher levels of CO₂ in others. Impacts on the marine environment are uncertain, but scenarios range from dramatic ecosystem responses that reduce their overall productivity to more intense coastal upwellings — the wind-driven movements of cooler, nutrient-rich water to the ocean surface — which would increase productivity.

Quantifying the impacts

Namibia's advanced Natural Resource Accounts (NRA) help to evaluate the contribution of the environment to national wealth by developing

KEY MESSAGES:

- Over 20 years, annual losses to the Namibian economy could be roughly 1 to 6 per cent of GDP because of the impact climate change will have on the nation's natural resources.
- The impacts will fall hardest on the poor. Work opportunities will decrease and wages decline. Even under a best-case climate change scenario, a quarter of the population will need to find new livelihoods.
- Climate change is clearly a key influence on economic growth in Namibia. Nations such as Namibia can no longer ignore the contribution of the environment to, and the importance of environmental sustainability for, national wealth in the face of the climatic shifts.

so-called 'satellite' accounts for natural assets such as fish, forests, wildlife, water and minerals. Data from the NRA can be fed into the conventional national economic accounts. This capability potentially allows for sound sustainable development planning that includes natural resources as well as man-made or owned assets — a clear advantage for policy makers in economies such as Namibia's, which is so dependent on natural resources.

In NRA, natural assets are valued in two ways. First, the values of the total natural resource stocks are measured using the appropriate metric unit for area or volume. These are treated as capital assets in the stock or asset account. Secondly, their annual contribution to national income in terms of direct use values is measured in the production or flow account. Changes in the capital stock from year to year are also reflected in the national income.

Values	Current GDP contribution (%)	Changes expected due to climate change (%)	Effect on GDP (millions N\$)	Confidence in range of change
Use values:				
Cereal production	0.5	Decrease (10-20)	-16 to -32	Low to medium
Crop production	1	Decrease (10-20)	-32 to -65	Low to medium
Livestock production	4	Decrease (20-50)	-264 to -660	Medium
Traditional agriculture	1.5	Decrease (40-80)	-197 to -395	Medium to high
Fishing	6	Increase(30)/decrease(50)	0 to -990	Low
Tourism	2.3	Increase/decrease	-	Low
Forests	+ *	Unchanged	0	Low
Non-use value	+ *	Decrease	-	Low
Total value			-509 to -2142	

* Not included in the traditional national accounts

Data from the NRA was fed into a Computable General Equilibrium (CGE) model, which uses actual economic data to determine how economies respond to policy or other changes. This revealed that under a best-case scenario, agricultural impacts would be partly offset by improved water distribution, there would be no impact on fisheries and the overall GDP would fall by only about 1 per cent. Under a worst-case scenario, large-scale shifts in climate zones would reduce agricultural and fishing outputs, and the overall GDP would fall by almost 6 per cent over 20 years. However, this estimate constitutes only a fraction of possible climate change impacts because it considers only two economic sectors – agriculture and fisheries – and ignores impacts such as those on health, infrastructure and energy that relate less to natural resources and that other country studies have shown to be significant. The estimate also ignores non-use values such as 'option values' for future use or 'existence values' of just knowing that an area or species exists.

Namibian natural resource experts have further worked to quantify, as much as possible, the economic impacts of climate change on Namibia's natural resource base. Estimates of how climate change will affect various sectors, and subsequent translation into economic impacts, can only be best guesses. Expert estimates suggest, however, that over 20 years, annual losses to the Namibian economy could be between 1 and 6 per cent of GDP — that is, between US\$70 million and \$200 million — if no action is taken to adapt to climate change.

Who will be hit hardest?

Combining data from the NRA with Namibia's Social Accounting Matrix (SAM) provides the chance to see who will be hit hardest by the impacts of climate change on the environment. The SAM is a database that provides information on activities in different economic sectors and helps identify the poverty status of different groups. Evidence from low-income countries around the world suggests that the people likely to be most affected by climate change are the poorest and most vulnerable. And in Namibia, results show that climate change impacts will hit the poor hardest, with employment opportunities constrained and a substantial decline in wages, especially for unskilled labour.

Even under the best-case scenarios generated by the CGE model, subsistence farming will be sharply reduced. In the worst-case scenario for agriculture, labour intensive livestock farming is

hit hard, and while high-value irrigated crop production could thrive, job creation in this area would be minimal. Thus, even under the best-case scenario, a quarter of the population will need to find new livelihoods. Displaced rural populations are likely to move to cities, which could cause incomes for unskilled labour to fall by 12 to 24 per cent in order to absorb the new workers. Income distribution in Namibia is

already one of the most uneven in the world and this inequality is likely to increase. What this will do to social cohesion, if no counteracting policies are put in place, can only be imagined.

IIED is conducting a second study in this project series 'Estimating the economic costs of climate change' in Tanzania. This work is ongoing and publication is expected in April 2008. If you are interested in participating in this project in Tanzania, please contact James MacGregor at james.macgregor@iied.org.

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Migration and adaptation to climate change

Cecilia Tacoli, IIED

Climate change is having an undeniable impact on many human systems and behaviours, including population mobility. This is hardly surprising: migration is an adaptive response to changes in people's circumstances. Yet environmental factors are not the whole story. Socio-economic, political and cultural factors are also closely linked to population movement, and heavily influence vulnerability to both direct and indirect impacts of climate change. Shifts in migration patterns are a strategy of adaptation to complex transformations, and recognising and accommodating this is key in policies for sustainable development and poverty reduction in the context of growing environmental stress.

Vulnerability to climate change and non-environmental factors

The Intergovernmental Panel on Climate Change (IPCC) has laid out how climate change is having a dual impact on weather systems: gradual change (for instance, sea level rise and an increase in average temperature) and changes in extremes (for instance, increasing frequency and intensity of drought and extreme weather events, such as hurricanes). This combination of impacts will affect population mobility patterns, with gradual change boosting long-term migration flows, and extreme events resulting in higher numbers of internally displaced persons.

Adaptation plans need to take into account that the rural and urban poor are often both most at risk and most vulnerable to these impacts. The poor are more likely to live in high-risk areas with limited protection and support services, while loss of property has far more severe consequences for them because they do not usually have access to insurance. Gender can also be a factor in increasing vulnerability. In parts of rural Bangladesh, for instance, women's ability to escape floods is constrained by social norms preventing them from fleeing their homes without a man.

Much of the growing public interest in migration stems from the perception that population movement has reached crisis point, with too many people moving from poor to rich countries and from rural areas to urban centres. Climate change is now overtaking population pressure as the culprit: it is seen as triggering the movement of hundreds of millions of refugees escaping natural disasters and conflicts over access to dwindling natural resources.

Such views of rapid and uncontrolled migration are based on 'common sense' rather than hard evidence. A recent UN Environment Programme report on the Sudan points out that while environmental and natural resource issues are important, conflict in most of the country's regions is primarily the outcome of political, religious and ethnic divisions, land tenure deficiencies and competition over oil and gas reserves. Moreover, since 1970, well-established local mediation and dispute resolution mechanisms have been destroyed by legal reforms that have not provided viable substitutes.

Migration as an adaptation strategy

Most migration is a response to inequalities in the spatial distribution of opportunities, be they economic, social, cultural, political or environmental. For the poor, the migration of one or several family members is a common strategy to diversify income sources. People from rural households might earn cash from non-farm employment, while those in urban households, who often face employment insecurity and poor living conditions, may maintain rural assets such as land and livestock as a safety net. This helps to manage risk and reduce vulnerability and, in the most successful cases, can be a way out of poverty.

