

Adapting to climate change

What's needed in poor countries, and who should pay

Climate change is forcing vulnerable communities in poor countries to adapt to unprecedented climate stress. Rich countries, primarily responsible for creating the problem, must *stop harming*, by fast cutting their greenhouse-gas emissions, and *start helping*, by providing finance for adaptation. In developing countries Oxfam estimates that adaptation will cost at least \$50bn each year, and far more if global emissions are not cut rapidly. Urgent work is necessary to gain a more accurate picture of the costs to the poor. According to Oxfam's new Adaptation Financing Index, the USA, European Union, Japan, Canada, and Australia should contribute over 95 per cent of the finance needed. This finance must not be counted towards meeting the UN-agreed target of 0.7 per cent for aid. Rich countries are planning multi-billion dollar adaptation measures at home, but to date they have delivered just \$48m to international funds for least-developed country adaptation, and have counted it as aid: an unacceptable inequity in global responses to climate change.

Summary

'If the rainy season starts late, crops fail and people suffer. Children eat leaves. In that situation, only God can help us.'

Kasko Ajikara, farmer and father, Gadabedji village, Niger

'We basically have three choices – mitigation, adaptation, and suffering. We're going to do some of each. The question is what the mix is going to be. The more mitigation we do, the less adaptation will be required, and the less suffering there will be.'

John Holdren, President of the American Association for the Advancement of Science.^{T1}

There is a deep injustice in the impacts of climate change. Rich countries have caused the problem with many decades of greenhouse-gas emissions (and in the process have grown richer). But poor countries will be worst affected, facing greater droughts, floods, hunger, and disease.

The impacts are already hitting vulnerable communities, where people are starting to adapt their lives to this reality. In South Africa, less frequent and less reliable rains are forcing farmers to sell their cattle and plant faster-maturing crops. In Bangladesh, villagers are creating floating vegetable gardens to protect their livelihoods from flooding. In Viet Nam, communities are helping to plant dense mangroves along the coast to diffuse tropical-storm waves.

Climate change is a challenge to current models of economic growth: all countries will have to find low-carbon paths to development, in order to keep global temperatures to less than 2 degrees Celsius above pre-industrial levels. But given their historic role in causing the problem, rich countries now have two extraordinarily clear obligations: to *stop harming*, by massively cutting their greenhouse-gas emissions, and to *start helping*, by providing compensatory finance so that poor countries can adapt, before they suffer the full impacts of climate change.

Tackling climate change requires an unprecedented level of global co-operation. The G8 summit in Germany in June 2007 brings an important opportunity for rich countries to demonstrate their commitment to achieving such co-operation. The task of G8 leaders at Heiligendamm is clear. They must set a global target to keep global warming below 2 degrees, and commit to reducing emissions in their economies by 2015.

Rich countries must also demonstrate their commitment to generating the global co-operation needed to tackle climate change by living up to their obligation to finance adaptation in developing countries, but without diverting resources from aid already committed. When donors to the Global Environmental Facility meet in Washington DC later in June, to pledge contributions to the international funds set up for adaptation, it will be their ideal opportunity to start providing that finance on the scale needed.

What is needed for developing countries to adapt to climate change? Changes at many levels. Communities must build their resilience by adopting appropriate technologies and diversifying their livelihoods to cope with the coming climate stress that lies outside the realm of human

experience. Ministries must learn to plan and budget around climate uncertainty. New and old national infrastructure, such as hospitals, reservoirs, and roads, must be climate-proofed.

This paper sets out a rough guide to the scale of the financing challenge. Oxfam estimates that the costs for developing countries of adapting to climate change will be well above the World Bank's widely cited estimate of \$10–40bn annually. Based on new approaches to scaling up costs, we estimate the cost will be at least \$50bn each year, and far higher if greenhouse-gas emissions are not cut rapidly.

Who should provide that finance? An approach rooted in equity and justice suggests that countries that are both *responsible* for producing excessive emissions, and *capable* of providing assistance, should bear the costs. Oxfam's new Adaptation Financing Index gives an indication of what fairness in adaptation requires: the USA is responsible for over 40 per cent of what's needed annually, the European Union for over 30 per cent, and Japan for over 10 per cent. Within the European Union, the top five contributors should be Germany, the UK, Italy, France, and Spain.

Adaptation calls for many tens of billions of dollars each year. But rich countries have so far pledged a mere \$182m to international funds for developing-country adaptation – less than 0.5 per cent of the minimum amount that Oxfam believes is needed overall.

Funding just the most urgent and immediate adaptation priorities of the least-developed countries (LDCs) is likely to cost \$1–2bn. Among donors, the mood is anything but urgent: they have so far delivered \$48m to the international fund set up for LDCs – less than five per cent of what's needed: enough for Haiti, Samoa, and Kiribati, but no more.

Not only is this funding a fraction of what is needed, but it is almost all being counted towards long-standing commitments to provide 0.7 per cent of national income as aid. Only the Netherlands has explicitly committed to provide climate-related finance in addition to this. Development and poverty reduction are hugely under-funded and donor countries must raise their aid to 0.7 per cent as was promised in 1970. Finance for adaptation should be provided in addition to this, and should not be included in the definition of aid.

Meanwhile, rich countries are investing in their own climate-change adaptation, with budgets for individual projects at home outstripping their total contribution to international adaptation funds. The UK – the biggest contributor to international funds so far, pledging \$38m – is investing £178m (\$347m) in cooling systems for the London Underground, partly in preparation for climate change. The Netherlands, pledging \$18m to international funds, is spending at least €2.2bn (\$2.9bn) on building new flood dykes at home, in anticipation of climate-change impacts.

Rich countries must seize the opportunity offered by the G8 summit in June 2007. Stop harming and agree that immediate measures must be taken to keep global warming as far as possible below 2 degrees Celsius. Start helping and provide adaptation funds on the scale needed, in proportion to their responsibility for pollution, and their capability to assist. On its own, adaptation is by no means an answer to climate change: it can only make a

difference to poor communities if emissions are cut rapidly. So what will it take to achieve justice in climate adaptation?

Rich countries must lead in drastically reducing their greenhouse-gas pollution in order to keep global warming less than 2 degrees Celsius (3.6 degrees Fahrenheit) above pre-industrial levels. This is essential to avoid dangerous climate change, and to preserve poor peoples' ability to avoid the worst impacts, through adaptation. Rich and poor countries must start working together to find low-carbon pathways for future human development.

The countries topping Oxfam's Adaptation Financing Index – the USA, the European Union, Japan, Canada, and Australia – should start providing more finance to developing countries immediately. In line with their responsibility for causing climate change, and their capability to assist, they should start actively planning to raise the scale of resources needed – likely to be at least \$50bn annually.

Additional finance for adaptation must not come out of existing aid commitments. Development is essential to enable poor people to adapt successfully, but it is still hugely under-funded: donors must live up to the commitment of providing 0.7 per cent of gross domestic product (GDP) in order to eradicate poverty. Adaptation finance cannot be rebranded or diverted from aid commitments, and must be reported systematically and transparently. In line with the 'polluter pays' principle, it is owed not as *aid* from rich country to poor country, but as *compensatory finance* from high-emissions countries to those most vulnerable to the impacts. There are many innovative mechanisms for raising this finance independently from aid, which deserve full consideration.

More robust estimates of the economics of adaptation are urgently needed. This calls for an initiative equivalent to the British government's 'Stern Review' on the economics of stopping climate change, but one focused on examining the relationship of development to adaptation, providing examples of best practice in project design and finance, and producing stronger estimates of the costs and benefits of adaptation. This would give developing countries a firmer basis for integrating adaptation into development plans and budgets, and would give high-income, high-emissions countries a clearer estimate of the finance that they are capable of – and responsible for – providing.

A far more intensive, action-learning phase of adaptation is needed to promote learning-by-doing. There is still much for the international community to define and clarify about how best to manage and disburse funds for adaptation, and how best to build climate resilience in developing countries. But vulnerable communities across the world cannot be expected to wait until each and every question has been resolved, before they start getting the support needed. A far more intensive, action-learning phase – focused on testing, building up organisational capacity, and scaling up successful demonstration projects – would produce valuable learning-by-doing. Beginning in this initial three-to-five year phase, international adaptation funds should be made available to diverse actors, including NGOs because they can often reach and support vulnerable communities most effectively. The experience and expertise built up from this phase should be systematically documented and shared to promote learning. In

this way, learning from practical experience will contribute to unresolved debates on eligibility and governance of funds, and will also inform best practice on adapting to climate change.

1 Poor communities: hit first and worst

Philip Emanman is a social-development officer in the Kenyan government's Arid Lands Management Programme, based in Turkana. Every month, colleagues collecting data across his region send him reports on weather, harvests, and prices. Lying on his desk is the monthly drought bulletin for December 2006. The front-page summary reads:

Pastoral, all species: Alarm

Agro-pastoral: Alarm

Fisheries: Alarm

Peri-Urban: Alarm

District summary: Alarm

'There used to be a major drought every 15–20 years', he said. 'Now it's every two or three years. Our climate is worsening every year.'

Many forces have led to the crisis facing Turkana's nomadic pastoralists: a growing population, a severe lack of government investment in the region, deforestation, and land conflicts between communities. But, in line with the predictions of climate models, the crisis is exacerbated by less frequent and less reliable rain.² 'The problem is not only the drought', explained Esinyen Timu, a village elder in Oropoi district, 'but now we can't predict when and if the rains will arrive. It means we can't make decisions on what we will do next week with our animals, or what we will do next year with our lives. We've lost our way of living, lost our animals and our sorghum because our rains never came.'³

Oxfam has been working with communities in Turkana for almost 40 years, and is now beginning to assess the challenge of supporting them in coping with the new vulnerabilities that will be created by climate change. 'Someone needs to be held accountable for whatever climate change is occurring', said Jacob Lokwee, an Oxfam project officer in Turkana. 'We now face more frequent droughts and poverty is increasing. With all these changes, people have to live. And to live, they have to adapt. To adapt, we will need resources.'

