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**Adapting to the inevitable:
national action and
international cooperation**

“If you are neutral in a situation of injustice, you have chosen the side of the oppressor.”

Archbishop Desmond Tutu



“An injustice committed against anyone is a threat to everyone.”

Montesquieu

Adapting to the inevitable: national action and international cooperation

All countries will have to adapt to climate change

The village of Maasbommel on the banks of the River Maas in Zeeland, southern Netherlands, is preparing for climate change. Like most of the Netherlands, this is a low-lying area at risk from rising sea levels and rivers swollen by rain. The landscape is dominated by water—and by the networks of dykes that regulate its flow. Located on the Maasbommel waterfront are 37 homes with a distinctive feature: they can float on water. Fixed to large steel stilts that are sunk into the river bed, the hollow foundations of the homes act like the hull of a ship, buoying the structure above water in the event of a flood. The floating homes of Maasbommel offer a case study in how one part of the developed world is adapting to the increased risks of flooding that will come with climate change.

People in the developing world are also adapting. In Hoa Thanh Hamlet in Viet Nam's Mekong Delta, people understand what it means to live with the risk of flooding. The greatest risks occur during the typhoon season, when storms that develop in the South China Sea produce sudden sea surges at a time when the Mekong is in flood. Vast networks of earth dykes maintained through the labour of farmers are an attempt to keep the flood waters at bay. Here too, people are dealing with climate change risks. Dykes are being strengthened, mangroves are being planted to protect villages from storm surges, and homes are being constructed on bamboo stilts. Meanwhile, part of an innovative 'living with floods' programme supported by donor agencies is providing vulnerable communities with swimming lessons and issuing life-jackets.

The contrasting experiences of Maasbommel and Hoa Thanh Hamlet illustrate how climate change adaptation is reinforcing wider global inequalities. In the Netherlands, public investment in an elaborate flood defence infrastructure provides a higher level of

protection against risk. At a household level, technological capacity and financial resources offer people the choice of dealing with the threat of flooding by purchasing homes that enable them to float 'on' the water. In Viet Nam, a country that faces some of the world's most extreme threats from climate change, a fragile flood defence infrastructure provides limited protection. And in villages across the Mekong Delta, adaptation to climate change is a matter of learning to float 'in' the water.

All countries will have to adapt to climate change. In rich countries governments are putting in place public investments and wider strategies to protect their citizens. In developing countries adaptation takes a different form. Some of the world's most vulnerable people living with the risks of drought, floods and exposure to tropical storms are being left to cope using only their own very limited resources. Inequality in capacity to adapt to climate change is emerging as a potential driver of wider disparities in wealth, security and opportunities for human development. As Desmond Tutu, the former Archbishop of Cape Town, warns in

his special contribution to this Report, we are drifting into a situation of global adaptation apartheid.

International cooperation on climate change demands a twin-track approach. The priority is to mitigate the effects that we can control and to support adaptation to those that we cannot. Adaptation is partly about investment in the 'climate-proofing' of basic infrastructure. But it is also about enabling people to manage climate-related risks without suffering reversals in human development.

If left uncorrected the lack of attention to adaptation will undermine prospects for human development for a large section of the

world's most vulnerable people. Urgent action on mitigation is vital because no amount of adaptation planning, however well financed or well designed, will protect the world's poor from business-as-usual climate change. By the same token, no amount of mitigation will protect people from the climate change that is already inevitable. In a best case scenario, mitigation will start to make a difference from around 2030 onwards, but temperatures will increase to around 2050. Until then, adaptation is a 'no-choice' option. The bad news is that we are a very long way from a best-case scenario because mitigation has yet to take off.

Special contribution

We do not need climate change apartheid in adaptation

In a world that is so divided by inequalities in wealth and opportunity, it is easy to forget that we are part of one human community. As we see the early impacts of climate change registering across the world, each of us has to reflect on what it means to be part of that family.

Perhaps the starting point is to reflect on the inadequacy of language. The word 'adaptation' has become part of the standard climate change vocabulary. But what does adaptation mean? The answer to that question is different things in different places.

For most people in rich countries adaptation has so far been a relatively painfree process. Cushioned by heating and cooling systems, they can adapt to extreme weather with the flick of a thermostat. Confronted with the threat of floods, governments can protect the residents of London, Los Angeles and Tokyo with elaborate climate defence systems. In some countries, climate change has even brought benign effects, such as longer growing seasons for farmers.

Now consider what adaptation means for the world's poorest and most vulnerable people—the 2.6 billion living on less than US\$2 a day. How does an impoverished woman farmer in Malawi adapt when more frequent droughts and less rainfall cut production? Perhaps by cutting already inadequate household nutrition, or by taking her children out of school. How does a slum dweller living beneath plastic sheets and corrugated tin in a slum in Manila or Port-au-Prince adapt to the threat posed by more intense cyclones? And how are people living in the great deltas of the Ganges and the Mekong supposed to adapt to the inundation of their homes and lands?

Adaptation is becoming a euphemism for social injustice on a global scale. While the citizens of the rich world are protected from harm, the poor, the vulnerable and the hungry are exposed to the harsh reality of climate change in their everyday lives. Put bluntly, the world's poor are being harmed through a problem that is not

of their making. The footprint of the Malawian farmer or the Haitian slum dweller barely registers in the Earth's atmosphere.

No community with a sense of justice, compassion or respect for basic human rights should accept the current pattern of adaptation. Leaving the world's poor to sink or swim with their own meagre resources in the face of the threat posed by climate change is morally wrong. Unfortunately, as the *Human Development Report 2007/2008* powerfully demonstrates, this is precisely what is happening. We are drifting into a world of 'adaptation apartheid'.

Allowing that drift to continue would be short-sighted. Of course, rich countries can use their vast financial and technological resources to protect themselves against climate change, at least in the short-term—that is one of the privileges of wealth. But as climate change destroys livelihoods, displaces people and undermines entire social and economic systems, no country—however rich or powerful—will be immune to the consequences. In the long-run, the problems of the poor will arrive at the doorstep of the wealthy, as the climate crisis gives way to despair, anger and collective security threats.

None of this has to happen. In the end the only solution to climate change is urgent mitigation. But we can—and must—work together to ensure that the climate change happening now does not throw human development into reverse gear. That is why I call on the leaders of the rich world to bring adaptation to climate change to the heart of the international poverty agenda—and to do it now, before it is too late.



Desmond Tutu
Archbishop Emeritus of Cape Town

Mitigation is one part of a twin strategy for insurance under climate change. Investment in mitigation will provide high returns for human development in the second half of the 21st Century, reducing exposure to climate risks for vulnerable populations. It also offers insurance against catastrophic risks for future generations of humanity, regardless of their wealth and location. International cooperation on adaptation is the second part of the climate change insurance strategy. It represents an investment in risk reduction for millions of the world's most vulnerable people.

While the world's poor cannot adapt their way out of dangerous climate change, the impacts of global warming can be diminished through good policies. Adaptation actions taken in advance can reduce the risks and limit the human development damage caused by climate change.

Northern governments have a critical role to play. When they signed the United Nations Framework Convention on Climate Change (UNFCCC) in 1992, these governments agreed to help “the developing countr(ies) that are particularly vulnerable to the adverse effects of climate change in meeting costs of adaptation to those adverse effects”. Fifteen years on that pledge has yet to be translated into action. To date, international cooperation on adaptation has been characterized by chronic under-financing, weak coordination and a failure to look beyond project-based responses. In short, the current framework provides the equivalent of an aid sponge for mopping up during a flood.

Effective adaptation poses many challenges. Policies have to be developed in the face of uncertainties on the timing, location and severity of climate change impacts. Looking to the future, the scale of these impacts will be contingent on mitigation efforts undertaken today: delayed or limited mitigation will drive up the costs of adaptation. These uncertainties have to be considered in the development of adaptation strategies and financing plans. However, they do not provide a justification for inaction. We know that climate change is impacting on the lives of vulnerable people

today—and we know that things will get worse before they get better.

In one respect, the developed world has shown the way. Here, no less than in the developing world, governments and people have to deal with climate change uncertainty. But that uncertainty has not acted as a barrier to large-scale investment in infrastructure, or to the development of broader adaptation capacities. As the primary architects of the dangerous climate change problem, the governments and citizens of the rich world cannot apply one rule at home and another to the vulnerable communities that are the prospective victims of their actions. Watching the consequences of dangerous climate change unfold in developing countries from behind elaborate climate defence systems is not just ethically indefensible. It is also a prescription for a widening gap between the world's haves and have-nots, and for mass resentment and anger—outcomes that will have security implications for all countries.

This chapter is divided into two parts. In the first section we focus on the national adaptation challenge, looking at how people and countries are responding to the challenge and at the strategies that can make a difference. Climate change poses such a threat because it is exposing vulnerable people to incremental risks. Enabling people to manage these risks requires public policies that build resilience through investment in infrastructure, social insurance and improved disaster management. It requires also a strengthened commitment to broader policies that bolster human development and reduce extreme inequalities.

In the second section we turn to the role of international cooperation. There is an overwhelming case for rich countries to play a greater role in supporting adaptation. Historic responsibility for the climate change problem, moral obligation, respect for human rights and enlightened self-interest combine to make this case. Increased financing for the integration of adaptation into national poverty reduction planning is one requirement. Another is the early development of a coherent multilateral structure for delivering support.

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Planning for adaptation to climate change is a fast-growing industry in developed countries

4.1 The national challenge

All countries will have to adapt to climate change. How they adapt, and the choices open to people and governments, will be determined by many factors. The nature of the risks associated with climate change varies across regions and countries. So too does the capacity to adapt. The state of human development, technological and institutional capabilities and financial resources all play a role in defining that capacity.

In some respects, the incremental risk posed by climate change is one of degree. The policies and institutions that can enable countries and people to adapt to climate risks today—social and economic policies that build capabilities and resilience against ‘climate shocks’, investment in infrastructural defences against flooding and cyclones, institutions for regulating watershed management—are the same as those that will be needed to address future threats. However, the scale of these threats poses both quantitative and qualitative challenges. Some countries—and some people—are far better equipped than others to respond.

Adaptation in the developed world

Planning for adaptation to climate change is a fast-growing industry in developed countries. National governments, regional planning bodies, local governments, city authorities and insurance companies are all drawing up adaptation strategies with a common goal: protecting people, property and economic infrastructure from emerging climate change risks.

Mounting public concern has been one factor shaping the adaptation agenda. In many developed countries there is a widespread perception that climate change is adding to weather-related risks. The 2003 European heatwave, the 2004 Japanese typhoon season, Hurricane Katrina and the devastation of New Orleans, and episodes of drought, flooding and extreme temperature across the developed world have been among the headline events fuelling public concern. Uncertainty over the

future direction of climate change has done little to deter public calls for more proactive government responses.