Whether migration as an adaptation strategy is successful and sustainable depends on several factors, including policies recognising that people often live and keep their assets in

KEY MESSAGES:

- Vulnerability to climate change is the result of many socio-economic, cultural and political factors, as well as environmental stress. Conflict and forced migration are inevitable where national and local institutions are weak or fail to represent the interests of poorer groups.
- Migration has long been a spontaneous strategy for adapting to both environmental and non-environmental factors. Where planned resettlement becomes necessary, the agreement of all stakeholders and long-term institutional support are crucial to success.
- Environmental stress is often a contributing factor in rural-urban migration and urbanization processes, which can in turn be key to adaptation. But national and local institutions must adapt to the new challenges of rapid urban growth by addressing the specific needs of the poor and encouraging economic growth that includes them.

more than one place. These are rare, however. In Botswana, for instance, many of the urban poor rely on livestock and farmland in rural home areas for food and income reserves but, as non-residents in their home area, they are not entitled to drought relief and risk heavy losses without compensation in the event of rainfall failure.

Links between migration and gradual climate change

Migration is a long-established strategy for overcoming difficult environmental conditions, often as a temporary measure. Historically, circular migration is important throughout the ecologically fragile areas of East Africa. In the Sahel during the severe drought of the mid-1980s, temporary circulation increased considerably. With climate change predicted to severely disrupt water supplies and damage land productivity, it is likely that these temporary measures will no longer be sufficient and that traditional livelihoods will need to undergo more radical transformations, including long-term and permanent migration to urban centres.

In Bangladesh, it is estimated that more than a million people every year lose their land and homes to flooding. While soil erosion is a central factor generating rural poverty, around 70 per cent of Bangladeshi rural households are effectively landless because of the country's highly unequal pattern of land ownership. This exacerbates their vulnerability to the impacts of climate change, and increases rural-urban migration.

Extreme weather events and population movement

Usually, populations who move in response to extreme weather events go back once the emergency has passed. But the length of time needed for reconstruction depends largely on the resources available and, in turn, on previous levels of poverty. In Honduras, the effects of Hurricane Mitch are still felt after almost a decade and many people are still displaced. While poverty increases vulnerability, the lack of effective institutions makes reconstruction far more difficult. In areas at high risk from disasters, repeated crises and limited reconstruction efforts increase vulnerability over time.

Adaptation and migration: the policy issues

Gradual climate change will contribute to higher levels of migration, alongside many other socio-economic trends. Spontaneous adaptation processes will involve larger numbers of people moving out of areas affected by water shortages and drought, soil erosion and possibly heat stress. In some cases they may be forced out of agriculture altogether under the combined onslaught of environmental factors, commercialisation of land, low incomes and limited access to inputs and markets.

Many of them may move to urban centres, speeding up processes of urbanization. To reduce the vulnerability of poor groups, urban planning will need to address their specific needs and encourage economic growth that includes the poor. Overall, a major shift is needed in most policy makers' perceptions that rural migrants to the cities constitute a problem. Migrants are often thought to increase urban poverty, but in most cases they are more likely to be employed than non-migrants, and to contribute to the urban

economy. Access to affordable housing and the provision of basic services are the new challenges presented by the rapid growth of the populations of urban centres. Improving local governments' capacity to address them is more effective than attempting to limit migration.

In many parts of the world, variations in climate — such as in the intensity and frequency of storms, rainfall or heat waves — will be so extreme that spontaneous adaptation strategies may not be sufficient. Planned adaptation initiatives, including resettlement programmes, may be necessary. These need to be worked out carefully in consultation with both the people needing to move and those already living in the resettlement area.

The successful negotiated resettlement of poor city dwellers in a number of countries, including India, Thailand and South Africa, shows that participation must be voluntary, participants must have secure rights over land in the new location, local institutions must be flexible and provide support over time, and the way resettlement is handled must be negotiated and agreed with all stakeholders. The same principles apply to disaster preparedness and to resettlement resulting, for example, from the construction of flood protection or other infrastructure designed to reduce climate change impacts. Disaster risk management includes both technical and political dimensions, and vulnerable groups need to be fully fledged participants in the process, with the support of effective and accountable institutions at the local and national levels.

Finally, while the overwhelming majority of people who migrate will continue to move within their own countries or regions, environmental stress and natural disasters — especially those that reduce already limited employment opportunities — are likely to affect changes in international migration patterns. In some cases, such as in the small island states affected by rises in sea levels, entire populations will have to move.

Overall, environmental stress will exacerbate the growing economic, social, political and cultural inequalities that disproportionately affect poor people in poor countries. As migration will increasingly become their main adaptation strategy, policies will need to accommodate it, as attempting to limit it would only increase their vulnerability.

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Miles better? How 'fair miles' stack up in the sustainable supermarket

Ben Garside, James MacGregor and Bill Vorley

In 2007, 'food miles' shot to the top of consumer concerns in the UK. Buying goods that took the shortest route from farm to table was widely seen as a way of shrinking carbon footprints. This left airfreighted produce singled out as the epitome of unsustainable consumption, and some UK retailers began to label flown items such as green beans from Kenya. Yet looking at the bigger picture, fresh produce airfreighted from Africa accounts for less than 0.1 per cent of UK emissions, and per capita emissions from sub-Saharan Africa are minuscule compared to those in industrialised countries. Against this background are the million-plus African livelihoods supported by growing the produce. Within the grocery supply chain the time is ripe for 'fair miles' — a working idea that puts development in the South on the environmental agenda, and allows UK retailers a more balanced response on behalf of their millions of customers.

As the start of 2007, UK retailers were jostling to establish their green credentials by pledging on eco-initiatives. In part this was a response to a rapid change in consumer polling on environmental issues — especially on climate change and 'food miles'. Both Tesco and Marks & Spencer announced that they would label airfreighted products and stock more locally produced food.

Marks & Spencer launched a £200 million five-year plan in January of that year. Their aim was to become carbon neutral by 2012 and roll out environmental management requirements for suppliers. The company stated that it was looking to minimise the amount of food airfreighted, and began to label such food as 'flown'.

The same month, Tesco's CEO Terry Leahy launched a £500 million eco-plan with a pledge to reduce the company's carbon footprint and encourage consumers to buy more sustainable products. Their target was to measure the

footprints of 70,000 items so that shoppers could 'be empowered to make informed choices' and help in driving the market for low-carbon products. Leahy set a target to airfreight less than 1 per cent of its products (with a bias for sourcing from 'the poor' within this percentage), compared to the 3 per cent currently flown in. Stickers for airfreighted products worded 'by air' were introduced as an interim measure.

In late spring, the Soil Association launched a one-year consultation on ways to reduce or eliminate the environmental impact of organic air freight, with a view to a complete or partial ban. Amid media attention and as part of the huge response to such a ban, IIED submitted its analysis. It shows clearly why a ban on airfreighting will damage lives in Africa, and why the Soil Association should see the consultation as a chance to positively support 'fair miles'.

Food miles in perspective

How do food miles measure up? As IIED has shown, the bigger picture begins to emerge when we compare the realities of airfreighting, along with related socioeconomic and environmental issues, for both the importing and exporting countries.