Vulnerable communities across the world are starting to learn to live with the reality of climate change, adapting as they can to its impacts. But these impacts are set to get far worse, even if global warming is kept to less than 2 degrees Celsius above pre-industrial levels.

According to the April 2007 report of the Intergovernmental Panel on Climate Change (IPCC), farming and fishing communities in

developing countries will suffer some of the worst impacts of climate change, including more frequent droughts and floods, more crop damage and falling yields, water shortages, and more disease. Communities dependent on glacial water – around one-sixth of the world's people – will face more floods and avalanches, followed by water shortages. Coastal communities worldwide will likewise face more flooding and storms due to rising sea levels. And if temperatures rise by just 1.5–2.5 degrees Celsius, 20–30 per cent of all plant and animal species could become extinct: a direct threat to 450 million of the world's poorest people whose livelihoods depend entirely on the sustainable use of natural resources.⁴

The impacts predicted by the IPCC vary by region:

Africa is one of the continents most vulnerable to climate change:

- 75–250 million people across Africa could face more severe water shortages by 2020.
- Agricultural production and access to food will be severely compromised in many African countries: agricultural land will be lost, and there will be shorter growing seasons and lower yields. In some countries, yields from rain-fed crops could be halved by 2020.
- Rising water temperatures will decrease fish stocks in large lakes, already depleted by over fishing.

Small islands are especially vulnerable to the impacts of climate change, sea-level rise, and extreme weather events:

- Rising sea levels and increased storm surge will threaten the homes and livelihoods of communities, forcing some to migrate permanently.
- Coastal erosion and coral bleaching will undermine incomes from fishing and tourism.
- Freshwater resources on small islands are likely to be seriously compromised, especially in the Pacific and the Caribbean.

Asia:

- Glacial melt from the Himalayas will increase flooding and avalanches, then reduce water supplies. Throughout Asia, the loss of fresh water could affect one billion people by the 2050s.
- In Central and South Asia, crop yields could fall by up to 30 per cent, creating a very high risk of hunger in several countries.
- Increased deaths and illness are expected from diarrhoeal disease due to flooding and drought, and are also expected from cholera due to higher sea temperatures.

Latin America:

- Shifting rainfall patterns and the loss of glaciers will significantly reduce water availability for human consumption, agriculture, and generating energy.
- In dry areas, agricultural land will become salty and sandy, with lower crop yields and lower livestock productivity, thereby undermining food security.
- In tropical forests, higher temperatures and the loss of ground water will reduce biodiversity, affecting the livelihoods of many indigenous communities.
- Rising sea levels will cause more flooding in low-lying areas, and warmer sea waters will diminish fish stocks.⁵

These devastating climate impacts are set to undermine millions of people's livelihoods and their way of life, potentially undoing many decades of development.

2 Rich countries: stop harming and start helping

'The poorest developing countries will be hit earliest and hardest by climate change, even though they have contributed little to causing the problem. Their low incomes make it difficult to finance adaptation. The international community has an obligation to support them in adapting to climate change. Without such support there is a serious risk that development progress will be undermined.'

The Stern Review, 2006

It's a widely accepted ethical principle, understood from playgrounds to courtrooms around the world. If you harm others, you have two obligations: to stop harming them, and to help them cope with the damage done.

Rich countries have certainly harmed others with many decades of excessive greenhouse-gas emissions. The impacts of climate change are already putting at risk the lives and livelihoods of millions of people - across Africa, Asia, Latin America, and the Pacific - who are least responsible for causing it, and least equipped to cope with it. And they inevitably face higher risks in the future because of delayed warming still to come from greenhouse gases that have already been emitted. Until global emissions are drastically cut, those risks will continue to rise fast. The ethical obligation upon rich countries to stop harming and start helping is extraordinarily clear.

Stopping dangerous climate change is an urgent global priority – in particular by keeping global warming to less than 2 degrees Celsius (3.6 degrees Fahrenheit) over pre-industrial temperatures. The IPCC makes clear that, beyond this 2-degree threshold, climate change would likely occur at a speed and scale that humans, animals, and ecosystems could not cope with.⁶ All countries must devise low-carbon strategies for achieving sustainable development, finding ways that are more successful in reducing poverty than past or present models of growth. But today's high-income countries – most responsible for the build-up of greenhouse-gas pollution over many decades – must lead the way *now* with major cuts in their emissions, as they committed to doing back in 1992 under the UN Framework Convention on Climate Change (UNFCCC).

As well as halting climate change, the obligation of rich countries to help developing countries cope with the coming impacts of climate change is an equally urgent priority. The IPCC's report (cited above) confirms that the risks facing the most vulnerable communities are certain. This knowledge that there will be high risks in the future means there is a window of opportunity now for high-income, high-emissions countries to provide finance to vulnerable countries and communities so that they can build their resilience before they face the full impacts of climate change.

In addition to the strong moral obligation to act, there are at least three additional reasons why rich countries should lead in cutting their greenhouse-gas pollution and in providing adaptation finance:

Future negotiations: tackling climate change through major cuts in greenhouse-gas emissions calls for an unprecedented level of global co-operation. Rich countries must demonstrate their commitment to achieving that co-operation by living up to their obligations, under the UNFCCC, to finance adaptation in developing countries.⁷

Future costs and liability: adaptation can reduce the damage that will be caused by climate change, but cannot eliminate it. Cutting emissions now and adapting early will help to greatly reduce the (potentially very large) financial costs of that climate damage. Climate litigation is very likely to increase in the future, as the evidence on links between greenhouse-gas emissions and specific weather events gets stronger. And claims for damages against polluters will likely be higher where polluters have failed to cut their emissions sufficiently, or have failed to provide the compensatory finance that vulnerable communities need in order to build their resilience now.

Global stability: without rapid emissions cuts and strong support for adaptation, climate change may well unravel global stability. Developing countries particularly will face more poverty, hunger,

disease, death, conflict over resources, and mass migration. Rich countries will face serious climate threats at home, but will additionally be confronted by these global crises, with greater risks to international security arising from political and economic disruptions, and social unrest. It is in every country's interest to tackle climate change now.

3 No aid diversion: new finance needed

Rapid poverty reduction is essential to help poor communities build their resilience to natural climate variability and the greater stresses of human-induced climate change. Yet there is already an appalling deficit in international aid for development.

In 2005, the G8 promised to increase annual aid levels by \$50bn by the year 2010. This finance would be a crucial step towards achieving the Millennium Development Goal targets, which aim to halve poverty by 2015. But it is still only 0.36 per cent of rich-country incomes – just half of the 0.7 per cent target they signed up to in 1970. Two years on, aid from the G8 to poor countries is falling, not rising: if current trends continue, Oxfam calculates that they will miss their promised increase by a staggering \$30bn.⁸

On top of this development deficit, climate change will make it harder to realise the MDGs because it threatens the prospect of reaching every one of the goals, as Table 1 shows. Adapting to climate change will add significantly to the cost of meeting the MDGs and other development goals. As the Stern Review concurs, 'this makes it still more important for developed countries to honour both their existing commitments to increase aid sharply *and* help the world's poorest countries adapt to climate change'.⁹

Table 1: How climate change threatens the MDGs

MDG	Potential impacts of climate change on the Millennium Development Goals
1. Eradicate extreme poverty and hunger	<p>Climate change is predicted to:</p> <ul style="list-style-type: none"> • Degrade the forests, fish, pastures, and crop land that many poor families depend on for their food and living. • Damage poor people's homes, water supply, and health, which will undermine their ability to earn a living. • Exacerbate social tensions over resource use, which can lead to conflict, destabilising livelihoods and forcing communities to migrate.
2. Achieve universal primary education	<p>Climate change could undermine children's ability to attend school.</p> <ul style="list-style-type: none"> • More children (especially girls) are likely to be taken out of school to help fetch water, care for ill relatives, or help earn an income. • Malnourishment and illness among children could reduce their school attendance, and impair their learning when they are in class. • Floods and hurricanes destroy school buildings, and force migration.
3. Promote gender equity and empower women	<p>Climate change is expected to exacerbate current gender inequalities.</p> <ul style="list-style-type: none"> • Women tend to depend more on the natural environment for their livelihoods than men do, and so are more vulnerable than men are to its variability and change. • Women and girls are typically the ones to fetch water, fodder, firewood, and often food. In times of climate stress, they must cope with fewer resources and a greater workload. • Female-headed households with few assets are affected particularly severely by climate-related disasters.
4, 5, 6. Reduce child mortality, improve maternal health, and combat major diseases	<p>Climate change will lead to more deaths and illness due to heat-waves, floods, droughts, and hurricanes.</p> <ul style="list-style-type: none"> • It may increase the prevalence of diseases spread by mosquitoes (such as malaria and dengue fever) or of those spread in water (such as cholera and dysentery). Children and pregnant women are particularly vulnerable to these diseases. • It is expected to reduce the quality and quantity of drinking water, and exacerbate malnutrition among children, particularly in sub-Saharan Africa.
7. Ensure environmental sustainability	<p>Climate change will alter the quality and productivity of natural resources and ecosystems, some of which may be irreversibly damaged. These changes will also reduce biological diversity and compound existing environmental degradation.</p>
8. Develop a global partnership	<p>Climate change is a global challenge, and responding to it requires global co-operation, especially to enable developing countries to tackle poverty and inequality. It heightens the need for donors to honour their ODA commitments, and to provide additional resources for adaptation.</p>

Source: adapted from Sperling (2003) and Reid and Alam (2005)

Adaptation finance will be spent most effectively if it is integrated into developing countries' plans and budgets. But it must be accounted for separately from development assistance. Why? Because rich countries' responsibility to finance developing-country adaptation is *additional* to and *distinct* from their role in providing ODA.