The insurance industry has been a powerful force for change. Insurance provides an important mechanism through which markets signal changes in risk. By pricing risk, markets provide incentives for individuals, companies and governments to undertake risk reduction measures, including adaptation. In both Europe and the United States, the insurance industry has shown growing concern over the implications of climate change for risk-related losses (see chapter 2). Projections pointing to the increased frequency of extreme flood and storm events are one source of that concern. In several countries, the insurance industry has emerged as a forceful advocate of increased public investment in ‘climate-proofing’ infrastructure to limit private losses. For example, the Association of British Insurers is calling for a 50 percent increase in national flood defence spending by 2011.¹

Adaptation in the developed world has taken many forms. The ‘floating home’ owners of Maasbommel provide a household-level illustration of behavioural shift. In other cases, business is being forced to adapt. One example comes from the European ski industry. Snow cover in European alpine areas is already in retreat, and the IPCC has warned that, at middle elevations, the duration of snow cover is expected to decrease by several weeks for each 1°C of temperature increase.² The Swiss ski industry has ‘adapted’ by investing heavily in artificial snow-making machines. Covering one hectare of ski slopes requires about 3,300 litres of water, and helicopters are used to ferry in the raw material, which is converted into snow through energy-intensive freezing.³

Many developed countries have conducted detailed studies on climate change impacts. Several are moving towards the implementation of adaptation strategies. In Europe, countries such as France, Germany and the United Kingdom have created national institutional

structures for adaptation planning. The European Commission has urged member states to integrate adaptation into infrastructure programmes and for a good reason.⁴ With a lifetime of 80–100 years, infrastructure such as bridges, ports and motorways have to take into account future climate change conditions. Sectors such as agriculture and forestry will have to deal with far earlier impacts, as will the public at large.

The scale of defensive climate change adaptation efforts in rich countries is not widely appreciated. While the record varies, the overall picture is one of rising investments in preventative action. Among the examples:

- *The Netherlands.* As a densely populated, low-lying country with more than one-quarter of its land area below sea level, the Netherlands faces acute climate change risks. The risks are contained through a vast network of canals, pumps and dykes. The dykes are constructed to withstand weather events that might happen only once in every 10,000 years. It is not only the sea that poses threats. The River Rhine, which forms a large delta with the Maas, is a constant flood threat. With sea levels rising, more intense storms occurring, and climate models predicting that precipitation could increase by 25 percent, adaptation planning in the Netherlands is viewed as a matter of national security. Dutch water policy recognizes that current infrastructure may be insufficient to deal with increased water levels in rivers and rising sea levels. In 2000 the national policy document—*Room for the River*—set out a detailed framework for adaptation. The framework includes more stringent planning controls on human settlements, Catchment Area Strategies implemented by regional authorities to develop flood-retention areas, and a budget of US\$3 billion for investment to protect against flooding. The policy aims at protecting the Netherlands from discharges from the River Rhine of up to 18,000m³/s from 2015—around 50 percent above the highest recorded level to date.⁵
- *United Kingdom.* The United Kingdom Climate Impacts Programme (UKCIP)

has drawn up detailed region-by-region and sectoral studies looking at adaptation challenges. Management strategies for flooding are being developed in the light of risk assessments of rising sea levels and increased rainfall. Forecasted changes in climate, storms and rainfall patterns are expected to lead to an increased risk of flooding. In contrast to the Netherlands, Britain's flood defence systems are designed to cope with the biggest floods expected every 100–200 years. With sea levels rising and more storms and rain in prospect, flood defence strategies are under revision. Estimates by the insurance industry suggest that the number of homes at risk of flooding could rise from 2 million in 2004 to 3.5 million over the long term if flood defence infrastructure is not strengthened. Only around one-half of the national flood defence infrastructure is in good condition. The Environment Agency, a government body, has called for at least US\$8 billion to be spent strengthening the Thames Barrier—a mechanized flood defence structure that protects London. Current spending on flood management and coastal erosion is around US\$1.2 billion annually.⁶ Major floods in 2007 led to renewed calls for increased spending.

- *Japan.* Concern over adaptation in Japan was heightened in 2004 when the country was hit by 10 tropical cyclones. This was more than in any other year over the previous century. Total losses amounted to US\$14 billion, of which roughly one-half was covered by insurance. Rising temperatures and rising sea levels are also increasing risk: average sea levels are rising at 4–8mm a year. While Japan has one of the world's most highly developed flood defence infrastructures, ports and harbours are seen as sites of great vulnerability. More intensive tropical storm activity could lead to large-scale economic disruption. Plans developed by the Japanese Government to provide more effective defences in the face of a 21st Century sea level rise of 1 metre estimate costs at US\$93 billion.⁷

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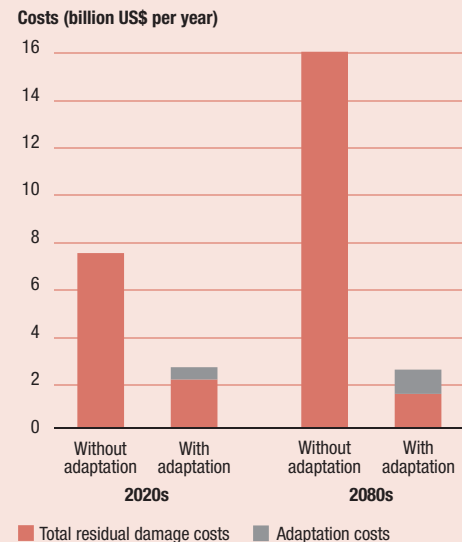
- Germany.* Large areas of Germany face increased risk of flooding with climate change. Research in the Neckar catchment area in Baden-Württemberg and Bavaria predicts an increase of 40–50 percent in small and medium-sized flood events by the 2050s, with a 15 percent increase in ‘hundred year’ floods. The Baden-Württemberg Ministry for Environment estimates the additional cost of long-term flood defence infrastructure at US\$685 million. Following large-scale flooding in 2002 and 2003, Germany adopted a Flood Control Articles Act which integrates climate change assessment into national planning, imposing strict requirements on the designation of flood areas and human settlements.⁸
- California.* Climate change will have serious implications for water supply in parts of California. Rising winter temperatures are expected to reduce the accumulation of snow in the Sierra Nevada, which functions as a large water storage system for the state. Reductions in snow cover in the Sacramento, San Joaquin and Trinity drainage areas (relative to the average for 1961–1990) are projected to amount to 37 percent for the period 2035–2064, rising to 79 percent for the period 2070–2090. As an already highly water-stressed state, California has developed an extensive system of reservoirs and water-transfer channels to maintain flows to dry areas. In its 2005 Water Plan Update, the Department of Water Resources (DWR) sets out a wide-ranging strategy to deal with reduced water flows, including efficiency measures to reduce water use in urban areas and agriculture. Increased investment in recycled water, with a target of 930 million cubic meters by 2020, or roughly twice current levels, also figures. California also faces increased flood threats from two directions: rising sea levels and accelerating snow melt. The DWR estimates the costs of upgrading the Central Valley flood control system and levees in the Delta alone at over US\$3 billion. Climate change could redraw California’s coastal map, with beachfront

real estate ending up under water, sea walls collapsing and cliffs eroding.⁹

These examples demonstrate that policy-makers in rich countries do not see climate change uncertainty as a cause for delaying adaptation. Public investments today are seen as an insurance against future costs. In the United Kingdom, government agencies estimate that every US\$1 spent on flood defences saves around US\$5 in flood damage.¹⁰ The returns on early adaptation investments are likely to increase over time as climate change impacts strengthen. Estimates by the European Commission suggest that the damage caused by rising sea levels in 2020 will be up to four times higher than damage incurred if preventative measures are taken. By the 2080s, they could be over eight times higher.¹¹ Further, the costs of such defence measures are only a fraction of the damages they avoid (figure 4.1).

Not all adaptation is defensive. In the short term at least, climate change is likely to create winners as well as losers—and most of the winners will be in rich countries. Agriculture provides an illustration. While small-scale farmers in developing countries stand to lose under climate change, the medium-term impacts could create opportunities in much of the developed world. In the United States,

Figure 4.1 Adaptation is good investment in the European Union



Source: CEC 2007b.

national climate change projections show that near-term agricultural food production may increase, albeit with southern states lagging behind and the Great Plains facing more droughts as production centres move north.¹² Northern Europe also stands to gain from longer and warmer growing seasons, creating scope for improved competitiveness in a range of fruit and vegetables.¹³ Displacement of imports from developing countries therefore remains a threat to human development in some product areas.

Living with climate change—adaptation in developing countries

While rich countries are preparing to adapt to climate change, it is developing countries that will be faced with the greatest and earliest burden in terms of adverse impacts on living standards, livelihoods, economic growth and human vulnerability. As in the developed world, people in the poorest countries will have to deal with the consequences of a changing climate. However, there are two important differences. First, developing countries in tropical and subtropical regions will register some of the strongest climate change effects. Second, the incremental risks that come with climate change will be superimposed on societies marked by mass poverty and acute vulnerability. While northern governments have the financial, technological and human capabilities to respond to the climate change risks facing their citizens, developing countries are far more constrained.