The view from Africa 'Ecological space' refers to a country's emissions: the bigger they are, the smaller the ecological space. In the UK, the annual carbon dioxide (CO₂) emissions rate per person is 9.2 tonnes. In Kenya it is 0.2 tonnes and in Uganda, 0.1 tonnes. Thus, sub-Saharan African countries have considerable reserves of ecological space compared with the countries to which they export.

The Kyoto Protocol recognises the need for equity and economic development for developing countries in the transition to a low-carbon future. Current calculations of a sustainable carbon future estimate equitable ecological space per capita globally as approximately 2 tonnes of CO₂ per year.

KEY MESSAGES:

- Airfreighting flowers and vegetables from developing countries, especially those in Africa, has drawn fire on environmental grounds and highlighted the issue of fairness in the 'food miles' debate.
- Without the right analysis, there is a risk that environmental and food miles arguments will work against development goals such as 'trade not aid'.
- Informed debate in the UK on food miles versus 'fair miles' is now allowing supermarkets to move away from token gestures toward a balanced response.

Meanwhile, the socioeconomic benefits for Africa are substantial. Over 100,000 rural people are employed in the exported fresh fruits and vegetables (FFV) sector in sub-Saharan Africa, roughly split 50/50 between small-scale farmers and employees on larger farms. Those who benefit include both rural and urban groups, and smallholders and employees along the supply chain. The FFV trade also has poverty alleviation benefits and provides seasonal, unskilled employment opportunities.

Indirect employment benefits are also significant. An estimated 100,000 to 120,000 people work in support services for the producers and employees. In total, there are an estimated 1 million to 1.5 million people whose livelihoods depend in part on the supply chain linking production on African soil and consumption in the UK. Every £1 of agricultural income generates another £1.5 for other businesses in Zambia and £1.64 in Kenya.

The view from the UK The UK's carbon footprint is largely domestically generated. Its Kyoto targets demand the reduction of domestic road transport and energy use, then aviation. Estimates that air travel will double in the next 20 years mean that cuts in that sector will be a necessary part of the solution. Yet passenger traffic makes up the lion's share of this rise. In the UK, it accounts for 90 per cent of air transport emissions, while international freight accounts for five per cent. The year 2006 saw air traffic in all sectors expand by 6 per cent.

Agricultural produce makes up only 0.1 per cent by value of all airfreighted goods. For FFV, between 60 and 80 per cent of imports to the UK are carried in the bellyhold of passenger aircraft. In the wider context, air freight is responsible for 8 per cent of the entire FFV sector and 0.2 per cent of total UK greenhouse gas emissions – while FFV from Africa accounts for 0.1 per cent of all UK emissions.

How UK retailers are changing their view

Analysis from IIED and other organisations such as the International Trade Centre has helped the balanced environment/development view to gain traction. The UK government, and some supermarkets and environmental organisations, have shown recognition that the food miles concept has limits as an indicator of environmental impact – and is also blind to the social and economic benefits associated with trade in food, especially from developing countries.

In March 2007, Leahy spoke of the need to balance 'fair miles' against 'air miles', admitting there would be 'hard choices'. On Freshinfo, a UK news site for commercial growers, he said, 'We all know that transporting a product by air creates far higher carbon emissions than any other form of transport. So we could say, "Let's scrap all imports by air." Yet some of the poorest people on earth get their goods to market by aeroplane.'¹ Tesco also said it was determined to boost trade volumes in agricultural produce with Kenya beyond the current US\$400 million mark, and has now dropped the 'by air' labelling scheme.

In June, Marks & Spencer reassured Kenyan agricultural suppliers that it would not cut imports of fresh produce.² Paul Monaghan, head of ethics at Co-operative Retail, meanwhile

described airplane stickers on airfreighted fruit and flowers as 'lazy thinking' and 'dangerous'. In the UK Guardian he said: 'There is a whole series of decisions like this which are being taken which are wrong because people aren't joining the issues up.'³ He committed the Co-op to reducing carbon, 'but never at the expense of the world's poorest'. And in November, Tesco and Marks & Spencer both admitted the stickers had had no impact on sales.⁴

The food miles debate is also being incorporated into a broader agenda on the entire 'carbon lifecycle' of a product, from seed to plate. From this, the Carbon Trust and the British Standards Institute will develop a new standard for measuring the carbon footprint of products. A number of other studies have shown significant carbon 'hotspots' within the food supply chain, in farm production methods, processing techniques, and consumer shopping patterns.

Yet airfreight remains on the radar. In October the Soil Association announced a ban on certification of airfreighted produce that was not additionally certified by it or by the Fairtrade Foundation. On the Department for International Development website, the UK trade and development minister Gareth Thomas responded by expressing concern for 'the livelihoods of the African farmers who don't meet these extra standards', adding that the move 'could also turn consumers away from airfreighted fruit and vegetables in general'.⁵

There is no need for legitimate interest in local food and 'food miles' to work against the interests of developing countries. What is clear is that consumers, policy makers, and food chain businesses should base decisions on good information. If environmental harm is to be weighed against developmental gains, it is essential to consider the full context in more detail, so that:

- The degree of harm is put into the context of Africa's current use of 'ecological space'
- The degree of harm is quantified and compared to that of other food choices
- The degree of development gain is quantified, to demonstrate whether this trade really benefits those living in poverty.

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See www.agrifoodstandards.net/publications for an overview of the issues covered here.

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Room to move: 'ecological space' and emissions equity

James MacGregor and Muyeye Chambwera

Tackling climate change will involve a monumental balancing act. How can we effectively curb emissions while ensuring that poor countries are not restricted in their efforts to develop sustainably? The concept of 'ecological space' offers a viable solution. By measuring and comparing countries' greenhouse gas emissions, we can pinpoint their share of the total remaining emissions the planet can sustain without serious disruption to climate. The relatively low emissions of poor countries — and the per capita levels for the poorest are just 2 per cent of those in the US — allow them the ecological space for non-restrictive economic development. Overall, the concept is a workable guide to achieving emissions equity while collectively moving towards a low-carbon future.

The distribution of ecological space

'Ecological space' extends the concept of rights to natural resources such as energy, land and clean air. With respect to climate change, ecological space means the highest sustainable level that global greenhouse gas emissions can reach. Because regions, countries and even individuals also have a share of ecological space within the total, the issue of equity in how it is distributed is key. The Kyoto Protocol's recognition of per capita carbon dioxide emissions helps in defining the concept of equitable ecological space at the individual level.

When we look at how ecological space is actually distributed globally, however, there is an obvious imbalance. Past and present emissions, and hence contributions to climate change, differ widely among different countries. Today, sustainable carbon emissions stand at about 2 tonnes per person per year. However, the actual global average is 3.6 tonnes, with the UK averaging 9.2 tonnes and Africa 1.04. So the UK, and other countries, have exceeded the limits of their ecological space, while Africa is under-utilizing its own.

The Least Developed Countries (LDCs) emit the least carbon per capita and in total. In Africa, only two countries — Libya and South Africa — emit more than the global average. In the LDCs, the per capita emissions of 0.2 tonnes amount to about 2 per cent those of the UK. The 1950-2000 data from the World Resource Institute's Climate Analysis Indicators Tool shows that African countries contributed 4.6 per cent of cumulative global carbon emissions then, and just 3.5 per cent today. Meanwhile, the EU has been exceeding global per capita average emissions for many years.