Financing adaptation must be *additional* to ODA, and funds must not be raised by re-branding or diverting commitments to provide 0.7 per cent of GDP as aid. That would be a severe distortion of aid promises: by analogy, if someone had promised to support a child through school, and then broke her bicycle, it would hardly be acceptable for them to offer to pay for the bike repairs by using the money they had set aside to buy her school books for next term. Yet this is exactly what donors would be doing if they diverted aid commitments in order to pay for the costs of adapting to the climate change they have largely caused.

Financing adaptation is also *distinct* from ODA because of the origin of the responsibility. The funding required is not on the basis of rich countries providing aid to poor ones, but on the basis of polluting countries providing compensatory finance to those most vulnerable to the effects of that pollution. For these reasons, money should be raised through innovative financing mechanisms that can ensure a reliable flow of funds independent from current ODA (see Section 7).

4 Addressing adaptation: what will it take?

The severe floods of 2000 came as a shock to riverside communities in India's West Bengal. 'There was a government announcement over a loud speaker, warning us that there would be a severe flood', recalled Dipali Biswas in Nadia district. 'But we were still not aware just how severe it would be. When I saw the water rise above the roof of my house, I was stunned'.

With little warning or preparation, Dipali's home and her village were hit hard by the region's worst flood in decades, which devastated many districts not usually affected. According to the IPCC, climate change will make such flooding more frequent in the region, due to increasing glacial melt from the Himalayas.¹⁰

Since 2000, the local NGO Sreema Mahila Samity (SMS), based in Nadia district, has initiated community-based disaster planning, supporting communities to: set up village task forces; plan and practise their disaster response; learn to build quick-assembly boats

and flood shelters; raise the foundations of their houses; and establish flood-proof communal grain banks.

Dipali is a member of her village's Early Warning Task Force. 'These days, we can hear about floods in many ways', she explained, 'from the village committee, from a telephone number that we can call to get the latest information, from the TV and radio, and of course from observing the river ourselves. During the flood season, we never miss a radio or TV weather report'.¹¹

Many communities have, for centuries, faced natural climate variability such as fluctuating rainfall or extreme weather events. Some have found ways to adapt to it, for example by irrigating their crops, or finding alternative livelihoods that do not depend on agriculture. But many of the poorest communities remain extremely vulnerable to natural climate variability because they lack the resources or opportunities they need to cope with it. To add to that challenge, human-induced climate change will bring a speed and scale of change unprecedented in human history, through droughts, floods, and heat-waves, to melting glaciers and intense hurricanes. Vulnerable communities and countries will need to build even greater resilience in order to handle the coming impacts.

Climate stress: exacerbating poverty and inequality

Climate change will hit hardest in communities that already face social and economic challenges: communities that farm on marginal and degraded land, communities living in economic poverty, communities living with the crises of HIV and AIDS and other infectious diseases, communities caught in conflicts over natural resources, marginalised indigenous communities, and other communities that have little voice in national decision-making.

Women are particularly vulnerable to the impacts of climate variability and coming climate change. Why? Because deep inequalities between women and men – in the community, in the economy, and before the law – mean that women typically shoulder more responsibilities, but have fewer rights realised. First, women tend to depend more on the natural environment for their livelihoods, for example relying on rain to water their crops, or making use of forest plants for medicines, materials, and food. Second, women have often had less education, and are subject to social customs which may restrict their mobility and role in the economy, so it is more difficult for them to find new, more dependable ways of earning an income. Third, women are typically responsible for unpaid household chores such as fetching water and

fuel, and caring for ill and dependent family members: climate variability and change will make all of these tasks more demanding. Fourth, women's claim to their agricultural land is often insecure, and their role as carers means they have little time to be involved in community decision-making. Without their perspectives and participation, there is a real risk that adaptation plans could actually make women more vulnerable to climate impacts, and less empowered in their communities.¹²

Finding ways to adapt

Poor people who are beginning to feel the effects of climate change are already seeking ways to adapt to it. In South Africa, for example, some farming communities are reporting less frequent and less predictable rains, and as a result their crops and animals are dying, leaving their families facing hunger, illness, and debt. The ADAPTIVE research project found that people are adapting by planting fast-maturing crops, eating wild fruits, collecting wild seeds, selling their animals, seeking paid work in town, and trying to start up cash-generating businesses.¹³

But there are clear limits to how far poor people can adapt without wider support. Many people lack viable opportunities to diversify their livelihoods, or have no money to pay for the technologies they need, such as irrigation systems or insecticide-treated bed nets. Most have very little access to reliable climate information that would help them to plan better, or no means of learning how other communities in a similar situation have adapted. Research among subsistence farmers in Zimbabwe found that nearly half of those interviewed said that they would want to adjust their farming according to long-term forecasts, but their lack of cash and credit would prevent them from doing so.¹⁴

Communities must be at the heart of efforts to build their resilience to climate change because adaptation is inherently local. But – as the experience in Dipali's village shows – their efforts will only be effective if they are backed up by national strategies and policies, and by international financial support. Ensuring the success of adaptation requires the following:

- **taking community-centred approaches**, since adaptation is necessarily local, and is best tackled by putting the affected communities at the heart of the process;
- **integrating adaptation into development planning processes**, to ensure that adaptation needs are incorporated across sectoral plans, mainstreamed into national and local strategies, and backed up with the budgets needed;

- **restructuring and strengthening institutions** – within governments and within civil society - at local, national, and international levels, particularly to build their capacity to understand, and respond to, climate impacts;
- **providing reliable information** on the likely impacts of climate change, and on early warning and forecasts, delivered in ways that communities and policy makers can understand and respond to;
- **promoting appropriate technology** such as resilient crop varieties, irrigation schemes, and renewable energy sources, so that they are available and affordable for low-income communities;
- **reducing vulnerability in people’s livelihoods**, such as through social-protection schemes which provide guaranteed employment in rural communities vulnerable to climate stress;
- **protecting ecosystems and existing infrastructure** so that they are resilient to the coming stress from climate change.¹⁵

Table 2 illustrates (for the case of increased risks of coastal or river flooding) the diverse types of adaptation measures needed, and the wide range of actors at many levels who must be involved to make them succeed. The table includes types of adaptation activity that are often not taken into account, and covers actors at all levels – particularly communities and households – whose role in adaptation is often overlooked.

Table 2: What will it take to adapt to climate change? Diverse measures by many actors

(Illustrative adaptation measures for increased risks of river or coastal flooding)

Type of adaptation activity	Macro-level activity				Community-level activity		
	International collaboration	Donors	Governments, national and local	Private sector	Local NGOs	Communities	Households
1. Integrate adaptation into planning, policies, and practice	Contributing to international learning networks on adaptation	Supporting e.g. social-protection schemes among vulnerable communities	New approaches to integrating climate information into national budgeting processes	Expanding insurance markets and micro-finance provision	Promoting community-based flood preparedness	Creating village-level task forces to monitor and plan responses to flood events	Women preparing and storing emergency stocks of food, water, and medicines
2. Climate-proof ongoing infrastructural investments	Climate-proofing international river-management initiatives	Integrating increased flood risks into new and current projects	Flood-proofing new roads and rural electrification	Flood-proofing new commercial buildings and transport systems	Integrating increased flood risks into new and current projects	Building community flood shelters, emergency boats, and grain banks	Contributing grain to the community grain bank, ready for use after a flood
3. Climate-proof the existing stock of natural and physical capital	Regional co-operation in protecting cross-border ecosystems	Supporting the upgrading of e.g. existing irrigation schemes	Reinforcing existing roads, or ensuring sustainable soil management	Flood-proofing existing supply chains, retail, factories	Supporting communities in reinforcing river embankments	Reforestation of communal land and restoring floodplains	Raising the foundations of an existing house
4. Address new investments needed due to climate change	International monitoring and forecasting of climate change	Establishing research and learning networks on climate change	Draining glacial lakes to prevent downstream flooding	Paying higher insurance costs due to increased flood risks	Supporting communities to plant mangrove coastal barriers	Rebuilding community settlements away from coastal land likely to be submerged	Relocating the household due to more frequent devastation from floods

5 Financing adaptation: what will it cost?

No one knows how much it will cost for developing countries to adapt to climate change. Why not? Because too little adaptation has been done to provide robust cost assessments; because many future impacts of climate change are still uncertain; and – most importantly – because the severity of climate impacts will depend on how fast global greenhouse-gas emissions are cut.

But the absence of an estimate is not just an accounting delay. It is a gaping political gap in the pressure and impetus for the international community to mobilise resources anywhere near the scale needed.

A rigorous assessment of the economics of adaptation is urgently required, equivalent to the detailed analysis that the Stern Review provided on the economics of cutting greenhouse-gas emissions. In the spirit of building towards such an assessment, this section reviews existing estimates of adaptation costs, provides initial estimates of some areas not yet costed, and estimates that the cost of adaptation in developing countries is likely to be at least \$50bn each year, and will be far higher if there is not rapid action to cut global emissions.