Adaptation to climate change is not a future scenario for the developing world. It is already happening—just as it is in rich countries. But the contrasts with adaptation in the developed world are striking. In London and New York, people are being protected against the risks associated with rising sea levels through public investment in infrastructure. In the poorest countries, adaptation is largely a matter of self-help. Millions of people with barely enough resources to feed, clothe and shelter their families are being forced to direct money and labour to adaptation. Among the examples of that struggle:

- In northern Kenya the increased frequency of droughts means that women are walking

greater distances to collect water, often ranging from 10 to 15 km a day. This confronts women with personal security risks, keeps young girls out of school and imposes an immense physical burden—a plastic container filled with 20 litres of water weighs around 20 kg.¹⁴

- In West Bengal in India, women living in villages in the Ganges Delta are constructing elevated bamboo platforms known as *machan* on which to take refuge above monsoon floodwaters. In neighbouring Bangladesh, donor agencies and NGOs are working with people living on *chars*—highly flood-prone islands that are cut off during the monsoon—to raise their homes above flood levels by placing them on stilts or raised embankments.¹⁵
- Communities in Viet Nam are strengthening age-old systems of dykes and embankments to protect themselves against more powerful sea surges. In the Mekong Delta, agricultural collectives now levy a tax for coastal protection and are supporting the rehabilitation of mangrove areas as a barrier against storm surges.¹⁶
- Investments in small-scale water harvesting are increasing. Farmers in Ecuador are building traditional U-shaped detention ponds, or *albarradas*, to capture water during wetter years and recharge aquifers during drought years.¹⁷ In Maharashtra, India, farmers are coping with increased exposure to drought by investing in watershed development and small-scale water-harvesting facilities to collect and conserve rainwater.¹⁸
- In Nepal, communities in flood-prone areas are building early warning systems—such as raised watchtowers—and providing labour and material to shore up embankments to prevent glacial lakes from bursting their banks.
- Farmers across the developing world are responding to emerging climate threats by drawing on traditional cultivation technology. In Bangladesh, women farmers are building ‘floating gardens’—hyacinth rafts on which to grow vegetables in flood-prone areas. In Sri Lanka, farmers are experimenting with rice varieties that can withstand saline intrusion and cope with reduced water.¹⁹

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Human development
itself is the most secure
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to climate change

None of these cases provides evidence of adaptation directly attributable to climate change. It is impossible to establish causality between specific climate events and global warming. What has been established is an overwhelmingly probable link between climate change and the type of events—droughts, water shortages, storms and weather variability—that force adaptation. Attempting to quantify the climate change components of the increment to risk in any one case is an exercise in futility. But ignoring evidence of mounting systemic risks is a study in myopia.

Human development itself is the most secure foundation for adaptation to climate change. Policies that promote equitable growth and the diversification of livelihoods, expand opportunities in health and education, provide social insurance for vulnerable populations, improve disaster management and support post-emergency recovery all enhance the resilience of poor people facing climate risks. That is why climate change adaptation planning should be seen not as a new branch of public policy but as an integral part of wider strategies for poverty reduction and human development.

Good climate change adaptation planning will not override problems linked to inequality and marginalization. Experience in Kenya is instructive. For Kenya's 2 million pastoralists, increased exposure to future drought is a real threat. However, that threat is magnified by wider forces that are weakening pastoral livelihoods today, including a policy bias in favour of settled agriculture, the privatization of water rights and disregard for the customary rights of pastoralists. In the Wajir district of northern Kenya, to take one example, the encroachment of crop production into pastoral areas has restricted access to grazing lands, blocked migration corridors and undermined traditional water-sharing arrangements, leading to increased overgrazing and reduced milk production.²⁰

Framing national adaptation policies

There are no blueprints for successful climate change adaptation. Countries face different

types and degrees of risk, start from different levels of human development and vary widely in their technological and financial capabilities.

While policies for human development are the most secure foundation for adaptation, even the best human development practice will have to take into account emerging climate change risks. These risks will magnify the costs of past policy failure and will demand a reassessment of current human development practice, placing a premium on the integration of climate change scenarios into wider national programmes.

So far adaptation planning has been a fringe activity in most developing countries. To the extent that strategies for adaptation are emerging, the focus is on climate-proofing infrastructure. This is a critical area. But adaptation is about far more than infrastructure. The starting point is to build climate change risk assessment into all aspects of policy planning. In turn, risk management requires that strategies for building resilience are embedded in public policies. For countries with limited government capacity this is an immense task.

The magnitude of that task is insufficiently appreciated. In Egypt, a 0.5 metre increase in sea levels could lead to economic losses in excess of US\$35 billion and the displacement of 2 million people.²¹ The country is developing an institutional response through a high-level ministerial dialogue led by the Ministry of the Environment. But the sheer magnitude of the climate risks will require far-reaching policy reforms across the entire economy.

Another illustration comes from Namibia.²² Here too climate change poses threats across many sectors. Fisheries provide an example. Commercial fish processing is now one of the mainstays of the Namibian economy: it represents almost one-third of total exports. One of the sources of Namibia's rich fishery revenues is the Benguela current—a cold water current that runs along its coast. With water temperatures warming, there is growing concern that key fish species will migrate southwards. This creates a major adaptation challenge for the fisheries sector. Given the uncertainties, should Namibia be increasing investments in fish processing? Or, should it be seeking diversity?

Adjusted for country context, these are the type of questions being asked of governments across the developing world. Providing answers requires vastly strengthened capacity in risk assessment and resilience planning. While an international response is emerging through mechanisms such as the Global Environmental Facility (GEF), that response remains under-financed, poorly coordinated and weakly managed.

Successful adaptation planning will require a transformational change in government practices. Reactive measures are guaranteed to prove insufficient, as are responses that fail to address transboundary climate change impacts through regional cooperation. But, the greatest transformation is required in planning for human development and poverty reduction. Building the resilience and coping capacity of the poorest and more vulnerable sections of the society will require something more than rhetoric pledges to the MDGs and pro-poor growth. It will require a fundamental reappraisal of poverty reduction strategies backed by a commitment to enhanced equity in tackling social disparities.

As in other areas, adaptation policies are likely to be more successful and responsive to the needs of the poor when the voice of the poor identifies priorities and shapes the design of policies. Accountable and responsive government and the empowerment of people to improve their own lives are necessary conditions for successful adaptation, just as they are for human development. The foundations for successful adaptation planning can be summarized under four 'i's:

- *Information* for effective planning;
- *Infrastructure* for climate-proofing;
- *Insurance* for social risk management and poverty reduction;
- *Institutions* for disaster risk management.

Information on climate risks

In planning for adaptation to climate change, information is power. Countries lacking the capacity and resources to track meteorological patterns, forecast impacts and assess risk cannot provide their citizens with good quality information—and are less able to target the

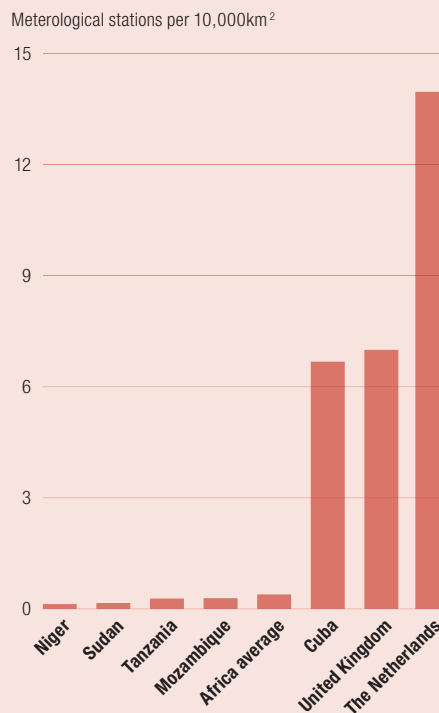
public investments and policies that can reduce vulnerability.

At a global level there is an inverse relationship between climate change risk exposure and information. The IPCC acknowledges that current climate models for Africa provide insufficient information to downscale data on rainfall, the spatial distribution of tropical cyclones and the occurrence of droughts. One reason for this is that the region has the world's lowest density of meteorological stations, with one site for every 25,460 km²—one-eighth of the minimum level recommended by the World Meteorological Organization (WMO).²³ The Netherlands, by way of contrast, has one site for every 716 km²—four times above the WMO minimum (figure 4.2).

Inequalities in climate monitoring infrastructure are intimately linked to wider disparities. Opportunities in education and training are critical for the development of meteorological infrastructure and the conduct of relevant research. In countries with restricted

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Figure 4.2 Africa's climate information gap



Source: Calculated from WMO 2007 and UN 2007b.

Without improved access to information, governments and people across the developing world will be denied opportunities to develop effective climate adaptation strategies

access to secondary and tertiary education, the human capital for these activities is often lacking. Evidence for this can be seen in the distribution of published international research. Whereas Europe and North America account for over two-thirds of all papers published in two major climate journals, Africa accounts for just 4 percent.²⁴

Financing constraints widen the disparities in access to information. Developed countries are able to invest far more heavily than poorer countries in meteorological data collection and analysis, providing climate-sensitive sectors with a steady flow of information. Farmers in France, to take one example, benefit from a meteorological network that invests US\$388 million annually in climate monitoring and analysis, using some of the world's most sophisticated forecasting systems.²⁵ By contrast, in Ethiopia, where over 90 percent of people depend on agriculture for their livelihoods, the national meteorological budget for 2005 was around US\$2 million. By sub-Saharan African standards, Ethiopia is well endowed: in Malawi, the meteorological budget for 2005 was less than US\$1 million.²⁶ Indeed, the French meteorological budget exceeds expenditure on climate monitoring and analysis for the whole of sub-Saharan Africa.²⁷

Capacity for monitoring and forecasting climate can have an important bearing on livelihood security. For agricultural producers, advance warning of abrupt changes in rainfall patterns or temperature can mean the difference between a successful harvest and crop failure. Seasonal forecasting systems and effective dissemination of the information they generate can enable farmers to monitor potential hazards and respond by adjusting planting decisions or changing the mix of crops.

One successful example comes from Mali. Here the national meteorological service—the Direction Nationale de la Météorologie (DNM)—has developed a programme for transmitting rainfall and soil moisture information through a network of representative farmers' organizations, NGOs and local governments. Information is collected from diverse sources, including the WMO, regional

monitoring systems and a national network of simple rain gauges. Throughout the growing season, farmers receive regular bulletins, enabling them to adjust production practices. Evaluation of results in the 2003–2004 cropping season show that crop yields and incomes were higher in areas where agro-meteorological information was used, notably for maize.²⁸

The Mali experience demonstrates that low income does not have to be a barrier to successful action. In this case, government, farmers and climatologists have worked together to generate and disseminate information in a way that empowers vulnerable producers, reducing the risks and uncertainties associated with erratic rainfall. In other countries, information is less available, and what is available is often unequally distributed, or presented in ways that are not useful to farmers or other users. All too often, large-scale commercial growers have access to good-quality meteorological information while smallholders in the marginal areas facing the greatest climate risks are in 'information-free' zones.

Building meteorological monitoring capacity will require international cooperation. Many developing countries lack both the financial and technological capabilities to scale up monitoring activities. Yet without improved access to information, governments and people across the developing world will be denied opportunities to develop effective climate adaptation strategies.