Harnessing ecological space

Because of its past and present greenhouse gas emissions, the industrialised world is the prime driver of climate change. Poor countries meanwhile pollute the least and suffer the most from the impacts of climate change. These disparities in emissions also mean most developing countries, particularly in Africa, have high levels of carbon credit. To redress the balance, developing countries can use some of their excess ecological space to reduce poverty and boost low-carbon economic growth and development. If the balance is achieved at a globally low level of emissions, it would be in line with the theory of Contraction and Convergence, proposed in the 1990s by the Global Commons Institute and accepted as a policy target by the Africa Group, among others.

While a significant share of the emissions from industrialised countries can be accounted to sources such as 'luxury' consumption and leisure, African countries emit mostly 'productive' carbon, generated in the course of meeting basic needs. This difference could be realized in trade-driven activities that benefit developing countries — for example, the export of flowers or green beans from several African countries, including Kenya, to developed countries like the UK (see 'Fresh thinking', below). While this may generate additional emissions in developing countries through production and freighting of these goods, it

KEY MESSAGES:

- Equity in mitigation should remain a key element in discussions under the Kyoto Protocol.
- Compared to industrialised countries, developing countries have 'ecological space' credit because of lower emissions, past and present.
- The international community needs to recognise the global benefits of promoting opportunities for developing countries to use or sell their unused ecological space – for example through low-carbon development, trade, transfer of knowledge and poverty reduction.
- Identifying and promoting equitable trade expansion would then promote sustainable development.

Fresh thinking: Africa's exported produce

Exporting produce such as flowers or green beans offers a good option for developing countries to use their excess ecological space in ways that promote development and poverty reduction. It is also an example of 'trade not aid', with the benefits spilling over into other parts of the economy. In Zambia, for instance, every US\$1 of agricultural income generates another \$1.50 for other businesses and about \$1.65 in Kenya. Currently there are 1 million to 1.5 million livelihoods supported by the industry, which has a declared value of some \$400 million and good prospects for growing further in Africa.

Emissions from aviation are not included in national emissions calculations at the moment, partly because of the unresolved problem of how to allocate associated aviation emissions between departure and arrival countries. In the case of exported African produce, if the aviation emissions were entirely allocated to the UK carbon budget they would account for an extra 0.1 per cent of the UK's total emissions. This would exceed the UK's ecological space even further, and effectively stop further trade in fresh produce with Africa — with predictable negative impacts on African economies.

Alternatively, if all the emissions were allocated to Kenya's budget, they would account for an extra 4.8 per cent of the country's total emissions, raising per capita emissions to 0.42 tonnes. As this is the equivalent of just 20 per cent of Kenya's estimated ecological space, the trade would be sustainable. An additional factor is that 60-80 per cent of fresh produce flown from Africa is transported in the bellyhold of passenger flights; so, when the passenger emissions have been factored out, the level accounted to produce will be lower.

In practical terms, potential exporters should be offered the opportunity to choose to use their spare national ecological space to pursue development initiatives, with scope to invest in low-emissions technologies in the long term.

also enables them to develop their economies and boost the livelihoods of many people.

Other initiatives have been proposed to enable the poor to adapt to the impacts of climate change due to past emissions by developed countries, such as:

- Incorporating adaptation as an additional value to the prices of voluntary carbon offsets originating in poor communities
- Introducing an International Air Travel Adaptation Levy to raise adaptation finance.

What needs to happen for the idea to work

A number of issues that have arisen around the concept of ecological space need to be addressed for it to work.

First, there is a need for innovative financial and economic mechanisms to encourage best practices. The UN Framework Convention on Climate Change could then be able to address both the impacts of climate change, and poverty reduction and economic development. Such mechanisms could include:

- A socially differentiated tax system on aviation that incorporates social considerations without transforming the incentives aimed at producing environmental benefits
- Allocating the carbon load from the export of fresh produce to the producing country.

Secondly, one of the challenges of achieving equitable emissions distribution is arriving at an internationally enforced global contract to reduce carbon emissions — for example, to the target of 0.45 tonnes per capita by 2100. Some of the issues that surface in this context are:

- Significant data limitations that constrain consensus among all countries
- The need for facilitating low-carbon economic development through technology and knowledge transfer from developed to developing countries
- The hot debate over mechanisms to hit the 0.45 tonnes per capita target by 2100, as these require emissions reductions

of over 90 per cent while allowing unconstrained economic development in developing countries.

Thirdly, the use of ecological space as a benchmark has limitations. As the global population rises, the global per capita ecological space shrinks. With the population of Africa forecast to double by 2025, total CO₂ emissions will rise if the per capita emissions are kept constant. Thus per capita and total ecological space available to different countries and regions as well as globally will need to be reviewed as conditions such as population shift.

Finally, as economic development continues, total carbon emissions from LDCs and developing countries will rise. If this economic development entails a shift from agriculture to manufacturing, higher levels of emissions will be expected. To keep these low, it will be essential to support this shift with the transfer of cleaner technology from developed countries. Even if the economic development is agriculture-based, improvements in technology and productivity are essential to minimize agricultural expansion as it often involves deforestation, which can generate emissions problems too.

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Water pressure: climate change and adaptation in the Niger River Basin

Ilona Millar

Climate change is expected to result in severe water stress over much of the African continent. Not only will water become scarcer in already dry regions, but changing freshwater temperatures could affect natural ecosystems and water quality. The Sahel, running along the southern edge of the Sahara, could see its water supply become even more erratic, increasing the risk of extended drought and more intense monsoons. Adapting to such potentially dramatic shifts will demand major adjustments to current water management systems and practices. But there is a serious complicating factor: more than 80 rivers and lakes on the continent are shared by two or more countries. As experience in the Niger River Basin shows, this interdependence must be a priority in regional, national and local adaptation strategies that affect transboundary water sources.

Climate change and water in Africa

Climate change and freshwater systems are interconnected in complex ways, with rainfall patterns, evaporation and water use influencing the availability of surface and groundwater. The direct impacts of climate change on these systems stem from the relationship between precipitation and/or temperature and the abundance and quality of water resources. Climate change may also have indirect impacts by causing shifts in temperature, population, lifestyle, economy or technology that in turn trigger shifts in demand for water.

Climate change is also expected to amplify and entrench water resource anomalies such as local drought or flooding at the river/lake basin level. The Intergovernmental Panel on Climate Change (IPCC) has indicated that the persistent drought in the Sahel since the late 1960s has resulted in a decrease in the availability of freshwater resources. The IPCC's 2007 Fourth Assessment Report, confirming its earlier findings, shows that trends in Africa include a rise in average temperatures of 0.7 °C for most of the continent

during the 20th century, and decreases in rainfall of up to 30 per cent over large portions of the Sahel. In the Niger River Basin, the river's mean annual discharge declined by 40-60 per cent. In future, the basin could see changes in rainfall, evaporation and runoff of approximately 10 per cent, although the scant available data make it difficult to predict these changes with any certainty.

The Fourth Assessment Report further notes that 25 per cent of the population of Africa — more than 200 million people — currently experience water stress. The population at risk of increased water stress in Africa is projected to be between 350 million to 600 million by 2050.

Water management as adaptation

Water management affects how vulnerable freshwater systems are to climate change. So the institutions governing water allocations and water infrastructure play an important role in determining how and where water resources are used. The IPCC has recognised the need for regional coordination in water management, particularly in international and shared basins, and it recommends that international basin authorities should be strengthened and backed by robust legal frameworks. In its Fourth Assessment Report, the IPCC states that current water management practices are unlikely to be capable of reducing the negative impacts of climate change on water supply reliability, flood risk, health, energy and aquatic ecosystems. Better incorporation of current climate variability into water-related management would, however, make adaptation to future climate change easier.