Climate-proofing investments in developing countries

The World Bank has produced a preliminary estimate that it will cost around \$10–40bn to climate-proof investments in developing countries. Taking the annual core flows of development finance (government spending and domestic private-sector investment, ODA, and foreign direct investment), they estimated the proportion of investments sensitive to climate risk in each category, and then estimated the extra costs of ‘climate-proofing’ those investments through adaptation, producing a range of \$9–41bn annually, as shown in Table 3.¹⁶

Table 3: World Bank preliminary estimate of the costs of additional impacts of climate adaptation

Item	Amount per year \$bn	Estimated portion sensitive to climate %	Estimated costs of adaptation %	Total per year \$bn
ODA and concessional finance	100	40	10–20	4–8
Foreign direct investment	160	10	10–20	2–3
Gross domestic investment	1,500	2–10	10–20	3–30
Total adaptation finance	-	-	-	9–41

Source: World Bank 2006

As climate impacts become better understood, the estimates for the percentage of investments that are climate-sensitive, and for the additional costs, will need to be reviewed. But the method used provides a very useful starting point for understanding the scale of costs. The World Bank’s estimate, however, is often cited – mistakenly – as ‘the cost of adaptation’. Not so. It only accounts for a fraction of the adaptation that is needed.

In relation to Table 2 above, the World Bank’s calculations primarily account for the costs faced by ‘macro actors’ for the activities in rows 1 and 2 (integrating adaptation into ongoing planning, policies and practices, and climate-proofing ongoing infrastructural investments). What it does not account for are:

- the costs for ‘macro actors’ of climate-proofing the *existing* stock of natural and physical capital where no new investment had been planned (row 3), or the cost of financing new investments needed specifically because of climate change (row 4).
- the costs faced by ‘community-level actors’ (households, communities, and local NGOs) for the vast majority of their adaptation needs (rows 1–4).

Estimating the scale of some of these other adaptation costs is complex, due to little data, and due to unavoidable overlaps between different approaches. But taking alternative starting points, we can broadly estimate the cost of several adaptation activities that are not covered in the World Bank’s approach, and so start to see the larger scale of funding required. The rest of this section presents estimates from three other approaches:

1. Scaling up the costs of community-based projects by NGOs (partially addressing the costs of row 1–4 activities for local NGOs and communities)
2. Scaling up the most urgent and immediate national adaptation needs (addressing the cost of urgent row 1–4 activities for governments)
3. Considering costs that are not adequately taken into account in any of the above.

1. Scaling up NGO community-based initiatives

Community-based NGOs are among the most effective actors in supporting adaptation because their projects are inherently local, and they usually have strong relationships with the communities they serve. As a result, they can empower communities through adapting to climate change in ways that no other development actor can. Examples of local NGOs working with communities to address diverse climate risks include:

- **Coastal exposure:** in Viet Nam, the Red Cross has worked with its local branches and communities to plant 22,000 hectares of mangroves, providing 100km of protection for sea and river dykes. The project benefited 1.2 million people – successfully protecting many communities from the impact of Hurricane Damrey in 2005 – and cost \$5m over nine years.¹⁷
- **Flood risk:** in India, Oxfam’s local partners piloted a scheme to raise the foundations of 600 flood-prone mud houses, costing around \$70 per house. In Bangladesh, CARE (funded by CIDA) worked with sixteen local NGOs to support communities in adopting more flood-resilient livelihood strategies, stockpiling food in flood-proof storage, harvesting rainwater, and creating floating vegetable gardens in waterlogged areas. The project benefited 7,500 households, at a cost of \$2.5m over three years.
- **Water shortage:** in Peru, where farmers face increasingly heavy rain, but dry winters, Practical Action’s local partners have supported rural communities (covering 3,600 people) to understand the risks they face, diversify their livelihoods, and cultivate native crops – costing \$200,000 over two years. In Zambia, where farmers face reduced and more erratic rainfall, Tearfund has supported local NGOs in spreading the practice of minimum tillage farming, to retain soil moisture, aiming to benefit 12,500 households, as part of a project costing \$528,000 over five years. In Nicaragua, where farmers face both droughts and floods, Oxfam’s local partners have supported communities with conservation agriculture, tree planting, and water

management. The project aims to benefit 2,000 farming households, at a cost of \$250,000 over two years.

This is a very small sample of projects, but as a starting point, it indicates that the average cost for NGOs to provide community-based support for adaptation – over a diverse range of risks, and diverse countries – is currently around \$20 per person.¹⁸ Across all developing countries, 2.8 billion people live on less than two dollars a day, and the vast majority are likely to be vulnerable to the impacts of climate change. On the basis of meeting needs, if we assume that, at any one time, 40 per cent of those people need support from community-level adaptation projects (which last on average for three years), then community-level interventions would cost in the region of \$7.5bn per year. The organisational capacity-building needed for NGOs to provide this kind of scaled-up support will be an additional and significant cost. But this figure begins to indicate the cost of meeting some of the adaptation needs in communities (rows 1–4 for local NGOs and communities).

2. Scaling up urgent and immediate adaptation needs

Due to the high vulnerability of many least-developed countries (LDCs) to climate change, a fast-track process for financing their most immediate and urgent adaptation needs was set up under the UNFCCC in 2001. To date, 13 countries have submitted National Adaptation Plans of Action (known as NAPAs) to the UNFCCC, setting out priority projects together with the budgets required for implementing them. Among the priority projects countries have proposed are:

- **Samoa:** \$620,000 needed to strengthen public-health links with the meteorological early-warning system, for faster response to outbreaks of climate-related disease, such as typhoid, dengue fever, and diarrhoea.
- **Bangladesh:** \$1.5m needed to provide drinking water to coastal communities to combat increasing salinity due to sea-level rise.
- **Malawi:** \$5.4m needed to improve climate monitoring and early-warning systems for managing Lake Malawi and its surrounding natural resources.
- **Haiti:** \$830,000 to build community and household water tanks to ensure adequate water supplies, ease social tension, and reduce women's work during droughts.

The total cost of all projects proposed by these 13 countries is \$330m. Some NAPAs have been criticised for not including civil society sufficiently in the process, or not identifying the major priorities affecting vulnerable communities in the country. While

acknowledging these shortcomings, the budgets provide an initial indication of the scale of urgent needs in these 13 countries. In order to estimate the finance that will be needed for these priorities in all LDCs, we can scale up these budgets in relation to several parameters, such as the size of the population, the size of the economy, or the area of land used for human activity, in all LDCs (see Table 4). The result across these different parameters is an estimate of just the most immediate and urgent projects for all LDCs costing \$1–2bn.

Only the LDCs have been invited by the UNFCCC to submit NAPAs. But all developing countries have urgent and immediate adaptation needs, a significant proportion of which will not be addressed in ongoing investment plans. We can extrapolate from LDC costs to all developing countries, on the same basis (scaling up by population, GDP, and land-use area). The result is an estimate ranging from \$7.7bn (when population is used as the scaling parameter) to \$33.1bn (when GDP is used instead). This indicative range of \$8–33bn (the total, not annual, cost of these projects) would cover the most urgent and immediate priorities across developing countries. A significant portion of these priorities would go beyond row 1 and 2 activities, and so would not be accounted for in the World Bank’s estimate.

Table 4: Estimates of the cost of urgent and immediate adaptation needed, scaled up from the 13 NAPA budgets submitted

Grouping	Parameters		
	Population, millions	GDP, \$bn	Land use, sq. km
NAPA 13 submitted	217.8	83.49	349,320
All LDCs	741	257.3	2,262,910
All developing countries	5094	8347	15,178,410
Scaling up from NAPA budgets (NAPA-13: \$330m)	On the basis of:		
	Population:	GDP:	Land use area:
Scaling up for all LDCs	\$1.1bn	\$1.0bn	\$2.2bn
Scaling up for all developing countries	\$7.7bn	\$33.1bn	\$14.4bn

Source: based on Müller and Hepburn (2006), updated by Oxfam with data from UNFCCC and Climate Analysis Indicators Tool (CAIT).

3. Beyond scaling up: identifying high but hidden costs

The estimates above are obviously far from robust, but they give useful initial indications for considering the scale of assistance needed. And though it is enlightening to focus on the costs that can

be captured in such exercises, it is important to keep in mind the costs that are left out, but are very real for the countries and communities faced with them:

- **Protecting ecosystems:** none of the approaches above adequately addresses the national and regional costs of protecting ecosystems from climate change (row 3), yet ecosystems play crucial roles in sustaining human development and providing the resources that enable communities to adapt.
- **Providing global public goods:** the above estimates scale up national-level projects, but adaptation calls for investing in global initiatives too, such as new research into flood-or drought-tolerant crop varieties, and documenting and sharing best practice on preventing land degradation and desertification.¹⁹
- **Preventing greater gender inequality:** many of the costs of adaptation facing households will be forced upon women, through their unpaid caring work. Adaptation interventions must aim to offset this increased gender inequality but, to succeed, will often be likely to take longer and cost more, for governments and NGOs alike.
- **Learning by doing and building organisational capacity:** what successful adaptation looks like will only be learned by piloting initiatives and massively scaling up those that work. Across adaptation measures of all kinds, some will not work, or will require more time and support, potentially raising the costs of succeeding. Scaling up capacity of the organisations that will be providing support (such as local NGOs and local government) will be one of the biggest challenges.
- **Addressing unknown and unexpected impacts:** many currently expected climate impacts would not have been thought of ten years ago because the understanding of climate change is evolving fast. Crucially, the severity of impacts will depend on the speed at which global greenhouse-gas emissions are cut. If unanticipated impacts turn out to raise risk exposure by, say, one-third above experts' current estimates, and likewise raise adaptation costs by one-third, then even just the World Bank's estimate of \$10–40bn to climate-proof planned investments would rise to \$20–70bn.²⁰

Taking into account these diverse estimates of cost – scaling up the most urgent and immediate priorities, scaling up community-level projects, and identifying many of the costs that have not yet been calculated – we estimate that the cost of adapting to climate change in developing countries is likely to be at least \$50bn annually, and will be far more if greenhouse-gas emissions are not cut fast enough.