There have been some encouraging developments. At their summit in Gleneagles in 2005, G8 leaders recognized the importance of building capacity to monitor climate. They pledged to strengthen existing climate institutions in Africa and to help the region obtain the benefits of cooperation through the Global Climate Observation System (GCOS) with "a view to developing fully operational regional climate centres in Africa".²⁹ The Government of Finland has actively supported the development of meteorological infrastructure in eastern Africa. In the United Kingdom, the Meteorological Office's Hadley Centre has developed a low-cost, high-resolution climate monitoring model that has been made freely available, together with

training and support, to 11 regional centres in the developing world.³⁰

Encouraging as these initiatives have been, the international response has fallen far short of what is needed. Based on the commitments made by the G8, the Economic Commission for Africa and the WMO have drawn up plans requiring a modest US\$200 million of expenditure over 10 years to expand the region's observation and infrastructure capacity.³¹ However, donor support thus far has been limited. Resources have been mobilized only for initial scoping exercises—and the G8 has failed to monitor progress at subsequent summits. In a review of progress to date, the Africa Partnership Forum has concluded: “Despite the G8 commitment and strong support by key African institutions...the funding of the programme has yet to be realized.”³²

Infrastructure for climate-proofing

Throughout history, communities have attempted to protect themselves against the vagaries of climate by building infrastructure. Flood defence and drainage systems, reservoirs, wells and irrigation channels are all examples. No infrastructure provides immunity from climatic forces. What infrastructural investments can do is to provide partial protection, enabling countries and people to manage the risks and limit vulnerability.

Climate change has important implications for the planning of infrastructural investments. Rising sea levels, higher temperatures and increased exposure to floods and storms all affect the viability of such investments. Current approaches to adaptation planning in many developing countries focus on the ‘climate-proofing’ of existing investments against incremental risk. The following examples, drawn from National Adaptation Programmes of Action (NAPAs), illustrate these approaches:

- Cambodia estimates that US\$10 million of investment will be required to construct water gates and culverts for newly rehabilitated road networks developed without factoring in increased risks of flooding.
- In Bangladesh, projects worth US\$23 million have been identified by government

to create a coastal buffer zone in regions vulnerable to storm surges, with an additional US\$6.5 million to counter the effects of increasing salinity in coastal soils. In the transport sector, the Government estimates that raising an 800 kilometre network of roads by between 0.5 and 1 metre to counter sea level rises will cost US\$128 million over a 25-year period.

- In Haiti the national adaptation plan estimates that a budget of US\$11 million is needed for investment in projects to counter water shortages and the threat of flooding through measures to tackle soil erosion.

The project-based approach to adaptation planning set out in NAPAs, which detail only immediate and urgent needs, provides a limited perspective on the scale of financing required for effective ‘climate-proofing’. In Viet Nam, UN agencies and the Ministry of Agriculture and Rural Development have drawn up a comprehensive strategy for reducing disaster risk in the Mekong Delta. The strategy builds on assessments of communities and ecologies vulnerable to climate change, with adaptation planning integrated into a wider programme for coastal zone management. It includes investments aimed at strengthening drainage systems, reinforcing dykes and trenches around human settlements and agricultural areas, and supporting the restoration of mangrove areas. Capital investment costs are estimated at US\$1.6 billion between 2006 and 2010 and at US\$1.3 billion from 2010 to 2020.³³

Viet Nam's strategy for disaster risk reduction in the Mekong Delta illustrates three important points of wider relevance in approaches to adaptation. The first is that effective adaptation planning in high-risk environments requires investments that are beyond the financing capacities of most governments acting alone. The second is that adaptation planning requires a long time-horizon—in the case of the Mekong it is 15 years. Third, adaptation planning is unlikely to succeed if it is approached as a stand-alone exercise. In Viet Nam, the Mekong strategy is integrated into the country's national poverty reduction strategy and medium-term expenditure framework,

Current approaches to adaptation planning in many developing countries focus on the ‘climate-proofing’ of existing investments against incremental risk

An obvious danger is that the adaptation needs of marginalized communities will be overlooked in the face of demands from more powerful groups with a stronger political voice

linking it to public policies aimed at overcoming hunger and reducing vulnerability—and to wider partnerships with donors.

Infrastructural development can be a cost-effective route to improved disaster risk management. In rich countries, recognition that disaster prevention is more cost-effective than cure has been an important factor in shaping government infrastructure investment. Similar cost-benefit principles apply in the developing world. One recent global study estimates that US\$1 invested in pre-disaster risk management activities in developing countries can prevent US\$7 in losses.³⁴ National research confirms this broad cost-benefit story. In China, the US\$3 billion spent on flood defences in the four decades up to 2000 is estimated to have averted losses of US\$12 billion.³⁵ Evidence from a mangrove-planting project designed to protect coastal populations from storm surges in Viet Nam estimated economic benefits that were 52 times higher than costs.³⁶

Successful adaptation planning has the potential to avert economy-wide losses. Disaster risk analysis in Bangladesh provides an insight into returns to adaptation investments. Using risk analysis methods analogous to those deployed by the insurance industry, researchers assessed the economic asset losses associated with flooding risks today, in 2020 and in 2050, under a range of plausible climate change scenarios. If no adaptation was assumed, the costs associated with more extreme '50-year events' amounted to 7 percent of GDP in 2050. With adaptation they fell to around 2 percent.³⁷ The differential translates into potentially large setbacks in agricultural production, employment and investment, with negative implications for human development.

Consideration of distributional factors is critical to adaptation planning. Governments have to make tough decisions about where to allocate limited public investment resources. An obvious danger is that the adaptation needs of marginalized communities will be overlooked in the face of demands from more powerful groups with a stronger political voice.

Pro-poor adaptation strategies cannot be developed in isolation from wider policies aimed at reducing poverty and overcoming inequality. In Bangladesh, government and donors have started to identify adaptation strategies that reach some of the country's most marginalized people, such as those living on highly flood-prone *char* islands. As in other areas, there are strong cost-benefit grounds for undertaking pro-poor adaptation: the estimated return on investment in *char* islands is around 3:1 (box 4.1). The cost-benefit case is powerfully reinforced by basic equity considerations: US\$1 in the household income of some of Bangladesh's poorest people has to be attached a higher weight than, say, US\$1 saved by high-income groups.

Infrastructure for water management can play an important role in enhancing—or diminishing—the opportunities for human development. Some of the world's poorest agricultural producers will face some of the toughest climate change adaptation challenges. With their livelihoods dependent on the timing and duration of rainfall, temperature and water runoff patterns, the rural poor face immediate risks with very limited resources. This is especially true for producers dependent on rainfed rather than irrigated agriculture. Over 90 percent of sub-Saharan African agriculture is in this category. Moreover, the region has one of the lowest rates of conversion of precipitation into water flows, partly because of high evaporation and partly because of the lack of an irrigation tradition.³⁸ Although South Asia has wider access to irrigation, two in every three rural people still depend on rainfed agriculture.

Agricultural producers operating in water-stressed, rainfed environments already invest labour in developing water harvesting systems that conserve rainfall. As climate change increases the risks, one of the challenges in adaptation planning is to support these efforts. In many countries, the development of irrigation systems also has a role to play. In 2005 the Economic Commission for Africa called for a doubling of the arable area under irrigation by 2015. Improved access to irrigation could help simultaneously to raise productivity and reduce climate risks. However, proposals in this area

must take into account the impact of future climate change on water availability.

Beyond irrigation there are wider opportunities to develop water harvesting, especially in countries—such as Ethiopia, Kenya and Tanzania—with relatively abundant, but concentrated rainfall.³⁹ Ethiopia spans 12 major river basins and has relatively abundant water, but one of the lowest reservoir storage capacities in the world: 50 cubic metres per person compared with 4,700 in Australia. In

countries lacking water storage capacity, even increased rainfall may not enhance water availability. High levels of runoff and increased risks of flooding are more likely outcomes.

Experience from India is instructive. Here, as elsewhere, climate change will place additional pressures on already highly stressed water systems. While overall rainfall is projected to increase on average, much of the country will receive less rain. Local communities are already developing innovative responses to water stress.

Box 4.1

Adaptation on the *char* islands of Bangladesh

River deltas in Bangladesh are on the front line of climate change. Located in the Ganges–Brahmaputra Delta, islands and other low-lying delta lands—known as *chars*—are home to over 2.5 million highly vulnerable people living under risk of frequent flooding. The human development imperative to help such communities adapt to the increased threats brought about by climate change has long been recognized. But innovative cost–benefit exercises are showing that it makes economic sense too.

The lives of *char* people are closely bound up with the flow of rivers—and with flooding. *Chars* themselves undergo constant erosion and reformation, as rivers wash away soil and deposit silt. Entire islands are vulnerable to erosion and flooding, though people living by unprotected river channels face special risks.

Coping capacity is limited by poverty. The riverine areas of Bangladesh are marked by high levels of human deprivation. Over 80 percent live in extreme poverty (see table). Indicators for nutrition, child mortality and public health are among the worst in the country. Flooding poses a constant threat. People cope by building embankments and ditches around agricultural lands—and by rebuilding their homes when they are destroyed. Even minor floods cause high levels of damage. Major events—such as the 1998 and 2004 floods—destroy agricultural production and homes on a large scale, isolating communities from crucial health and other public services in the process.

Government, donors and local communities have developed a range of approaches for reducing vulnerability. Protecting homes has been identified as a priority. Under the Chars Livelihood Programme, one pilot project aims at ‘flood-proofing’ homesteads against floods with a one in twenty years likelihood of occurrence (most homes are currently vulnerable to two-year events). The objective is to construct earth platforms to accommodate homes for four households, with trees and grass planted as a protection against soil erosion. Hand pumps and basic latrines are provided to secure access to clean water and sanitation. So far, around 56,000 *char* people have participated in this re-housing programme.

The benefits for those involved are revealed in reduced exposure to flooding. But does it make economic sense to scale up the initiative for all 2.5 million *char* people? Using information

Source: Dasgupta et al. 2005; DFID 2002; Tanner et al. 2007.

from local people to estimate the appropriate height for raised earth platforms, to identify the most appropriate material for limiting soil erosion and to project future damages under different climate change scenarios, researchers have conducted cost–benefit analysis to assess potential returns.

The results point to a strong economic case for investment. Creating the 125,000 raised platforms needed to protect all *char* people from 20-year floods would cost US\$117 million. However, every US\$1 of this is estimated to protect US\$2–3 in assets and production that would otherwise be lost during floods. These figures understate the wider human development benefits. *Char* people are among the poorest in Bangladesh. It follows that losses sustained during floods have highly damaging implications for their nutrition, health and education. As shown in chapter 2, losses in these areas can trap people in long-term cycles of destitution, undermining lifelong opportunities and transmitting poverty across generations. There is, therefore, an urgent need to support in-country assessments of the costs and benefits of identified adaptation options, and to scale up such assessments to national budgetary planning exercises directed towards the needs of those most vulnerable to climate change.