Adaptation in the water sector involves altering hydrological characteristics to suit human demands, and altering demand to suit water availability. On the supply side, adaptation could include increasing storage by building dams and reservoirs, desalination or rainwater storage. On the demand side, measures could include improving water use efficiency and water recycling, reducing irrigation by changing cropping practices, importing agricultural

KEY MESSAGES:

- The impacts of climate change on shared rivers will require regional as well as national solutions.
- There is a need to enhance the capacity of regional bodies that coordinate water management, and to mainstream climate change and adaptation into their planning processes.
- Adopting a basin-wide approach, based on integrated catchment management, may have a number of environmental, social and economic benefits for countries in the region.

products to irrigation areas and promoting local practices such as rainwater harvesting.

Traditionally, water has been managed on the assumption that historic seasonal patterns will persist. Now, the uncertainties of climate change, such as greater risk of drought or floods, demand a more dynamic approach. The integrated catchment management framework is one method that seeks to respond to the shifting conditions of climate change. However, few African countries have implemented this approach to date.

The Niger River Basin: water in West Africa

Running in a giant crescent from Guinea to Nigeria, the Niger River in West Africa is, at over 4000 kilometres in length, the third longest river on the continent. The Niger River Basin has a total area of over 2 million square kilometres, spanning 7.5 per cent of the continent. Its water resources are shared between nine countries: Benin, Burkina Faso, Cameroon, Chad, Côte D'Ivoire, Guinea, Mali, Niger and Nigeria. The river is also the second largest wetland in Africa and is home to biodiversity of global significance.

Compared to other African river basins, the Niger Basin has not reached levels of high stress. The use of freshwater in West Africa represents only 1 to 3 per cent of the region's total renewable water resources and many countries retain a large potential for irrigation. For example, Mali currently irrigates less than 25 per cent of its share of the basin. However, if current trends are maintained, levels of freshwater withdrawal are likely to grow sixfold by 2025.

River systems are facing a number of human-induced pressures, including over-exploitation of groundwater, poorly coordinated infrastructure projects, pollution and the removal of plant cover along banks. There has also been a significant increase in dam construction in West Africa. On the Niger River, for example, there are proposals for at least 20 new dams. These offer a way of providing a reliable water supply, but can also affect patterns of access to water resources that support communities, industry, livestock, wildlife and ecosystems.

Water management policies in the Niger Basin

Across the Niger River Basin, countries are pursuing policies and strategies aimed at addressing poverty reduction, sustainable development, climate change and natural resource management. These are often developed independently at the national level in response to mandates set by the international community. A case in point is the National Adaptation Programmes of Action being developed by the Least Developed Countries under the UN Framework Convention on Climate Change.

There have been a number of attempts to coordinate and harmonise policies for the management of shared water resources in Africa generally and in specific basins such as the Niger River Basin. However, these efforts have met with varying degrees of success.

The Niger Basin Commission was first established in 1964 to coordinate the nine countries' sharing of water resources in the basin. The Commission, which has evolved into the Niger Basin Authority (NBA), now aims to promote inter-state cooperation for the integrated development of natural resources of the basin, as well as harmonisation of national development policies.

In 2004, at the Conference of the NBA heads of states, the resulting Paris Declaration, relating to the 'Principles of Management and Good Governance for Sustainable and Shared Management of the Niger Basin', endorsed a shared vision for the basin's future management.

While this shared vision does not explicitly address the impacts of climate change and the need to adapt to them, it nevertheless provides a model for regional cooperation and an institutional framework within which decisions can be made for the whole basin. Importantly, the shared vision reflects emerging principles of best practice water governance, including the equitable and sustainable use of water and prior consultation and cooperation among basin states. This kind of approach is imperative when looking at the impacts of and responses to climate change on water availability within a shared river basin.

There is growing awareness of the impact of climate variability and change on water resources. However, more work needs to be done to promote international and basin-level collaboration on climatic and hydrologic data collection and adopting water management approaches that respond to the integrated nature of transboundary river basins.

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On the road to Bali: operationalising the Kyoto Protocol Adaptation Fund

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The Adaptation Fund was created under the Kyoto Protocol to support adaptation measures on the ground, particularly in very vulnerable countries. It is unique both in the way it is financed and in the potential scale of money generated. As such, we believe it will be best served with a 'stand-alone' operating entity and a decision-making format that genuinely guarantees the authority of the Protocol's Meeting of Parties over the Fund. This may mean a delay in setting up and running the Fund – but given the importance of getting its governance and management right, we feel this is an acceptable risk.

A new kind of funding mechanism

The Adaptation Fund (AF) was discussed at the first Meeting of Parties of the Kyoto Protocol (COP/MOP1) in Montreal in 2005, and again at COP/MOP2 in Nairobi a year later. In Nairobi it was agreed in Decision 5/CMP2 that 'the Adaptation Fund should operate under the authority and guidance of and be accountable to the COP/MOP [Art 1(e)], and that the membership of the governing body of the Adaptation Fund shall:

- (i) be from Parties to the Kyoto Protocol
- (ii) follow a one-country-one-vote rule and
- (iii) have a majority of Parties not included in Annex I to the Convention'. [Article 3]

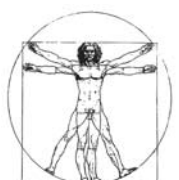
The AF is unique and, as such, its governance and management merit particular attention. Unlike the other UN climate change funds³, the AF does not rely exclusively on voluntary donations from industrialised countries. Instead it is currently envisaged that it will be funded mainly through an 'adaptation levy' on the credits generated by Clean Development Mechanism (CDM) projects carried out primarily by the private sector of both developed and developing countries. The 2 per cent levy is collected directly by an international body — the CDM Executive Board — and transferred to the AF for monetisation.

The adaptation levy is thus akin to an international tax on certain worldwide private sector activities. Because it does not flow through national treasuries, the money raised will by definition be additional to any Official Development Assistance (ODA). As the first instance of innovative international adaptation funding, it could potentially dwarf the amounts of money likely to be made available for adaptation through bilateral donations.

Moreover, there are other avenues of innovative funding for the AF that could and should be pursued — not least if the expected gap in adaptation funding is to

KEY MESSAGES:

- The Adaptation Fund of the Kyoto Protocol is a unique financing mechanism based on an international levy on mainly private sector projects under the Clean Development Mechanism.
- The Fund could potentially dwarf bilateral donations and become the main conduit for adaptation funding.
- The Fund will be best served with a 'stand-alone' governance and management structure featuring a new tailor-made expert executive body and a decision-making format that ensures the authority of the COP/MOP.
- While it would be ideal to set up such a structure without delay, speed is less important than getting the governance right, to achieve the purpose of the Fund.



be filled. These include an extension of the adaptation levy to the other mechanisms of the Kyoto Protocol (possibly at a higher rate), and the inclusion of bunker fuel-based emitting activities, such as air and maritime travel.

This is why we are not convinced by the two main arguments put forward for operating the AF by the same entity as the other two UNFCCC funds — namely, that this would eliminate significant duplications in adaptation activities under the different funds, and prevent the unnecessary creation of a new body. We believe that the AF is in a league of its own, and that it is sufficiently different from the other funds to necessitate the creation of a ‘stand-alone’ governance structure with an entirely new operating body.