Indeed, others predict that annual adaptation costs could be at least double this. According to Kermal Dervis, head of UNDP, donors will need to provide 50 to 100 per cent more finance over and above current aid – equivalent to \$50–100bn annually – to cover the impacts of climate change.²¹ Likewise, Christian Aid estimates that tackling adaptation will require a global fund of \$100bn each year.²²

Is this scale of funding – many tens of billions of dollars a year – impossible? Not at all. Staging the 2004 Olympics in Athens cost \$9–12bn²³ and the budget for the 2012 Olympics in the UK is already \$18bn.²⁴ In 2004, European spending on passenger flights and air freight was €96bn (\$128bn).²⁵ In 2005, Canadians spent \$17bn on personal travel overseas²⁶ and Americans spent \$151bn on buying new and used cars.²⁷ The US Congress has committed \$378bn for spending on the war in Iraq in 2007 alone.²⁸

From these perspectives, a minimum of \$50bn annually to build poor-country resilience to climate change would not only be compensatory finance from those countries primarily responsible for the problem, but would also be affordable, and innovative financing mechanisms can provide the bulk of what is needed (see Section 7).

6 Who should finance adaptation?

Since 1992, over 190 countries have committed – through creating the UN Framework Convention on Climate Change (UNFCCC) – to protect the climate system ‘on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly the developed country Parties should take the lead in combating climate change and the adverse effects thereof’.²⁹

Tackling climate change calls for an unprecedented level of international commitment and co-operation. Under the UNFCCC, financing developing-country adaptation is a key obligation for rich countries, and is widely viewed as an integral part of any future global agreement on emissions cuts. Rich countries must live up to that obligation, by supporting adaptation, in proportion to both their responsibility for contributing to the problem, and their capacity to assist.

There have been few attempts to estimate what share of financing should be provided by each country, and this gap has been an invitation to inaction. In the spirit of asking what justice and fairness require, Oxfam has devised a new Adaptation Financing Index, which gives a broad indication of which countries should take that responsibility for financing adaptation.

The index is constructed on the basis of four principles: responsibility, equity, capability, and simplicity (see Annex 1 for a detailed explanation). Ideally it would be calculated for all greenhouse-gas emissions, but those data are currently available only up to 2000, so we use CO₂ emissions instead, because they provide a reliable proxy for this purpose.

Responsibility: greenhouse-gas emissions have been contributing to global warming for over a century and so strict responsibility stretches back more than 100 years. The damaging impact of emissions has been widely known since 1990, and in 1992 – under the UNFCCC – all countries acknowledged the importance of cutting global emissions to stop climate change. Hence here we assess responsibility on a very conservative basis, starting from 1992, counting each nation’s excessive CO₂ emissions since then to 2003 (the most recent data available).

Equity: each person on the planet has the right to an equal share of the atmosphere’s resources, and so has an equal claim to producing greenhouse gases within the earth’s capacity to avoid dangerous global warming. In order to keep global warming below 2 degrees relative to pre-industrial levels, greenhouse-gas emissions must be reduced to 50 per cent of 1990 levels by 2050.³⁰ Fifty per cent of 1990’s global CO₂ emissions was 10.7bn tonnes, and so each person is assumed to have an equal right to produce annual emissions within that ‘permissible’ global total. Given the average size of the global population between 1992 and 2003, this approximates to a CO₂ allowance of 2 tonnes per person per year.

Capability: countries are considered capable of assisting if they have already achieved a high level of human development at home. UNDP’s Human Development Index (HDI) combines average income, life expectancy, adult literacy, and school enrolments, scoring countries on a scale of 0 to 1. The HDI provides a measure of financial wealth but also excludes countries with high levels of poverty at home, which they have an immediate obligation to address. Only countries that have achieved the highest levels of human development – an HDI score of 0.9 or above, on a scale of 0 to 1 – are considered capable of providing international assistance. Using the HDI also gives some implicit weight to historic CO₂ emissions because countries that have achieved high levels of development have typically done so through fossil-fuel based industrialisation.³¹

Only countries which are *both responsible and capable* are included in the index.

Simplicity: the value of an index lies in its ability to combine clear principles with relevant data in a systematic way, while ensuring that the complexity of the methodology is not greater than the quality of

the data. We aim to make this index reflect the fundamental principles in as clear and simple a way as possible.

The Adaptation Financing Index gives equal weight to a country's responsibility and capability (50 per cent of the score each), and produces a broad indication of the share that each country should contribute to financing adaptation in developing countries. Table 5 sets out the full results, and Figure 2 shows graphically the shares of the top countries, and also presents the data for selected countries that do not qualify for inclusion in the index. The height of the bars represents per capita emissions (on the left), or HDI scores (on the right), and the width of the bars indicates population size. A country's responsibility is given by the shaded area on the left (per capita emissions multiplied by population) and its capability is likewise given by the shaded area on the right (HDI score multiplied by population).

Taking Japan as an illustration: annual CO₂ emissions per person from 1992 to 2003 were on average 9.6 tonnes (7.6 tonnes over the 2-tonne threshold), across a population of 126 million. Compared to other countries, this gives Japan responsibility for 9.9 per cent of excess global emissions up to 2003. Japan's HDI score is high at 0.949: given population size, this implies that Japan has 15.9 per cent of international capability to assist. Taking the average of the two gives Japan a share of 12.9 per cent of the Adaptation Financing Index. This implies that Japan should be contributing approximately 13 per cent of the finance needed for adaptation.

China, by comparison, had average per capita emissions of 2.7 tonnes from 1992 to 2003. That's 0.7 tonnes per person above the 2-tonne allowance, but across a very large population of 1.2 billion people. But China's HDI is low at 0.768, due to 600 million people still living on less than two dollars a day, so China is considered not to have the capability to assist, due to critical development needs at home. Since the index requires both responsibility and capability, China does not qualify for inclusion. Though China and other newly industrialising countries are, according to this index, not responsible for financing adaptation, they will have to play important roles in global mitigation strategies because of their size and rapidly rising emissions.

What does the index reveal? Of course the methodology used is just one way of approaching the issue, but this approach implies that:

- 28 countries are both responsible for and capable of financing adaptation in developing countries;
- the USA and the EU should contribute over 75 per cent of the finance needed, with over 40 per cent from the USA, and over 30 per cent from the EU;

- Japan, Canada, Australia, and the Republic of Korea should contribute a further 20 per cent of the finance, with Japan providing over half of that;
- 17 of the EU's 27 member states are included in the index (the other ten have HDI scores below 0.9 and so do not qualify). The top five European contributors should be (in order): Germany, the UK, Italy, France, and Spain: together they account for over three-quarters of Europe's share;
- almost all the countries in the index are also classified as Annex II countries by the UNFCCC: those which have agreed to provide finance for the costs of climate change in developing countries.³² The index differs from Annex II in additionally including Cyprus, Israel, the Republic of Korea, Slovenia, and Singapore, and in not including Turkey.

Figure 2: The Adaptation Financing Index: top six shares, and other selected countries

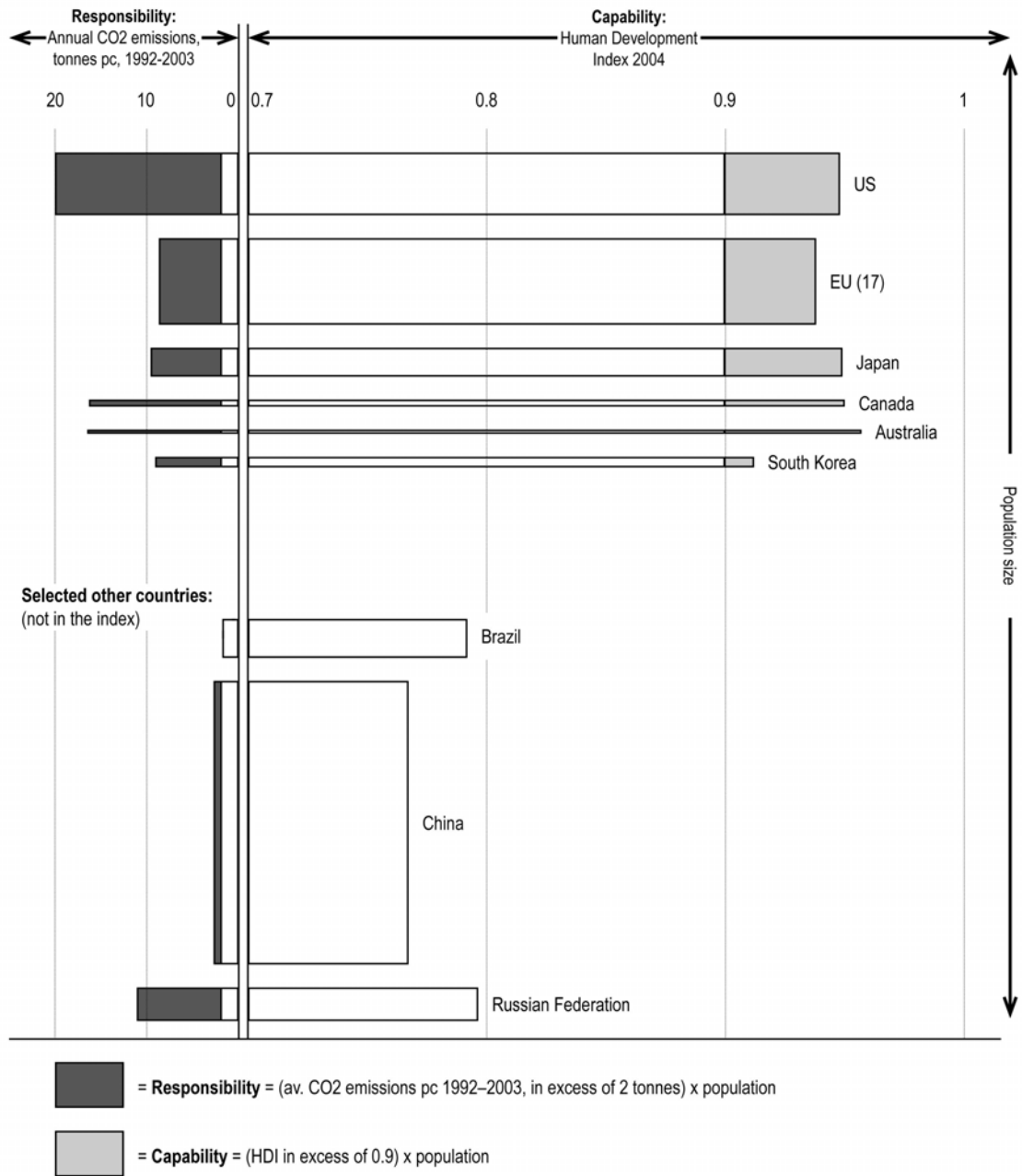


Table 5: The Adaptation Financing Index (AFI)