Human deprivation on the *char* islands

| 2005 | Char Island | Bangladesh average |
|---|-------------|--------------------|
| Extreme poverty (%) | 80 | 23 |
| Literacy rate (males 10 years and older, %) | 29 | 57 |
| Literacy rate (females 10 years and older, %) | 21 | 46 |
| Share of households suffering food insecurity (%) | | |
| 1 month or more | 95 | .. |
| 2 months or more | 84 | .. |
| 3 months or more | 24 | .. |
| 4 months or more | 9 | .. |

Source: Dasgupta et al. 2005.

Climate change provides
a strong rationale
for strengthening
social protection
safety nets for the poor

In Gujarat, where persistent drought and problems in irrigation management have led to the depletion of groundwater, community initiatives have restored 10,000 check dams to store monsoon rains and recharge groundwater. National and state programmes are supporting community initiatives. In Andhra Pradesh, the Drought-Prone Areas Programme covers over 3,000 watershed areas, incorporating a wide range of 'drought-proofing' measures, including soil conservation, water harvesting and afforestation.⁴⁰

Top-down planning, large-scale irrigation and huge water harvesting systems are not a panacea for the emerging risks facing agricultural producers as a result of climate change. The challenge is to support local initiatives through national and subnational strategies that mobilize resources and create incentives. Successful adaptation is not just about physical infrastructure. It is about where that infrastructure is created, who controls it and who has access to the water it conserves.

Insurance for social protection

Climate change will create incremental risks in the lives and livelihoods of the poor. Since many millions of poor people cannot fully manage current climate risks with their own resources, any adaptation strategy needs to strengthen risk management capabilities. Empowering people to cope with climate shocks—especially catastrophic shocks—without suffering the long-term setbacks analysed in chapter 2 is a condition for sustained progress in human development.

Prospects for successful adaptation to climate change will be shaped by wider human development conditions. Public policies in areas such as health, education, employment and economic planning can enhance or diminish the capacity for risk management. Ultimately, the first line of public policy defence against climate change risk is an effective strategy for overcoming poverty and extreme inequality. Social protection is an integral part of any such strategy.

Programmes for social protection encompass a wide range of interventions. They include

contributory schemes through which people can pool risks (old-age pensions and unemployment insurance are examples) and tax-funded transfers providing a variety of benefits to target populations. One of the overarching aims is to prevent temporary shocks from becoming a source of long-term destitution. In the context of climate change, social protection programmes implemented as part of a wider adaptation strategy can play a vital role in helping poor people to manage risks and avoid long-term human development reversals.

As we saw in chapter 2, climate shocks can rapidly erode the entitlements of vulnerable people through their impact on income, nutrition, employment, health and education. Well designed social protection measures can protect entitlements in these areas, while at the same time expanding opportunity. Incremental climate change risks, and adaptation to those risks, are not the sole motivation for an increased emphasis on social protection. Well designed policies in this area are critical in any national strategy for accelerating poverty reduction, reducing vulnerability and overcoming marginalization. However, climate change provides a strong rationale for strengthening social protection safety nets for the poor, especially in the following four areas:

- Employment programmes;
- Cash transfers;
- Crisis-related transfers;
- Insurance related transfers.

Employment programmes. Public work programmes can provide a measure for protecting nutrition and health, creating employment and generating income when climate shocks lead to a loss of agricultural employment or reduced food availability. Employment-based programmes to support cash-transfer or food-transfer schemes can also provide a longer-term safety net. One of the best known examples of such programmes is the Employment Guarantee Scheme in Maharashtra, India. The success of this programme in stabilizing household incomes and preventing food crises gave rise to a national campaign to secure 'the right to work'—and to all-India legislation. The 2005 National Rural Employment Guarantee

Act guarantees 100 days of employment at the minimum wage rate for every rural household in India.⁴¹ The costs are estimated at US\$10 billion annually, or around 1 percent of GDP.⁴²

Even relatively small cash transfers can make a difference. In Ethiopia, the Productive Safety Net Programme (PSNP) provides people with transfers of up to US\$4 a month in cash or food. Designed to overcome the uncertainties associated with annual food aid appeals, the programme provides some 5 million people with a predictable source of income and employment (box 4.2). Apart from reducing vulnerability to poor nutrition during episodes of drought, the transfers have enabled poor households to build up their productive assets and invest in health and education.

Cash transfers. Floods, droughts and other climate shocks can force poor households to withdraw children from school to increase labour supply, or to cut spending on health and nutrition. Such coping strategies narrow future opportunities, locking households into low human development traps. Cash transfers linked to clear human development goals can weaken the transmission mechanisms that convert risk into vulnerability. They can also create incentives for the development of human capabilities. Here are some examples:

- In Mexico the Oportunidades programme targets the poorest municipalities for transfers conditional on parents keeping their children in school and attending periodic health checks. In 2003 Progresa supported 4 million families at an annual cost of US\$2.2 billion. Coverage under the programme has been found to reduce by 23 percent the probability that children aged 12–14 will leave school and enter the labour market in the event of drought, unemployment among parents or other shocks.⁴³
- In Brazil a number of cash transfer programmes have been integrated into a single umbrella scheme—the Bolsa Família Programme (BFP)—which now covers about 46 million people, around one-quarter of the population. The BFP, which represents a legal entitlement for eligible households, has reduced vulnerability and

supported advances in human development across a broad front, enabling households to manage shocks without withdrawing children from school (box 4.3).

- Programmes in Central America have also built resilience against shocks. Since 2000, Nicaragua's Red de Protección Social (RPS) has provided cash transfers conditional on children attending school and health clinic checks. Randomized evaluation studies have shown that the RPS has successfully protected households from a range of shocks, including a slump in coffee prices. Expenditure levels in beneficiary households stayed constant in 2001 while a slump in coffee prices reduced income in non-beneficiary households by 22 percent. In Honduras, there is evidence that cash transfers have protected school attendance and child health during agricultural shocks through its Programa de Asignación Familiar (PRAF).⁴⁴
- In Zambia the Kalomo pilot project provides US\$6 a month (US\$8 for those with children) to the poorest 10 percent of households, sufficient to meet the costs of a daily meal and preclude absolute poverty. Increased household investment and improved child nutrition and school attendance have already been observed among beneficiaries. Additionally, some households have saved some of the cash and have invested in seed and small animals. The project aims to reach over 9,000 households (58,000 people) by the end of 2007 and is being considered for national upscaling at a projected cost of US\$16 million (0.2 percent of GDP or 1.6 percent of current aid flows) per year.⁴⁵

Crisis-related transfers. Climate shocks have the potential to lock smallholder agriculture into downward spirals that undermine the prospects for human development. When a drought or a flood wipes out a crop, people are left facing immediate nutritional threats. But farmers are also left without the seeds, or the cash to purchase seeds and other inputs, for next season's crop. This increases the prospect of reduced income and employment, and hence of continuing dependence on food aid. This

Cash transfers linked to clear human development goals can weaken the transmission mechanisms that convert risk into vulnerability

Box 4.2 The Productive Safety Net Programme in Ethiopia

“Before this programme we could only eat twice. In the hungry time before the harvest perhaps we would only have one meal. The children suffered. Sometimes I could not keep them in school or pay for medicines when they were ill. Of course life is difficult—but at least now I have something to get us through the hard times. Now we eat better food, I can keep my nine-year-old in school, and I am saving to buy a calf.”

These are the words of Debre Wondimi, a 28-year-old woman with four children living in Lay Gant *woreda* (district) of South Gondar, Ethiopia. Like millions of people across the country, her life is a struggle to cope with the lethal interaction of drought and poverty. Today, she is a participant in Ethiopia’s Productive Safety Net Programme (PSNP), a bold attempt to tackle the food security threats posed by an uncertain climate. That programme could provide important lessons for countries addressing the risk management challenges posed by climate change.

When the rains fail in Ethiopia the well-being and even the lives of people like Debre Wondimi and her children are put at risk. Droughts and famines have recurred throughout the country’s history. Since 2000 alone, there have been three major droughts, including a devastating episode in 2002–2003. These emergencies are superimposed on high levels of chronic deprivation. Ethiopia ranks 169 out of the 177 countries covered by the HDI. 23 percent of its population survives on less than US\$1 a day, and nearly two in five (38 percent) of its children are underweight for their age.

Food insecurity is thus an integral part of poverty in Ethiopia. Traditionally, the response to food insecurity has been food aid. Every year, donors and government have estimated the amount of food aid needed to cover chronic deficits, topping up that amount through emergency appeals.

The PSNP is an attempt to break with this humanitarian model. It is an employment-based social transfer programme. Targeting people facing predictable food insecurity as a result of poverty rather than temporary shocks, it offers guaranteed employment for 5 days a month in return for transfers of either food or cash—US\$4 per month for each household member. The aim is to extend coverage from 5 million people in 2005 to 8 million by 2009. Unlike the food aid model, the PSNP is a multi-year arrangement. Financed by government and donors it will operate for 5 years, shifting the mode of support away from sporadic emergency aid towards more predictable resource transfers.

Predictability is one of the foundations of the PSNP. The programme was prompted partly by concerns in the Ethiopian Government and donor community that emergency appeals were regularly falling short of their targets, or providing late and erratic support. For poor households, delayed support during a prolonged drought can have devastating consequences in both the short and longer term. In 1983–1984 it led to the death of thousands of vulnerable people.

Another distinction between the PSNP and humanitarian food aid is in its level of ambition. The objectives include not just smoothing household consumption by bridging production deficits, but also protecting household assets. Cash transfers are seen as a vehicle for building assets, increasing investment and stimulating rural markets, as well as for preventing the distress sales that push people into destitution.

How successful has the programme been? Independent evaluations give grounds for optimism on several counts. There is strong evidence that the transfers are reaching large numbers of poor people and making a difference to their lives (see table). The following are among the findings of a household survey on the impacts of PSNP transfers during the programme’s first year:

- Three-quarters of households reported consuming more or better food than in the previous year; 60 percent also reported that they had been able to retain more of their own food to eat rather than selling for other needs;
- Three in five beneficiaries avoided having to sell assets to buy food—a common ‘distress’ response—with over 90 percent attributing this directly to the PSNP;
- Almost one-half of beneficiaries stated that they used healthcare facilities more than in the previous year; over one-third of households enrolled more of their children in school and almost a half kept children in school for longer;
- Around one-quarter of beneficiaries acquired new assets, with 55 percent directly attributing this to the PSNP.

The PSNP faces a number of challenges. Around 35 million of Ethiopia’s people live below the national poverty line, suggesting many potential beneficiaries are currently excluded. The ‘graduation’ targets—the percentage of recipients ‘passing out’ of the programme after 3 years—may also be over-ambitious. It is not clear that the PSNP will equip people with the assets and resources needed to escape deprivation and poverty for good. However, the programme’s early implementation phase does demonstrate the potential of well targeted interventions to support household coping strategies.