Guaranteeing COP/MOP authority

The initial decision on the relation between the COP/MOP and the AF taken at Montreal was revisited at the very next session to assert the authority of the COP/MOP over the AF. This was a key assertion, not merely a redundant stylistic reformulation of the initial decision, and it must be adequately reflected in the governance structure of the AF.

We believe this means, at the very least, that the COP/MOP has ultimate authority over strategic decisions taken by the AF executive body, and that these decisions should be subject to approval by the COP/MOP. There are a number of features that would help to ensure this:

- Parties to the COP/MOP – which itself has to be explicitly designated as the voting constituency for the AF – must also be given the right to demand a vote on strategic decisions of the AF executive body.
- The COP/MOP decides which type of decisions by the executive body are strategic.
- Strategic decisions, once taken, must be ratified by the COP/MOP.
- The AF executive body must be responsible for making available information relevant to its decisions in a timely and transparent manner, in particular to the UNFCCC focal points.

Operating the Fund

To avoid conflicts with the COP/MOP’s overall political authority, and at the same time to ensure competence and avoid undue political interference, we propose that the AF executive body be made up of financial and adaptation experts. These will be chosen by the COP/MOP and operate in their personal capacity and in strict adherence with Article 3 of the Nairobi Decision.

We think that this kind of ‘stand-alone’ operating entity can be successful, as the Montreal Protocol Fund has amply demonstrated. The expert model also has a proven track record: it is used in the world’s most influential financial

systems, in bodies such as the Board of Governors of the US Federal Reserve System, the Board of Directors of the European Central Bank, and the Monetary Policy Committee of the Bank of England.

We also believe that – apart from the non-Annex I majority mandated in the Nairobi Decision – the executive body should be made up of members reflecting not only the UN regions, but also the main interest groups: the most vulnerable countries, including the Least Developed Countries (LDCs) and Small Island Developing States (SIDS), as the intended recipients, and the largest CDM investors, representing the main source of funding. The key, as mentioned above, is that all the members of the executive body would be sitting in their expert capacity and not as government representatives.

The day-to-day running of the AF could then be delegated to a Secretariat, either housed within an existing organisation or even set up as a separate entity. This structure is essential for achieving the broad political acceptance of this key climate change fund and we believe it is worth investing the time needed to get it right, particularly since the value of the credits collected through the adaptation levy to date is still negligible⁴.

Endnotes

¹ This opinion piece is based on a presentation by Enele Sopoaga on behalf of the Oxford Fellows to European colleagues during the 2007 ecbi Oxford Seminar (5-7 September). All authors are ecbi Fellows or Experts. For more on the ecbi see www.EuroCapacity.org.

² The views expressed in this article are the authors’ personal views and do not necessarily reflect those of either their respective countries or negotiating Groups.

³ The Least Developed Countries Fund and the Special Climate Change Fund.

⁴ At the time of writing, the AF holding account contained 1.6 million CERs (see <http://cdm.unfccc.int>), which even under the most optimistic assumptions would not raise more than €32 million.

The International Institute for Environment and Development (IIED) is an independent, nonprofit research institute working in the field of sustainable development. IIED provides expertise and leadership in researching and achieving sustainable development at local, national, regional and global levels. This opinion paper has been produced with the generous support of Sida (Sweden).

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The trouble with travel and trees

Hannah Reid and Dilys Roe, IIED

September 2007

Summary

The aviation industry is a small – although fast-growing – contributor to greenhouse gas emissions, but per kilometre its impact outstrips that of any other form of transport. As today's technology looks unlikely to reduce that impact significantly over the next 25 years, aviation has become a key issue in the climate change debate. Many air travellers and people working in the travel industry see carbon offsetting as a viable green solution to the problem. But how accurate is that view?

It is becoming clear that offsetting schemes based on tree planting or forest conservation may trigger a cascade of other problems. Entire communities may be evicted from land allocated for tree planting, or denied access to forest resources designated as protected carbon stores. Forest-based offsetting schemes are also subject to considerable uncertainty: forests can be chopped down or burnt, for instance, which releases stored carbon back into the atmosphere. Some schemes also fail to prevent 'leakage', in which planting trees or conserving forests in one place just shifts deforestation to another, adding nothing to overall carbon stores.

For real progress to be made on carbon sequestration and reducing greenhouse gas emissions, we need to go beyond tree-planting and offsetting. Too often they are an excuse for 'business as usual'. The focus must first be on a sustained reduction in emissions. Secondly, it needs to be recognised that the people bearing the heaviest costs of climate change contribute little to the problem, and that new mechanisms for compensating them and helping them adapt to changing conditions are needed. Finally, where offsetting is appropriate, schemes must take full account of the needs and rights of local people who live with the consequences of our new climate consciousness.

Here and now: the reality of climate change

Reports from the Intergovernmental Panel on Climate Change (IPCC) leave little doubt that human-induced climate change is a reality. It concludes, in its 2007 *Fourth Assessment Report*, that it

is over 90 per cent likely that the rise in global atmospheric temperature since the mid-19th century has been caused by human activity.¹

KEY MESSAGES:

- Many air travellers and people working in tourism see carbon offsetting as a viable green solution to the aviation industry's small but growing contribution to greenhouse gas emissions.
- Offsetting based on carbon storage through tree planting or forest conservation fails when trees are felled or die from disease, and some schemes may force communities off their land or deny them access to traditional resources.
- A sustained reduction in greenhouse gas emissions is key to tackling climate change – but where offsetting is appropriate, schemes should ensure that forest-dependent communities are not harmed and also include compensation arrangements.

Climate change – what to expect

The Intergovernmental Panel on Climate Change (IPCC) reports that for the next two decades, about 0.2°C per decade of warming is projected, triggering the following effects.²

- Receding snow cover and sea ice
- More frequent extremes, particularly heatwaves and heavy precipitation events
- More intense tropical cyclones (typhoons and hurricanes), with greater peak wind speeds and heavier precipitation
- Precipitation increases in high latitudes and decreases in most subtropical regions
- Sea level rise of as much as 59 centimetres by 2100.

To date, 191 countries have ratified the United Nations Framework Convention on Climate Change (UNFCCC). The agreement is clear: countries have 'common but differentiated responsibilities' to respond to the problem of climate change. The Kyoto Protocol clarified the understanding that wealthy industrialised nations should lead in reducing their emissions of greenhouse gases to 1990 levels. Reducing emissions is only part of the challenge; many are now focusing on how developing countries might cope with, or adapt to, the inevitable consequences of climate change.³ This is an urgent need: even if emissions were to plummet tomorrow, global warming and other climatic changes would continue for several decades because of time lags in the Earth's natural cycles.

Is the polluter paying?

The Kyoto Protocol recognises that industrialised nations are largely responsible for causing climate change and must both take the lead in addressing it, and ease economic restrictions on developing countries to achieve a sustainable low-carbon future. Data from 1950 to 2000 from the Climate Analysis Indicators Tool of the World Resources Institute indicates, for instance, that African countries contributed 4.6 per cent of cumulative global carbon emissions during that period.⁴ Today their share of emissions is even lower, amounting to just 3.5 per cent of the total.⁵

Despite mounting scientific evidence and numerous policy commitments at the international level, progress

on the ground in reducing levels of greenhouse gas emissions has proved elusive. Some governments refused to sign the Kyoto Protocol or to firmly commit to cutting emissions. Meanwhile, countries that have made such commitments have seen emissions continue to rise because of ineffective enforcement policies.