Country	Responsibility				Capability			Adaptation Financing Index (%)
	Average population 1992–2003 (million)	Cumulative CO2 emissions 1992–2003 (million tonnes)	Average annual CO2 emissions 1992–2003 (tonnes per capita)	Resp (%)	Population 2004 (million)	Human Development Index 2004	Capab. (%)	
USA	272.9	65,629	20.0	51.4	295.4	0.948	36.0	43.7
EU states (17)	377.7	39,221	8.7	26.6	386.3	0.938	37.0	31.6
Germany	81.5	10,635	10.9	7.5	82.6	0.932	6.7	7.1
UK	58.7	6,669	9.5	4.6	59.5	0.940	6.0	5.3
Italy	57.4	5,171	7.5	3.3	58.0	0.940	5.9	4.6
France	58.7	4,471	6.4	2.7	60.3	0.942	6.4	4.5
Spain	40.8	3,304	6.8	2.0	42.6	0.938	4.1	3.1
Netherlands	15.7	2,093	11.1	1.5	16.2	0.947	1.9	1.7
Belgium	10.2	1,452	11.9	1.0	10.4	0.945	1.2	1.1
Sweden	8.8	649	6.1	0.4	9.0	0.951	1.2	0.8
Austria	8.0	795	8.3	0.5	8.2	0.944	0.9	0.7
Greece	10.7	1,034	8.1	0.7	11.1	0.921	0.6	0.6
Finland	5.1	730	11.9	0.5	5.2	0.947	0.6	0.6
Denmark	5.3	701	11.0	0.5	5.4	0.943	0.6	0.5
Ireland	3.7	457	10.2	0.3	4.1	0.956	0.6	0.5
Portugal	10.1	694	5.7	0.4	10.4	0.904	0.1	0.2
Slovenia	1.9	177	7.8	0.1	2.0	0.910	0.1	0.1
Luxembourg	0.4	112	22.0	0.1	0.5	0.945	0.1	0.1
Cyprus	0.8	76	8.4	0.1	0.8	0.903	0.01	0.01
Japan	125.8	14,447	9.6	9.9	127.9	0.949	15.9	12.9
Canada	30.1	5,872	16.3	4.5	32.0	0.950	4.1	4.3
Australia	18.6	3,696	16.5	2.8	19.9	0.957	2.9	2.9
Rep. Korea	45.8	4,993	9.1	3.4	47.6	0.912	1.5	2.4
Switzerland	7.2	534	6.2	0.3	7.2	0.947	0.9	0.6
Norway	4.4	428	8.0	0.3	4.6	0.965	0.8	0.5
Israel	5.8	658	9.4	0.5	6.6	0.927	0.5	0.5
Singapore	3.5	633	15.1	0.5	4.3	0.916	0.2	0.3
New Zealand	3.7	358	8.1	0.2	4.0	0.936	0.4	0.3
Iceland	0.3	26	7.3	0.02	0.3	0.960	0.05	0.03
TOTAL	895.8	136,495	-	100	936.1	-	100	100
Selected other countries:								
Brazil	167.6	3,600	1.79	-	183.9	0.792	-	-
China	1,236.0	40,574	2.74	-	1,308.0	0.768	-	-
India	974.4	11,336	0.97	-	1,087.1	0.611	-	-
Russian Federation	146.3	19,420	11.1	-	143.9	0.797	-	-
South Africa	42.3	4,086	8.1	-	47.2	0.653	-	-

Source: CAIT (2007) and UNDP (2006)

7 Funding: a fraction of what's needed

Rich countries have begun funding adaptation in developing countries but on nowhere near the scale needed. This delay in adequate financing means a delay in learning what works, and risks losing the valuable window of opportunity that the world has to make a success of adaptation before the full impacts of climate change hit.

To make adaptation finance effective, it must be integrated into developing countries' plans and budgets, through bilateral and multilateral channels. But that finance should be systematically classified and reported quite separately from aid. To date, however, the finance that rich countries are providing is, in almost all cases, being counted as part of their aid commitments. Only the Netherlands has so far explicitly committed to providing climate-related finance in addition to 0.7 per cent of national income as aid.

Some donors have started to support developing-country governments in integrating adaptation into their national planning. It is currently not possible to assess the scale of bilateral resources spent by donors on integrating adaptation because it is not yet reported in a systematic and transparent way, but documented examples include:

- Canadian aid agency CIDA has helped to develop guidelines on vulnerability assessments in the South Pacific and the Caribbean, and has assisted countries such as China and Nigeria in identifying and assessing climate impacts, in preparation for drawing up effective national adaptation strategies.³³
- German aid agency GTZ is integrating climate concerns into its support for agricultural water-resource management in India, and is supporting the Tunisian government to develop strategies for and approaches to adaptation.³⁴
- Swedish aid agency SIDA has conducted international training programmes for developing-country policy makers to strengthen their capacity to identify vulnerable sections of society and to assess how best to support them in adapting.³⁵
- The UK's DFID is funding a five-year research programme which aims to bring together scientists and governments from across Africa to share expertise and develop policies for successful adaptation.³⁶
- USAID funds initiatives to translate global climate observations into information that is useful for developing-country policy planners, and for famine early-warning systems. The agency has also produced a manual—based on learning from pilot projects—

to guide planners in integrating climate adaptation into their programmes.³⁷

Measures such as those in the list above are essential to make adaptation successful, but they should be financed with money that is additional to long-standing ODA commitments, not drawn from it. Furthermore, the scale of finance needed goes far beyond what can be delivered effectively through bilateral ODA.

At a multilateral level, World Bank funding for adaptation totalled around \$50m between 2001 and 2006, mainly channelled through the Global Environment Facility.³⁸ Four new international funds have, however, been established for raising the finance needed for developing-country adaptation:

- **The Least Developed Countries Fund**, in operation under the Global Environment Facility (GEF) since 2001, is for addressing LDCs' most urgent and immediate adaptation needs. It relies on voluntary contributions for funding.
- **The Special Climate Change Fund**, operational under the GEF since 2005, is for funding adaptation planning and technology transfer in all developing countries. It also relies on contributions for funding.
- **The Adaptation Fund**, which is not yet operational, will fund 'concrete' (actual) adaptation measures in developing countries. At start up, its main flow of funds will come from a 2 per cent levy on carbon credits generated under the Clean Development Mechanism (CDM). The CDM aims to promote carbon-cutting energy investments – financed by rich-country companies – in developing countries.
- **The Strategic Priority on Adaptation**, set up by the GEF in 2006 as a three-year initiative to pilot capacity-building adaptation measures, is funded by \$50m from GEF Trust Funds.³⁹

Table 6 shows the status of these four funds. The total promised to date: \$232m.

Table 6: Pledges to the international adaptation funds, as of April 2007

Fund	Total pledged \$m	Total received \$m
Least Developed Countries Fund	120	48
Special Climate Change Fund	62	41
Adaptation Fund	-	-
Strategic Priority on Adaptation	50	50
Total	232	139

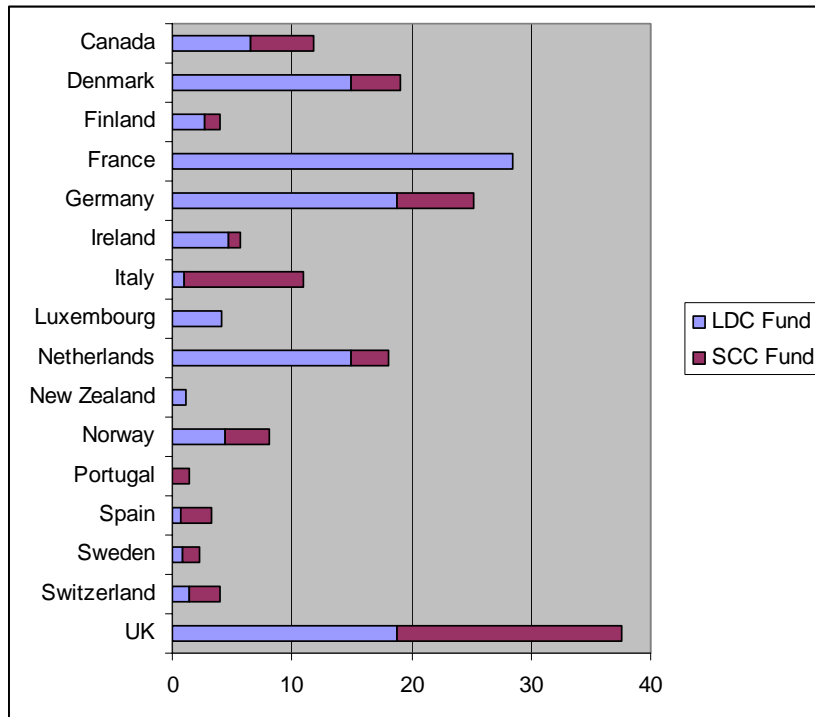
Source: *Global Environment Facility*

The Adaptation Fund is expected to become the largest and most reliably funded of the three international funds. The value of carbon credits which will finance it depends on the scale of projects under the CDM and on the price of carbon. Current estimates project that the credits will be worth around \$440m by 2012, and within a range (depending on the size of CDM projects and the price of carbon credits) of \$170m to \$1bn. But even in an optimistic scenario, that's still at most \$1bn raised in five years' time.⁴⁰

Only 16 countries have so far contributed to the two international funds that rely on contributions, as Figure 3 shows. In striking contrast to the scale of financing needed annually:

- total pledges so far by these 16 countries reach \$182m: barely registering on the scale on which they should collectively be contributing;
- meeting the most urgent and immediate needs in the least-developed countries is likely to cost \$1–2bn. But the LDC Fund currently has pledges of just \$120m, of which only \$48m has been received: enough to meet adaptation priorities in Haiti, Samoa, and Kiribati, but no more;⁴¹
- the USA, Japan, and Australia – who, according to the index, should collectively be contributing almost 60 per cent of all adaptation finance – have so far pledged nothing.