4

Adapting to the inevitable: national action and international cooperation

The human impact of safety nets

| | Outcome of productive safety net programme (PSNP) | Beneficiary households (%) | Households directly attributing outcome to PSNP (% of beneficiary households) |
|---------------------------|---|----------------------------|---|
| Food security | Consumed more or better food than last year | 74.8 | 93.5 |
| | Retained food production for consumption | 62.4 | 89.7 |
| Asset protection | Avoided having to sell assets to buy food | 62.0 | 91.3 |
| | Avoided having to use savings to buy food | 35.6 | 89.7 |
| Access to services | Used healthcare facilities more than last year | 46.1 | 75.9 |
| | Kept children in school longer than last year | 49.7 | 86.5 |
| Asset creation | Acquired new household assets | 23.4 | 55.3 |
| | Acquired new skills or knowledge | 28.6 | 85.5 |

Source: Devereux et al 2006.

Source: Devereux et al. 2006; Government of the Federal Republic of Ethiopia 2006; Menon 2007b; Sharp, Brown and Teshome 2006; Slater et al. 2006.

self-reinforcing downward spiral can be broken, or at least weakened, through the transfer of a range of productive inputs, for example:

- In Malawi, the subsidized transfer of a ‘productive package’ of seeds and fertilizers played an important role in facilitating recovery from the 2005 drought (box 4.4).
- Following a severe drought in the Gao region of Mali in 2005–2006, the international NGO Oxfam initiated a combined cash and credit work programme, acting through local government and community-based organizations. People were employed in creating small-scale water conservation structures, with half their income paid in cash and the other half as credit for the purchase of essential items, such as seeds, other inputs, livestock and schooling.⁴⁶
- In Kenya, drought in pastoral areas is associated with the ‘distress sale’ of livestock as animal feed supplies decline—a coping strategy that pushes livestock prices down just as food grain prices are rising. An innovative government programme has provided transport subsidies to traders, enabling them to move their animals to markets outside drought areas, effectively putting a floor under prices.⁴⁷

Insurance-related transfers. Coping with climate risk is an intrinsic part of life, especially for poor rural households. Formal insurance markets play a limited role in mitigating that risk. The barriers to market development are well-known. In any functioning insurance market, the price of premiums rises with risk. For poor households in high-risk marginal areas, insurance premiums are likely to prove

Box 4.3

Conditional cash transfers—Brazil’s Bolsa Família Programme

Conditional cash transfers (CCTs) can play an important role in breaking the link between risk and vulnerability. By setting minimum guaranteed levels for income and wider entitlements to health, education and nutrition, CCTs can empower poor people by creating a legal basis for their entitlements. Brazil’s *Bolsa Família* programme (BFP), one of the world’s largest CCT schemes, demonstrates what is possible.

Developed initially to deter child labour during crises, Brazil’s CCT was dramatically scaled up between 2001 and 2003. The original *Bolsa Escola* programme (a financial transfer contingent on parents keeping their children in school) was supplemented by three additional programmes. *Bolsa Alimentação* was designed as a cash or food transfer to reduce malnutrition among poor households. *Auxílio Gas* was a compensatory measure for poor households following the phasing out of cooking gas subsidies, and *Fome Zero* was introduced in 2003 in order to combat the worst forms of hunger in Brazil. Starting in 2003, efforts to consolidate these various CCTs into a single umbrella programme—the BFP—intensified.

Beneficiaries of the BFP are selected through various targeting methods, including geographic and household assessments based on per capita income. In 2006, eligibility requirements were set at monthly household income levels of Cr\$60 (US\$28) and Cr\$120 (US\$55) respectively for poor and moderately poor families.

As of June 2006, the BFP covered 11.1 million families or about 46 million people—a quarter of Brazil’s population and almost all of its poor. Total projected costs are estimated at US\$4 billion, or 0.5 percent of Brazilian GDP. This is a modest transfer that has produced impressive outcomes. Among the results:

- The programme reaches 100 percent of families living below the official poverty threshold of Cr\$120 per month; 73 percent of all transfers go to the poorest families and 94 percent reach families living in the bottom two quintiles.
- BFP accounts for almost one-quarter of Brazil’s recent precipitous drop in inequality and 16 percent of its decline in extreme poverty.
- BFP is also improving school enrolment rates. Studies have found that 60 percent of poor children aged 10–15 years currently not in school are expected to enrol in response to BFP and its predecessor. Drop-out rates have been reduced by around 8 percent.
- Some of the most pronounced impacts of the BFP have been on nutrition. The incidence of malnutrition among children aged 6–11 months was found to be 60 percent lower in poor households covered by the nutrition programme.
- Administration of the BFP has supported gender empowerment, with women established as beneficiaries with legal entitlements.

Each country faces different financial, institutional and political constraints in tackling vulnerability. One of the reasons why the BFP has worked in Brazil is that it has been implemented through a decentralized political system but with strong federal support in terms of setting rules, building capacity and holding providers to account. The Brazil case, like others cited in this chapter, demonstrates the potential for CCTs not only to reduce vulnerability but to go beyond this, enabling poor people to claim entitlements that facilitate human development breakthroughs.

Source: de Janvry et al. 2006c; Lindert et al. 2007; Vakis 2006.

One of the ways in which climate shocks create cycles of disadvantage is through their impact on agricultural production. When a drought or flood destroys a harvest, the resulting loss of income and assets can leave households unable to afford the seed, fertilizer and other inputs needed to restore production the following year. Well framed public policy interventions can break the cycle, as demonstrated by recent experience in Malawi.

The 2005 maize harvest in Malawi was one of the worst on record. Following successive droughts and floods, production fell from 1.6 million tonnes in the previous year to 1.2 million tonnes—a decline of 29 percent. Over 5 million people faced food shortages. With rural incomes in free fall, households lacked the resources to invest in inputs for the 2006 cropping season, raising the spectre of a famine on the scale of that experienced in 2002.

Supported by a group of donors, the Government of Malawi put in place a strategy for getting productive inputs into the hands of small-scale farmers. Around 311,000 tonnes of fertilizer and 11,000 tonnes of maize seed were sold at subsidized prices. Over 2 million households purchased fertilizer at US\$7 for 50 kg—less than one-third of the world price. For distribution, the government used private sector outlets as well as state agencies, enabling farmers to choose their source of supply.

Source: Denning and Sachs 2007; DFID 2007.

Subsequent harvests showed that this productive inputs programme was a moderate success. Good rains and an increase in the area planted to improved crop varieties raised productivity and overall output. It is estimated that the programme generated an additional 600,000–700,000 tonnes of maize in 2007, independent of rainfall variation. The value of this extra production has been estimated at between US\$100 million and US\$160 million, compared with the US\$70 million cost of the programme. The Malawian economy has also benefited from a reduction in food import requirements. And the increased production has generated household income and employment opportunities.

The productive inputs programme is not a stand-alone strategy for human development. Nor is it a panacea for rural poverty. Far more needs to be done to strengthen the accountability of government, tackle deep-seated inequalities and increase the level of investment in basic service provision for the poor. The programme will have to be retained for several years if it is to break the cycle of low productivity that afflicts Malawian agriculture. Nevertheless, the country's experience underlines the role that public policies can play in reducing vulnerability to climate risk by creating an enabling environment for poverty reduction.

unaffordable. Risk pooling and insurance arrangements also suffer from a range of agency problems. The verification of loss, especially in remote rural areas, and the creation of perverse incentives (such as declaring a loss rather than harvesting if crop prices are low) are two examples. To some degree, these problems can be addressed through weather-indexing (box 4.5). Public policies can also help vulnerable people create and manage their own schemes for coping with potentially catastrophic risks. When the 2001 Gujarat earthquake hit India, only 2 percent of those affected had insurance. Low insurance coverage increased vulnerability and hindered economic recovery. One positive outcome was the creation of a micro-insurance scheme for the poor supported by NGOs and the business community. The Afat Vimo scheme under the Regional Risk Transfer Initiative now covers 5,000 low-income families against 19 different types of disasters, with premiums of around US\$5 a year. This exercise demonstrates the potential for risk-spreading across

geographic locations even in areas marked by high levels of poverty and vulnerability.⁴⁸

Institutions for disaster risk management

Disaster risk management is an integral part of adaptation planning. Exposure to risk is a function not only of past human development but also of current public policy and institutional capacity. Not every flood or storm produces a climate disaster—and the same event can produce very different outcomes in different countries.

In 2004, the Dominican Republic and Haiti were simultaneously struck by Hurricane Jeanne. In the Dominican Republic, some 2 million people were affected and a major town was almost destroyed, but there were just 23 deaths and recovery was relatively swift. In Haiti, over 2,000 people were killed in the town of Gonaives alone. And tens of thousands were left trapped in a downward spiral of poverty.

The contrasting impacts were not the product of meteorology. In Haiti, a cycle of poverty and environmental destruction has

Can farm insurance schemes be scaled up as part of an integrated strategy for climate change adaptation and human development? Climate change has given an impetus to a range of initiatives aimed at extending access to micro-insurance and weather derivatives in the developing world. But there are difficulties in developing schemes that are accessible to the poor.

Attempts to expand market-based insurance have met with some success. In the Caribbean, for example, the Windward Island's Crop Insurance Programme has covered around 20 percent of the losses experienced by its members—caused by some 267 storm events between 1998 and 2004 alone—providing a safety net sufficient to get growers back on their feet.

However, as climate change increases the frequency and severity of droughts it will drive up the costs of insurance, pricing the most vulnerable people out of the market. The fact that the most vulnerable households are often poor precisely because they operate in high-risk environments adds to the problem, because insurance providers will attach a risk premium to proposals from people living in such environments.

A further problem is that the commonest form of farm insurance—traditional crop insurance—can create perverse incentives, including the incentive to let crops fail during periods of low prices. Weather-indexing can address this problem. In India, the Comprehensive Crop Insurance Scheme (CCI) insures farmers who use official credit systems, charging a small premium and using weather-indexes (rather than farm production) to determine claims.

Source: DFID 2004; IRI 2007; Mechler, Linnerooth-Bayer and Peppiatt 2006; Mosley 2000; World Bank 2006f.

Premium holders are paid in response to 'trigger events' such as delayed monsoons or abnormal rainfall. However, India's CCI currently has only 25,000 members, mainly wealthier producers.