Ironically, however, it is the poorer nations who will pay the highest price in facing climate change. Part of the reason is their geographic location in areas such as drought-prone sub-Saharan Africa or flood-prone Bangladesh. Such areas are particularly vulnerable to gradual and/or sudden changes in climate, which exacerbate existing environmental problems. Poor countries also have less capacity to cope with climate change because of their relatively limited financial resources, skills and technologies, and high levels of poverty. Compounding all this, many rely on climate-sensitive sectors such as agriculture and fishing. A recent study in a natural-resource based economy, Namibia, shows that GDP could fall by 1-6 per cent in the next 25 years, and that the hardest hit will be the poorest.⁶

A question of balance: aviation pros and cons

The IPCC estimates that aviation currently accounts for 2 per cent of global CO₂ emissions. Airplanes also create vapour trails that can persist in the atmosphere for hours, trapping and/or reflecting heat and exacerbating impacts on climate. And, while its current contribution to greenhouse gas emissions may only be a small proportion of the global total, aviation is a growing industry and the IPCC predicts that by 2050 it is likely to be responsible for 5-6 per cent of all emissions. Aviation was excluded from the first commitment period of the Kyoto Protocol so the industry has, to date, been exempt from any agreements made to reduce greenhouse gas emissions. So it could be argued that reducing air travel will help address climate change, and hence limit the disproportionate impact of climate change on poor countries.

Paradoxically, however, many poor countries are highly dependent on aviation-based industries such as air-freighted exports of fresh fruit and vegetables, and tourism. The negative impacts on development of limiting these industries because of reductions in air travel or air freight could far outweigh any benefits from reduced climate impacts.⁷

Is offsetting the answer?

A growing number of concerned travellers are recognising the mismatch between what the science says and what governments have been able to deliver on climate change, and between the opportunities and threats that aviation presents for environment and development aspirations. As a result, more and more are searching for new ways to take matters into their own hands and reduce their 'carbon footprints' without limiting the benefits that aviation can bring to poor countries. Businesses also see opportunities for greening their image by reducing their institutional footprints.

Offsetting emissions from travel and other sources provides one way of reducing carbon footprints, and recent years have seen a dramatic boost in the market for carbon offsets. But as the market grows, so does the cynicism surrounding it. There are a number of concerns:

- Is offsetting emissions just an excuse for 'business as usual', and does it actually help to change behaviour?
- Who benefits from the offset projects, and do some projects actually harm poor communities? For example, they may be prevented from accessing forests or land they may have used for generations but which are now being strictly protected for carbon benefits.
- Are carbon reductions priced too low, relative to the damage caused by climate change? Most offsets aim to find the cheapest way of delivering emission reductions to ensure carbon neutrality for the purchaser, regardless of any social issues.

Another issue is whether offsetting is even scientifically sound. Planting trees to capture and lock up the carbon emitted from an international flight is only successful if it can be guaranteed that the tree will not be cut down or burnt, thereby releasing the stored carbon into the atmosphere again. If the tree was going to be planted anyway, it may also be unreasonable to claim carbon offsets from the planting. And if planting trees or conserving forests in some areas just leads to deforestation and release of carbon to the atmosphere in others, any benefits from offsetting would be cancelled out.

Winners and losers in forest-based offsets

A wide range of forest-based projects can help reduce, prevent or offset carbon emissions, but in general the market is dominated by large-scale projects with little community ownership and benefit. Such projects may also result in such local people losing access to land that is designated for a plantation or other carbon-related activity: 'A number of countries have targeted "degraded areas" for...plantations. In many cases, however, these may be lands held under traditional common property systems that are used by local people for a variety of purposes.'⁸ With potentially high rates of return from carbon offset projects, opportunities are being seized by powerful elites, while local communities often lack the secure tenure and resource rights to stake their claim. In Uganda, for example, a project entailing the planting of trees for carbon offsets in Mount Elgon National Park has been criticised for ignoring local people's land rights and exacerbating the conflict between the park authorities 'guarding' the trees and adjacent communities claiming rights over the land.⁹

The challenge: harnessing the benefits of travel and tourism

It is clear that while climate change may be disproportionately bad for poor countries, simply reducing air travel – and thus potentially compromising the viability of key national industries – is not a quick-fix solution. Neither, however, is offsetting the way to resolve the dilemma, unless it can be linked to improved local livelihoods. While there are certainly risks to local communities from the rapidly growing interest in carbon conservation, there exist a growing number of schemes that could benefit local communities and generate income streams in areas with very little alternative economic potential, particularly where explicitly designed to do this. However, such schemes are still in their infancy.

Plan Vivo is a good example of a scheme specifically designed with community benefits in mind. It supports agroforestry and other small-scale initiatives with local communities that can be used to generate tradable carbon credits. In its Community Carbon Project with the N'hambita community living in the buffer zone of the Gorongosa National Park, Mozambique, agroforestry systems have been introduced that provide income from carbon finance and a range of benefits

such as fruit, timber, fodder, fuel wood and improved soil structure. The community has also gained improved organisational capacity, education and awareness about forest stewardship and conservation, as well as novel income streams via bee-keeping, cane rat production and craft making.

AdMit – an alternative approach?

In response to people's desire to do something about climate change, and concerns that simply offsetting carbon emissions from travel and daily life may not provide all the answers, the new economics foundation (nef) and the International Institute for Environment and Development (IIED) are developing a new vehicle for promoting activities which both reduce atmospheric greenhouse gas concentrations and help those most vulnerable to climate change cope with its impacts. Rather than paying to offset carbon emissions and thus 'absolving' the polluter of responsibility, the AdMit product will focus on payments to compensate for the damage their lifestyles cause. The 'offset' component of the product is secondary to this.¹⁰

Official resources for adaptation to climate change are desperately inadequate. Pledges made at international conferences get ignored, and the original promises were, in any case, nowhere near the scale of the problem. Any money raised that goes towards high quality, community-led adaptation efforts is welcome. AdMit projects will promote true sustainable development, rather than just providing the cheapest way to offset emissions.

New route for the travel industry

Tackling climate change demands, first and foremost, sustained reductions in greenhouse gas emissions. This means reducing international air travel, reducing carbon reliance or increasing efficiency. The industry is currently paying considerable attention to efficiency and technology and huge strides are being made. Improvements in technology may also reduce the need to travel for business, but tourism and air freight are set to grow in significance – and provide much-needed earnings for poor countries. This means that a responsible approach grounded in good sustainable development principles is needed. The travel industry can busy itself with technological and efficiency improvements but should also encourage individual travellers to play their part. Offsetting could be part of the solution – but only if it takes full account of the needs and rights of local people.

¹ IPCC (2007) *Fourth Assessment Report of the Intergovernmental Panel on Climate Change*.

² IPCC (2007) *Fourth Assessment Report*.

³ Reid, H. and Huq, S. (2007) *Adaptation to Climate Change: How we are set to cope with the impacts*. An IIED Briefing. IIED, London.

⁴ WRI (2006). *Climate Analysis Indicators Tool (CAIT) Version 3.0*. World Resources Institute, Washington DC.

⁵ MacGregor, J. 2006. *Ecological Space and a Low-carbon Future: Crafting space for equitable economic development in Africa*. Fresh Insights no. 8, DFID/IIED/NRI. www.agrifoodstandards.net/en/filemanager/active?fid=69.

⁶ Sahlen, L., Reid, H., MacGregor, J. and Stage, J. 2007. *Estimating the Economic Cost of Climate Change in Developing Countries: Namibia*. Discussion paper no. 07-04, Environmental Economics Programme, IIED. www.iied.org.