Figure 3: Pledges to international adaptation funds as of April 2007 (\$m)



Source: Global Environment Facility

Meanwhile, rich countries are investing in their adaptation needs at home because they are starting to recognise the importance and cost-effectiveness of acting early. The total budgets that they plan are unknown, but the costs of individual projects give an indication of the scale of finance that their governments are ready to provide:

- In the Netherlands, projects are under way to re-zone flood areas and reposition dykes by 2015, with a budget of €2.2bn (\$2.9bn).⁴²
- After France's heat-wave of 2003, the Health Minister committed \$748m in extra funding for hospital emergency services.⁴³
- In the UK, the government has allocated £178m (\$347m) for investing in cooling systems for the London Underground, partly in preparation for climate change.⁴⁴
- In Germany, a new sea wall is being constructed for the city of Hamburg, costing €600m (\$800m), and it doesn't even take full account of climate-change threats. In Wangerland, one small coastal town on the North sea, the existing dyke - 28km long - is being raised 75cm, and a new 17km dyke is being built, for a combined cost of €30m (\$40m).⁴⁵

- In 1995 the Canadian government allocated CAD\$276m (\$235m) for the research branch of Agriculture and Agri-food Canada, to conduct research on how to help farmers adapt to the changing climate.⁴⁶
- The Australian government, as part of its National Climate Change Adaptation Programme, has invested AUD1.8bn (\$1.3bn) in coping with water scarcity and in raising building-design standards to protect against more extreme storm surge and tropical cyclones.

In each of these countries, the funds committed to these single projects far outweigh the total funding they are providing for adaptation across all developing countries.

8 Innovative finance for adaptation

'Ultimately new financing instruments similar to those for clean energy will need to be explored for adaptation.'

World Bank, 2006

The seriousness of the climate threat, the scale of adaptation needed, and the clear responsibility of rich countries to finance adaptation all call urgently for innovative approaches to raising international funds for adaptation.

International funds must be disbursed through mechanisms that are effective, efficient and fair, ensuring that resources reach the countries and communities that need them most. In order to make this possible, some of the finance should be available to non-governmental organisations, since they are sometimes best placed to provide early and effective support to vulnerable communities.

The finance should be:

- additional to and distinct from existing aid requirements;
- determined on the basis of what's needed: at least \$50bn each year;
- provided reliably from year to year, so that adaptation can be properly integrated into national planning processes;
- raised in ways consistent with cutting greenhouse-gas emissions, since these lie at the heart of the problem;
- raised broadly in proportion to each nation's share of responsibility and capability.

The following are possible adaptation-financing mechanisms currently being discussed in the international climate-change discourse. While Oxfam is not specifically endorsing any one of these proposals at this point, they all deserve further exploration for their potential to contribute to equitable adaptation financing.

An international air-travel adaptation levy

International air travel is a fast-growing source of carbon pollution, and it is expensive: those who travel are both responsible for contributing to climate change, and capable of assisting the people who are harmed by it. In 2006 there were two billion air travellers, with 800 million of them on international flights;⁴⁷ a levy of \$10 on each ticket could raise \$8bn for adaptation each year.⁴⁸ Alternatively the levy could be raised against the price of the ticket, with a premium for business- and first-class. It could operate in conjunction with the air ticket 'solidarity levy' introduced by France in 2006 to finance medicines for developing countries, and which has already inspired 20 other countries⁴⁹ to create similar levies for this purpose.⁵⁰

Carbon taxes

Carbon taxes of some kind are already in use in countries including France, Sweden, the Netherlands, the UK, Germany, and Canada. They have also been proposed and hotly debated in other countries, including New Zealand, Japan, Ireland, Australia, the USA, and as an EU-wide measure. Instead of channelling all revenues raised to national needs, a percentage of the revenue raised from current or future national carbon taxes could be directed – in line with the 'polluter pays' principle – to financing adaptation overseas.

Levies and auctions for carbon trading

The Adaptation Fund will be financed, in part, through a 2 per cent levy on carbon credits generated under the Clean Development Mechanism, which promotes carbon-cutting energy investments, financed by rich-country companies, in developing countries. This principle of a 2 per cent levy on trading could be extended to other existing carbon-trading mechanisms, such as the similar scheme (known as Joint Implementation) which channels clean-energy investments from rich countries to transition countries (mainly in Eastern Europe). Likewise, trading levies or auctions of permits and certificates could be introduced into emerging national and regional carbon markets, such as the European Emission Trading Scheme and current proposals to cap and trade CO₂ emissions in the USA. They could also be introduced as part of voluntary carbon-offset schemes.

The money raised from these additional levies or auctions could contribute significant new resources to international adaptation funds.

Ending fossil-fuel subsidies

In the late 1990s, the Organisation for Economic Co-operation and Development countries collectively subsidised domestic fossil-fuel production and consumption in the range of \$10–57bn each year.⁵¹ How? Some examples: the Canadian government spent \$1.4bn on subsidies – mainly tax breaks – for the oil and gas sector in 2002.⁵² The US 2005 Energy Bill gave fossil-fuel producers a five-year royalty break worth an estimated \$7–28bn on oil and gas from the Gulf of Mexico.⁵³ In 2005, the German government's direct subsidy to coal production was an estimated €2.8bn (\$3.7bn).⁵⁴ The UK government gives an effective annual subsidy of £9bn (\$17.5bn) to the airline industry in waived taxes on fuel.⁵⁵ If these tax breaks and subsidies were ended, some of the revenue raised could be channelled to financing developing-country adaptation to climate change.

All of these mechanisms are feasible, and each of them could be incorporated into the economic adjustments needed in every country as part of the move to low-carbon futures that prevent further global warming.

9 Recommendations

Climate change is forcing vulnerable communities in poor countries to adapt to extreme and unpredictable weather. Rich countries, primarily responsible for creating the problem, must *stop harming*, by leading in cutting greenhouse-gas pollution, and *start helping* with adaptation. Sustainable development requires that all responses to climate change are more successful in reducing poverty than past and current models of economic growth. What, then, does justice in climate adaptation call for?

Rich countries must lead in drastically reducing their greenhouse-gas pollution in order to keep global warming less than 2 degrees Celsius (3.6 degrees Fahrenheit) above pre-industrial levels. This is essential in order to avoid dangerous climate change, and to preserve poor peoples' ability to avoid the worst impacts, through adaptation. Rich and poor countries must start working together to find low-carbon pathways for future human development.

The countries topping the Adaptation Financing Index – the USA, the EU, Japan, Canada, and Australia – should start providing

compensatory finance to developing countries, in line with their responsibility for causing climate change, and their capability to assist. The finance required is likely to be at least \$50bn annually.

Additional finance for adaptation must not come out of aid commitments. Development is essential to enable poor people to adapt successfully, but it is still hugely under-funded: donors must live up to the commitment of providing 0.7 per cent of GDP in order to eradicate poverty. Adaptation finance cannot be re-branded or diverted from aid commitments, and must be reported systematically and transparently. In line with the 'polluter pays' principle, it is owed not as *aid* from rich country to poor country, but as *compensatory finance* from high-emissions countries to those most vulnerable to the impacts. There are many innovative mechanisms for raising this finance independently from aid, which deserve full consideration.

More robust estimates of the economics of adaptation are urgently needed. This calls for an initiative equivalent to the British government's 'Stern Review' on the economics of stopping climate change, but one focused on examining the relationship of development to adaptation, providing examples of best practice in project design and finance, and producing stronger estimates of the costs and benefits of adaptation. This would give developing countries a firmer basis for integrating adaptation into development plans and budgets, and would give high-income, high-emissions countries a clearer estimate of the finance that they are capable of – and responsible for – providing.