The participation of small-scale-farmers' groups in the design of insurance packages and the provision of collateral through 'social capital' have produced some promising results. In Malawi, the World Bank and other donors have developed an insurance programme involving private sector companies and the National Smallholder Farmers Association. The programme offers insurance for groundnut and maize, with payments triggered when rainfall falls below a specified threshold determined by records at meteorological stations. This 'drought index insurance' is provided as part of an input loans package to groups of 20–30 farmers, with payouts triggered if there is insufficient rain during the planting season (a 'no-sow' provision) or during three key periods for crop development. The scheme has been successful in its first 2 years, motivating farmers to take the risk of using inputs to raise yields, but its spread is limited by Malawi's sparse network of meteorological stations.

The World Bank and a number of donors are exploring mechanisms for scaling up schemes of this kind, with additional pilot programmes in Ethiopia, Morocco, Nicaragua and Tunisia. While there is undoubtedly scope for enhanced insurance coverage using weather-indexing, there are limits to what private insurance markets can achieve for large vulnerable populations facing covariate risks linked to climate change.

denuded hillsides of trees and left millions of people in vulnerable slums. Governance problems, low levels of finance and a limited disaster response capacity left public agencies unable to initiate rescue and recovery operations on the scale required. In the Dominican Republic, national laws have limited deforestation and the civil defence force has a staff 10 times larger than its counterpart in Haiti to cater for a population of similar size.⁴⁹

Institutional and infrastructural capacity for disaster risk management is not automatically linked to national wealth. Some countries have demonstrated that much can be achieved even at low levels of average income. Mozambique used the chastening experience of the 2000 floods to strengthen institutional capacity in disaster management, putting in place more effective early warning and response systems (box 4.6). Cuba provides another striking example of a

country that has successfully built infrastructure that protects lives. Located at the centre of one of the world's most extreme tropical cyclone zones, the island is hit by several major storms every year. These cause extensive damage to property. However, loss of life and long-term development impacts are limited. The reason: an effective early warning system and a highly developed civil defense infrastructure based on community mobilization. Local authorities play a vital role in relaying early warning information and working with communities at risk. When Hurricane Wilma, then the most intense hurricane ever recorded in the Atlantic Basin, hit the island in 2005, over 640,000 people were evacuated—and there was just one fatality.⁵⁰

Simple comparisons across countries provide only a crude indicator of the effectiveness of disaster risk management measures. The impact of storms and floods is conditioned not just by their intensity, but

Countries cannot escape from the accidents of geography that put them in harm's way and increase their exposure to climate risks. What they can do is reduce these risks through policies and institutions that minimize impacts and maximize resilience. The experience of Mozambique powerfully demonstrates that public policies can make a difference.

One of the poorest countries in the world, Mozambique is ranked 172 out of 177 on the HDI and has more than one-third of its people living on less than US\$1 a day. Progress in human development has gathered pace over the past decade, but extreme climate events are a constant source of vulnerability. Tropical cyclones that gather in the Indian Ocean are a major cause of storms and flooding. The flooding is aggravated by the fact that Mozambique straddles the lowland basins of nine major rivers—including the *Limpopo* and *Zambezi*—that drain vast areas of south-eastern Africa before crossing the country on their way to the ocean.

In 2000 Mozambique was hit on two fronts. Heavy rains at the end of 1999 swelled river systems to near record levels. Then, in February 2000, cyclone Eline made landfall, causing extensive flooding in the centre and south of the country. Another cyclone—Gloria—arrived in March to make a bad situation worse. Emergency services were overwhelmed and donors were slow to respond. At least 700 people died and 650,000 people were displaced.

During 2007 Mozambique was revisited by a similar climate event. A powerful cyclone, accompanied by high rains, destroyed 227,000 hectares of cropland and affected almost half a million

people in the Zambezi basin. Yet on this occasion 'only' 80 people died and recovery was more rapid. What made the difference?

The experience of the 2000 flood gave rise to intensive dialogue within Mozambique and between Mozambique and its aid donors. Detailed flood risk analysis was carried out across the country's river basins, identifying 40 districts with a population of 5.7 million that were highly vulnerable to flooding. Community-based disaster risk management strategies and disaster simulation exercises were conducted in a number of high-risk basins. Meanwhile, the meteorological network was strengthened: in flood-prone Sofala province, for example, the number of stations was increased from 6 to 14. In addition, Mozambique has developed a tropical cyclone early warning system.

Mozambique's policymakers also recognized the importance of the mass media in disaster preparedness. Radio is particularly important. The local language network of Radio Mozambique now provides regular updates on climate risks, communicating information from the National Institute of Meteorology. During 2007, early warning systems and the media enabled government and local communities to identify the most at-risk areas in advance. Mass evacuations were carried out in the most threatened low-lying districts. Elsewhere, emergency food supplies and medical equipment were put in place before the floods arrived.

While much remains to be done, Mozambique's experience demonstrates how countries can learn to live with the threat of floods, reducing vulnerability in at-risk communities.

Source: Bambaige 2007; Chhibber and Laajaj 2006; IRI 2007; World Bank 2005b; WFP 2007.

4

by the topography and pattern of human settlements in the countries that they strike. Even with this caveat, cross-country data say something important: well-developed risk management institutions work. Average income in Cuba is lower than in the Dominican Republic—a country that faces comparable climate risks. Yet in the decade to 2005 the international disasters database records that Cuba had around 10 times as many people affected by disaster but less than one-seventh

of the deaths.⁵¹ Much of the difference can be traced to Cuba's highly developed infrastructure and policies for managing climate risks. With tropical storms set to increase in intensity, there is considerable scope for cross-country learning from best practices in climate-related disaster risk management. The conclusion: considerable benefits can be gained from awareness-raising and institutional organization—measures that do not have to entail high capital investment.

4.2 International cooperation on climate change adaptation

The UNFCCC sets out a bold agenda for action on adaptation. It calls for international cooperation to prepare for the impacts of climate

change in areas that range from agriculture, through coastal defence management, to lowland cities at risk of flooding. Under this

broad umbrella, rich countries are required to support developing countries that are particularly vulnerable to the adverse effects of climate change, building their adaptive capacity and providing financial assistance.⁵²

Northern governments have not honoured the spirit of the UNFCCC commitment. While investing heavily in adaptation at home they have failed to support parallel investments in developing countries. Increasingly, the world is divided between countries that are developing a capacity to adapt to climate change, and those that are not.

Inequalities in climate change adaptation cannot be viewed in isolation. They will interact with wider inequalities in income, health, education and basic human security. At any given level of climate change risk, countries with the most limited adaptation capacity will suffer the most adverse impacts on human development and economic growth. The danger is that inequalities in adaptation will reinforce wider drivers of marginalization, holding back efforts to forge a more inclusive model of globalization.

Enhanced international cooperation cannot guarantee effective adaptation or substitute for national political leadership. What it can do is help create an environment that enables developing countries to act and empowers vulnerable people, building the resilience needed to prevent increased risk from translating into greater vulnerability.

The case for international action

Why should the world's richest countries support the efforts of its poorest countries to adapt to climate change? The human development case for urgent international action is rooted in the ethical, social and economic implications of our ecological interdependence. Four considerations merit special emphasis.

Shared values

'Think of the poorest person you have ever seen,' said Gandhi, 'and ask if your next act will be of any use to him.' That injunction captures a basic idea: namely, that the true

ethical test of any community lies not in its wealth but in how it treats its most vulnerable members. Turning a blind eye to the adaptation needs of the world's poor would not meet the criterion for ethical behaviour set by Gandhi, or any other ethical criteria. Whatever the motivation for action—a concern for the environment, religious values, secular humanism or human rights—action on climate change adaptation by developed countries is an ethical imperative.

The Millennium Development Goals

The MDGs have galvanized unprecedented efforts to address the needs of the world's poorest people. The time-bound targets for 2015—ranging from halving extreme poverty and hunger to providing universal education, cutting child deaths and promoting greater gender equity—have been embraced by governments, civil society and major development institutions. While the MDGs are not a complete human development agenda, they reflect a sense of urgency and define a set of shared priorities. With climate change already impacting on the lives of the poor, enhanced adaptation is a requirement for supporting progress to the 2015 targets. In the world beyond 2015, climate change will act as a brake on human development, holding back or even reversing human progress until mitigation starts to take effect. Scaling up adaptation to counter that threat should be seen as a part of the post-2015 strategy for building on the achievements of the MDG process. Failure to act on adaptation would rapidly erode what will have been achieved by then. It would be inconsistent with a commitment to the MDGs.

Common interest

While the most immediate victims of climate change and failed adaptation will be the world's poor, the fall-out will not respect the neat divides of national borders. Climate change has the potential to create humanitarian disasters, ecological collapse and economic dislocation on a far greater scale than we see today. Rich countries will not be immune to the consequences. Mass environmental

The human development case for urgent international action is rooted in the ethical, social and economic implications of our ecological interdependence

The starting point is that donors have to deliver on past commitments

displacement, the loss of livelihoods, rising hunger and water shortages have the potential to unleash national, regional and global security threats. Already fragile states could collapse under the weight of growing poverty and social tensions. Pressures to migrate will intensify. Conflicts over water could become more severe and widespread.

In an interdependent world, climate change impacts will inevitably flow across national borders. Meanwhile, if the countries that carry primary responsibility for the problem are perceived to turn a blind-eye to the consequences, the resentment and anger that will surely follow could foster the conditions for political extremism.

Responsibility and liability

Historic responsibility for climate change and continuing high current per capita emissions of CO₂ raise important questions for the citizens of rich countries. The principle of protection from harm by others is enshrined in the legal codes of almost all countries. One clear example is smoking. In 1998, Attorneys General representing five American states and eighteen cities prosecuted a group of tobacco companies in a class action lawsuit for causing a range of diseases. Punitive damages of US\$206 billion were awarded, along with legal injunctions to change marketing behaviour.⁵³ Harm to the environment is also subject to the force of law. In 1989 the ship *Exxon Valdez* ran aground in Alaska, pouring 42 million litres of oil into a wilderness area of outstanding environmental importance. The United States National Transportation Safety Board claimed that negligence had contributed, leading to legal action that resulted in criminal damage and civil lawsuits worth over US\$2 billion.⁵⁴ More widely, when factories pollute rivers or the air, the 'polluter pays' principle is applied to cover the costs of cleaning up. If the environmental damages generated by climate change were neatly contained within one legal jurisdiction, those who had created the damage would be faced with a legal obligation to compensate the victims. That would place an obligation on rich countries not just to stop harmful practices (mitigation) but to compensate for damage (adaptation).

Current adaptation financing—too little, too late, too fragmented

International cooperation on adaptation can be thought of as an insurance mechanism for the world's poor. Climate change mitigation will make a small difference to the human development prospects of vulnerable populations in the first half of the 21st Century—but a big difference in the second half. Conversely, adaptation policies can make a big difference over the next 50 years—and they will remain important thereafter. For governments concerned with achieving progress towards the MDGs over the next decade, and building on that progress afterwards, adaptation is the only option for limiting the damage caused by existing climate change.