⁷ See www.propoortourism.co.uk for an analysis of the contributions of tourism to poverty reduction and www.agrifoodstandards.net for a critique of the concept of 'food miles'.

⁸ Smith, J. and Scherr, S. (2002) *Forest Carbon and Local Livelihoods: Assessment of opportunities and policy recommendations*. CIFOR, Bogor.

⁹ *Human Rights Abuses, Land Conflicts, Broken Promises: The reality of carbon offset projects in Uganda*. FERN Press Release, 12 January 2007.

¹⁰ For more information on AdMit, please contact Saleemul Huq at IIED (saleemul.huq@iied.org) or Andrew Simms and nef (andrew.simms@neweconomics.org).

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Climate change and forest resilience

Duncan Macqueen and Sonja Vermeulen

Significant global climate change is inevitable. Tree species have a limited capacity to tolerate climate change or migrate through natural or artificial means. We do not know enough about the comparative resilience of forest-based, agricultural, marine or fresh water ecosystems. But it is clear that biodiverse forest ecosystems are under threat. And the threat extends beyond forests themselves. An estimated 60 million indigenous people are heavily dependent on the world's rainforests. Some 350 million people live in or close to dense forests and rely on them for subsistence or income. A further 1.2 billion people in developing countries depend on trees on farm to generate food or cash.

Challenges to forest-based livelihoods

Challenges to forest-based livelihoods are numerous and very much dependent on location. Loss of land for production in low-lying areas may go hand in hand with increasing pressure on land because of changes in growing conditions or new environmental immigrants. There will be changes in the survival of indigenous species, and new conditions for production of commercial exotics. Events such as fires, floods and landslides will increase risks. Change and resilience elsewhere also matter. Global climate change will affect the comparative advantage of growing timber and non-timber forest products in different localities, with potentially major shifts in international markets.

Poorer countries are disproportionately dependent on natural resources. Participatory poverty assessments show how important the natural environment is to the most vulnerable groups in those countries. Poverty mapping shows how poor people often live on marginal lands, steeply sloping areas or areas subject to flooding. The poorest in society are both most dependent on natural resources and most vulnerable to the impacts of climate change.

The links between forest resilience and climate change

Understanding and making the most of forest resilience in the face of climate change is important on three counts:

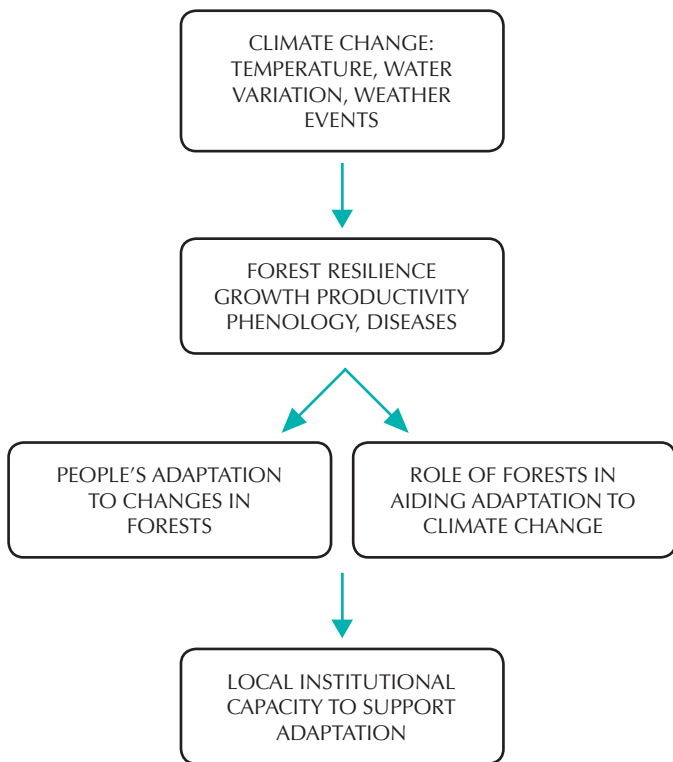
- Mitigation – Growing forests absorb CO₂, an important greenhouse gas. There is a need to redress the current imbalance between deforestation and afforestation, which is responsible for approximately one fifth of human CO₂ emissions.
- Risk reduction – Forests help to reduce risks from climate change for some of the poorest and most vulnerable groups. Poor people need to secure access to renewable forest products (fuel, construction materials, medicines, food and fodder) and services (soil stability, recharge of groundwater, coastal protection, biodiversity conservation).
- Adaptation – Tree based landscapes could be designed to provide diverse, more resilient livelihoods in the face of increasingly erratic weather, droughts and fires, floods and landslides and sea level rises. We need to understand whether adaptation is possible, and how, in different contexts (Figure 1).

Better use and more effective adaptation of forest resilience can only happen if relevant institutions have the capacity to help forest-dependent people to assess and act on change in forest ecosystems, products and markets – both locally and internationally. What is needed now is support and development of institutional awareness and capacity to deal with specific challenges in forest-based livelihoods due to climate change.

KEY MESSAGES:

- Forest ecosystems help protect poor people from climate change (e.g. providing subsistence foods in increasingly intense droughts or buffers to coastal erosion caused by rising sea levels).
- Forest ecosystems may not be able to adapt to the rate of temperature change or the intensity of weather events and associated impacts such as fires or floods.
- Resultant short term shocks and longer term erosion of forest ecosystem resilience are likely to hit the poor hardest.
- There may be ways of adapting forest landscapes to minimise risks – but these will require strong and knowledgeable local institutions, political will and advanced planning.
- Policy makers should actively support an alliance of local institutions that seek to co-develop social and forest resilience in areas most vulnerable to climate change.

Figure 1.



As the nature of the threat to forest ecosystems and poor livelihoods becomes clearer in each context, IIED will help to facilitate an alliance that is geared to strengthening local institutions. The alliance will aim to explore adaptation strategies that might include:

- Increasing local ownership and access to forest resources
- Developing local monitoring and analysis of climate change impacts
- Building institutional responsibility for adaptation strategies
- Favouring more diverse livelihood systems in which forests and trees play an integral part
- Providing incentives to counter lucrative but high risk systems such as monocultures
- Strengthening buffer zones and protection areas
- Minimising fragmentation and promoting connectivity
- Protecting mature stands and refugia (e.g. montane or moist forest areas)
- Managing fire and pests

Policy makers should be aware of the importance of developing both social and forest resilience to climate change. They should think in terms of devolving responsibility and finance to local institutions that are at the front line of adaptation to climate change. As the pace of climate change continues to increase, underwriting the costs of a broader alliance to explore these issues would make good sense.

Some important caveats...

Climate change may well have many more important impacts on poor people outside of forest-related products and services. Conversely, forest-related livelihoods may have far more pressing challenges than climate change. These scenarios will change over time – but we need to be careful before investing a substantial proportion of limited resources in development of capacity around forests and climate change.

...and a collaborative way forward

IIED is working with partners, especially from least developed countries, to identify which (if any) of the most pressing problems to do with climate change involve forest resources. The overarching project: “Capacity strengthening of civil society in Least developed countries on Adaptation to Climate Change (CLACC)” currently involves 12 countries in Africa and Asia – but its work is relevant to many other vulnerable countries. It aims to engage with sectors that climate change is likely to affect. It will facilitate discussion within these sectors, including the forest sector, identify the major issues where impacts will be felt, and analyse how to adapt to those impacts.

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