A far more intensive, action-learning phase of adaptation is needed to promote learning-by-doing. There is still much for the international community to define and clarify about how best to manage and disburse funds for adaptation, and how best to build climate resilience in developing countries. But vulnerable communities across the world cannot be expected to wait until each and every question has been resolved, before they start getting the support needed. A far more intensive, action-learning phase – focused on testing, building up organisational capacity, and scaling up successful demonstration projects – would produce valuable learning-by-doing. Beginning in this initial three-to-five year phase, international adaptation funds should be made available to diverse actors, including NGOs because they can often reach and support vulnerable communities most effectively. The experience and expertise built up from this phase should be systematically documented and shared to promote learning. In this way, learning from practical experience will contribute to unresolved debates on eligibility and governance of funds, and will also inform best practice on adapting to climate change.⁵⁶

Annex 1: Calculating the Adaptation Financing Index (AFI)

The index broadly estimates the share that each nation should contribute to financing climate-change adaptation in developing countries, based on its responsibility for the harm done and its capability to help.⁵⁷

Responsibility: responsibility is based on CO₂ emissions, from 1992, when the UNFCCC was adopted, to 2003, the most recent year of internationally comparable data. Responsibility is measured as excessive CO₂ emissions per person, taking 2 tonnes per year as the per capita carbon allowance. This allowance is calculated on the basis that in order to keep below 2 degrees warming, global emissions should fall to 50 per cent of 1990 levels by 2050:⁵⁸ that is 10.7bn tonnes of CO₂. Average global population from 1992 to 2003 was 5.9 billion. This gives a per capita annual allowance of 1.8 tonnes over this period, approximated here to 2 tonnes. In calculating responsibility, each country's population is taken to be its average between 1992 and 2003. Each nation's CO₂ 'allowance' is calculated as 2 tonnes per person, over 12 years. This is subtracted from total national emissions over the period.

Each country's responsibility: (cumulative tonnes CO₂ 1992–2003) – (2 tonnes x population x 12)

Capability: capability is based on a country's level of human development, measured by UNDP's Human Development Index in 2004, which combines average income, life expectancy, adult literacy, and school enrolments, on a scale of 0 to 1. Only countries with the highest levels of human development – scores exceeding 0.9 – are considered capable. In 2004, almost every country with an HDI score exceeding 0.9 had achieved at least: income per capita of \$20,000 (in international dollars); life expectancy of 77 years; adult literacy of 92 per cent; and combined gross enrolments for primary, secondary, and tertiary education of 80 per cent. The most recent year's HDI score and population data (2004) are used because the current situation is most relevant in assessing a country's capability to assist.

Each country's capability = [HDI – 0.9] x population

Creating the index

Only countries that have both a positive responsibility and a positive capability are included in the Adaptation Financing Index. Responsibility and capability are given equal weight (50/50) in creating each country's financing share.

% Responsibility (Rx) = country X's responsibility / all included countries' responsibility

% Capability (Cx) = country X's capability / all included countries' capability

Adaptation Financing Index = (Rx + Cx)/2

= approximate percentage share of adaptation finance that should be provided by country X.

The index could be adjusted by altering the years, thresholds, and weightings used, or by using other variables such as income per capita, all greenhouse gases, and emissions from land-use change.

One alternative measure of capability would be income per capita, but since this is a national average, it can be high while masking huge national inequalities. A country's HDI, by comparison, will fall if inequality is high because, unlike income, a small elite cannot amass the majority of a nation's life expectancy, literacy, and school enrolments.

One alternative measure of responsibility would be to include all greenhouse gases. Internationally comparable data are available only for 1990–2000. Recalculating the index on this basis, the top ten countries in the index would be unchanged, and their relative shares very similar: the USA would still have over 40 per cent of the share, the EU over 30 per cent, and Japan over 10 per cent. The largest change would be the Republic of Korea's share rising from 2.4 per cent to 3.8 per cent. This indicates that, for the purposes of this index, CO2 provides a reliable proxy for all greenhouse gases.

Notes

¹ J. Kanter and A. Revkin, 'World scientists near consensus on warming', *New York Times*, 29 January 2007.

² Schreck and Semazzi (2004).

³ Oxfam interviews, January 2007.

⁴ IPCC (2007).

⁵ *Ibid.*

⁶ *Ibid.*

⁷ Article 4.3 of the UNFCCC commits Annex II countries to 'provide new and additional resources to meet the agreed full incremental cost of implementing measures...' including 'preparing for the adaptation to climate change'. In addition Article 4.4 states that Annex II countries 'shall also assist the developing country Parties that are particularly vulnerable to the adverse effects of climate change in meeting costs of adaptation to those adverse effects.' For a complete listing of Annex II countries see note 32 below.

⁸ Oxfam International (2007)

⁹ Stern (2006). Italics have been added for emphasis.

¹⁰ IPCC (2007). 'Glacier melt in the Himalayas is virtually certain to increase related flooding, rock avalanches from destabilized slopes and disruption of water resources.', p.8.

¹¹ Oxfam interview, February 2007.

¹² Denton (2002); Denkelman (2002); Nelson et al. (2002); and IPCC (2007).

¹³ Thomas et al. (2005).

¹⁴ Jarman (forthcoming).

¹⁵ Adapted from Stern (2006) and Sperling (2003).

¹⁶ The Stern Review's estimate of costs is derived from this, but instead assumes that only 20 per cent (not 40 per cent) of official development assistance is climate-sensitive, and assumes that adapting all types of projects will cost only 5–20 per cent more (not 10–20 per cent more). Hence the Stern Review's cost range is \$4–37bn.

¹⁷ Danish Red Cross (2005).

¹⁸ This estimate assumes overhead costs of 10 per cent and beneficiary households with 5 or 6 members.

¹⁹ These and other global public goods are listed in Stern (2006).

²⁰ Based on the World Bank methodology and data, increasing all percentages by one-third, generating a cost range of \$18.5–72.9bn.

²¹ M. Turner, 'UN calls for aid to curb climate change', *Financial Times*, 1 March 2007, available at: <http://www.ft.com/cms/s/43af1a4a-c817-11db-b0dc-000b5df10621.html> (last checked by author 24 April 2007).

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- ²² Christian Aid press release, 'Global war chest needed to fight impact of climate change on poor', 6 April 2007.
- ²³ C. Davenport, 'A post-Olympic hurdle for Greece: the whopping bill', available at: <http://www.csmonitor.com/2004/0901/p07s01-woeu.html> (last checked by author 19 March 2007).
- ²⁴ ITN News, 'London Olympics will cost £9.325 billion', 15 March 2007, available at: <http://itn.co.uk/news/85e198fb6f97980297e7f64d22ac362a.html> (last checked by author 20 March 2007).
- ²⁵ European Commission (2006) *Energy and Transport in Figures*, Table 3.1.7, available at: http://ec.europa.eu/dgs/energy_transport/figures/pocketbook/doc/2006/2006_transport_en.pdf, (last checked by the author 19 March 2007).
- ²⁶ Statistics Canada, 'International transactions in services, travel by category and geographic area', Table 376-0031, available at: <http://cansim2.statcan.ca/cgi-win/cnsmcgi.exe>, (last checked by the author 19 March 2007).
- ²⁷ Bureau of Transport Statistics, 'Personal consumption expenditures on transportation by subcategory', available at: http://www.bts.gov/publications/national_transportation_statistics/2005/html/table_03_13.html, (last checked by the author 19 March 2007).
- ²⁸ Belasco (2007).
- ²⁹ UN (1992), Article 3
- ³⁰ Meinshausen et al (2006).
- ³¹ UNDP (2006). For an overview of critiques of the HDI, see Raworth and Stewart (2004).
- ³² Annex II countries are: Australia, Austria, Belgium, Canada, Denmark, the EU, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the UK, and the USA.
- ³³ Singh, S. (2006)
- ³⁴ GTZ (2003)
- ³⁵ SIDA (2007)
- ³⁶ DFID (2007)
- ³⁷ Breed, W. (2005).
- ³⁸ The World Bank GEF (2006) cited in Burton et al (2006)
- ³⁹ The Strategic Priority on Adaptation, Global Environment Facility.
- ⁴⁰ UNFCCC (2006). Prices in Euros are converted to dollars at May 2007 exchange rates
- ⁴¹ The NAPA budgets submitted by Haiti, Samoa, and Kiribati are \$24.5m, \$7.8m, and \$12.0m respectively. A portion of LDC funds is needed for the preparation of the NAPAs and for the overheads of administering the fund.

All NAPAs submitted are available at
http://unfccc.int/national_reports/napa/items/2719.php.

⁴² McKenzie Hedger and Corfee-Morlot (2006).

⁴³ Bulletin of the World Health Organisation 2003, 81 (10), cited in Simms et al. (2004).

⁴⁴ Darsh (2006).

⁴⁵ Personal communication with Germany's Ministry for the Environment

⁴⁶ Dore and Burton (2000).

⁴⁷ ICAO News Release, 21 December 2006, available at:
http://www.icao.int/cgi/goto_m.pl?icao/en/nr/2006/pio200618_e.pdf, (last checked by the author 27 April 2007).

⁴⁸ Müller and Hepburn (2006).

⁴⁹ Other countries setting up a levy on air travel to fund the UNITAID initiative include Benin, Brazil, Chile, Cambodia, Cameroon, Congo, Côte d'Ivoire, Cyprus, Gabon, Guinea, Jordan, Luxembourg, Madagascar, Mali, Mauritania, Mauritius, Nicaragua, Niger, Norway, and South Korea.

⁵⁰ <http://www.unitaid.eu/EN-Inutaid-unis-pour-soigner.html>, (last checked by the author 8 March 2007).

⁵¹ UNEP and IEA (2002) and De Moor (2001).

⁵² Pembina Institute (2005).

⁵³ Offices of the Democratic Leaders Harry Reid and Nancy Pelosi (2006) 'For and By Big Oil', a Special Joint House and Senate Democratic Report.

⁵⁴ Newman (2003). This estimate excludes pension fund deficit payments.

⁵⁵ Lohmann (2006).

⁵⁶ A pilot phase of this kind has been proposed as part of the BASIC Project's Sao Paulo Proposal. See BASIC (2006).

⁵⁷ Eco Equity and Christian Aid (2006) takes a similar approach to calculating national obligations within a climate regime.

⁵⁸ Meinshausen (2005).

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