National governments in developing countries have primary responsibility for developing the strategies needed to build resilience against climate change. Nonetheless, successful adaptation will require coordinated action on many fronts. Aid donors and development agencies will have to work with national governments to integrate adaptation into wider poverty reduction strategies and planning processes. Given that many of the most affected countries are among the poorest, international aid has a pivotal role to play in creating the conditions for adaptation.

Delivering on commitments

The starting point is that donors have to deliver on past commitments. Recent years have witnessed a remarkable change in the provision of aid. During the 1990s, development assistance flows went into steep decline, holding back global poverty reduction efforts. The 2000 UN Millennium Summit, then the largest gathering of world leaders in history, marked a turning point. It resulted in an unprecedented commitment to achieving shared goals—the MDGs—through a partnership between rich and poor countries. Commitments made at Monterrey in 2002, by the European Union in 2005 and by the G8 at Gleneagles backed that partnership with commitments on aid. The Monterrey Consensus reaffirmed a long-standing development assistance target of

0.7 percent of Gross National Income (GNI) for rich countries. Commitments made by the European Union and G8 in 2005 included a pledge to double aid flows by 2010—a US\$50 billion increase, with around one-half earmarked for Africa. These are resources that could help countries meet the challenge of scaling up adaptation efforts.

Early signs on delivery are not encouraging. International aid has been increasing since the late 1990s. However, in 2006, development assistance fell by 5 percent—the first recorded fall since 1997. This figure partially exaggerates the decline because of exceptional debt relief provided for Iraq and Nigeria in 2005. But even excluding these operations, aid levels fell by 2 percent.⁵⁵ Headline numbers on aid also obscure some wider concerns. For example, much of the increase since 2004 can be traced to debt relief and humanitarian aid. Debt relief inflates the figure for real resource transfers for reasons of financial accounting: aid data record

reductions in debt stock as increased aid flows. Humanitarian aid is heavily concentrated and—by definition—geared towards disaster response rather than long-term development.

Analysis by the OECD has raised important questions as to whether, on current trends, aid donors can meet their own commitments. Discounting debt reduction and humanitarian aid, the rate of increase will have to triple over the next four years if the 2005 commitment to double aid by 2010 is to be met (figure 4.3).⁵⁶ Of special concern is the stagnation since 2002 in aid flows for core development programmes in sub-Saharan Africa (figure 4.4). These trends are not compatible with the financing requirements for adaptation to climate change.

Limited delivery through dedicated adaptation mechanisms

In stark contrast to adaptation planning in developed countries, the multilateral aid response to adaptation financing in developing

Special contribution

No choice is our choice

The changing climate is changing our world for all times to come and for the worse—much worse. This much we know.

What we must now learn is how we can ‘cope’ with this changing climate and how indeed we can (and must) avert catastrophe by reducing our emissions. The fact is that even with the change in global temperature we’ve seen so far—some 0.7°C from the mid-1800s to now—we are beginning to see devastation all around us. We know that we are witnessing an increase in extreme weather events. We know that floods have ravaged millions across Asia; that cyclones and typhoons have destroyed entire settlements in coastal areas; that heatwaves have killed people even in the rich world. The list goes on.

But what we must remember is that this is limited damage. That we are living on borrowed time. If this is the level of devastation with just that seemingly small rise in temperature, then think what will happen when the world warms up another 0.7°C, which scientists now tell us is inevitable—the result of emissions we have already pumped into the atmosphere. Then think what happens if we are even more climate-irresponsible and temperatures increase, as predicted in all business-as-usual models, by 5°C. Just think: this is the difference in temperature between the last ice age and the world we know now. Think and act.

It is now clear that coping with changing climate is not new rocket science. It is about doing development. The poor already live on the margins of subsistence. Their ability to withstand the

next drought, the next flood or the next natural disaster is already stretched to the limits. Adaptation is about investment in everything that will make societies, particularly the poorest and most climate-vulnerable, more resilient. Adaptation is about development for all. But it needs much more investment and much more speed.

This is one part of what is needed. The other, more difficult, is to reduce our current emissions, and drastically. There is no other truth. We also know emissions are linked to growth and that growth is linked to lifestyles. Because of this our efforts to reduce emissions have been high on rhetoric and low on action. This will have to change.

It will have to change even as we learn another truth: we live on one planet Earth and to live together we will have to share its resources. The fact is that even as the rich world must reduce its carbon footprint, the poor world must get ecological space to increase its wealth. It is about the right to development.

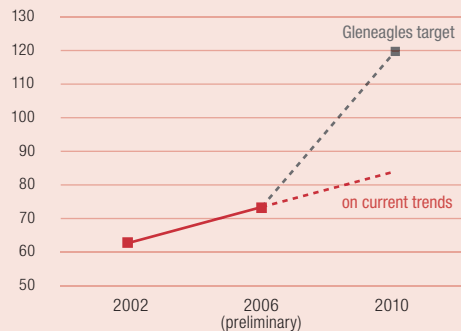
The only question is can we learn new ways to build wealth and well-being? The only answer is we have no choice.



Sunita Narain
Director Centre for Science and Environment

Figure 4.3 Aid flows need to speed up to meet commitments

Development projects, programmes and technical cooperation (2005 US\$ billion)



Source: Gurria and Manning 2007.

countries has been slow to take off. Indeed, the response has been characterized by chronic underfinancing, fragmentation and weak leadership. To make matters worse, international cooperation on adaptation has not been developed as part of the wider international aid partnership on poverty reduction. The end result is that multilateral financing mechanisms are delivering small flows of finance with high transaction costs, yielding very limited results.

Multilateral mechanisms for adaptation have been developed under a range of initiatives (table 4.1). Two UNFCCC funds—the Least Developed Country Fund (LDCF) and the Special Climate Change Fund (SCCF)—have

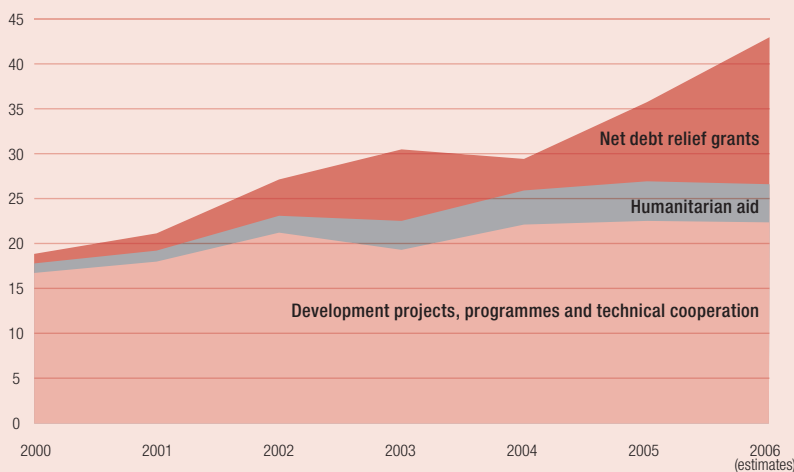
been established under the auspices of the GEF. Both are financed through voluntary pledges by donors. In 2004, another mechanism, the Strategic Priority on Adaptation (SPA), was created to fund pilot projects from GEF's own resources over a 3-year period. The stated objective of the GEF funds is to reduce countries' vulnerability by supporting projects that enhance adaptive capacity. With the entry into force of the Kyoto Protocol in 2005, another potential source of financing was created in the form of the Adaptation Fund—a facility to be funded through Clean Development Mechanism (CDM) transactions (see chapter 3).

The record of delivery to date is not impressive. It can be summarized as follows:

- *The Least Developed Country Fund.* Created in 2001, the LDCF to date has received pledges from 17 donors amounting to just under US\$157 million. Less than one-half of this amount has been delivered to GEF accounts. Actual spending in terms of delivery through projects amounts to US\$9.8 million.⁵⁷ The most tangible output of the LDCF to date has been 20 completed NAPAs. Many of these plans include useful analytical work, providing important insights on priorities. However, they suffer from two basic shortcomings. First, they provide a very limited response to the adaptation challenge, focussing primarily on 'climate-proofing' through small-scale projects: the average country financing proposal generated in the plans amounts to US\$24 million.⁵⁸ Second, the NAPAs have, in most countries, been developed outside the institutional framework for national planning on poverty reduction. The upshot is a project-based response that fails to integrate adaptation planning into the development of wider policies for overcoming vulnerability and marginalization (box 4.7).
- *The Special Climate Change Fund.* Operational since 2005, the SCCF has received pledges of US\$67.3 million, of which US\$56.7 million is specifically earmarked for adaptation.⁵⁹ The SCCF was created to address the special long-term adaptation needs of developing countries, with a remit covering health, agriculture, water and

Figure 4.4 Core aid to sub-Saharan Africa is flat

Net official development assistance (ODA) (2005 US\$ billion)



Source: Gurria and Manning 2007.

vulnerable ecosystems. Actual spending under projects to date amounts to US\$1.4 million.⁶⁰

- *The Strategic Priority on Adaptation.* This became operational in 2004. It earmarks US\$50 million over a 3-year period for pilot projects in a wide range of areas, notably ecosystem management. To date, US\$28 million has been committed, of which US\$14.8 million has been disbursed.⁶¹
- *The Adaptation Fund.* This was created to support “concrete activities”, to be financed through a 2 percent levy on credits generated through CDM projects. If implemented, the levy could generate a total income in

the range of US\$160–950 million by 2012, depending on trade volumes and prices.⁶² However, the Adaptation Fund has yet to support any activities because of disagreements over governance.

To reduce a complex story to a simple balance sheet, the record is as follows. By mid-2007, actual multilateral financing delivered under the broad umbrella of initiatives set up under the UNFCCC had reached a total of US\$26 million. This is equivalent to one week’s worth of spending on flood defence in the United Kingdom. Looking to the future, total committed financing for adaptation through dedicated multilateral funds amounts

Box 4.7

National Adaptation Programmes of Action (NAPAs)—a limited approach

National Adaptation Programmes of Action (NAPAs) are among the few tangible products of multilateral cooperation on adaptation. Funded through the GEF’s Least Developed Countries (LDC) Fund, NAPAs are intended to identify urgent and immediate needs while at the same time developing a framework for bringing adaptation into the mainstream of national planning. Have they succeeded?

On balance the answer to that question is ‘no’. Twenty NAPAs have been produced to date. While many include excellent analytical work, the overall exercise suffers from four inter-related shortcomings:

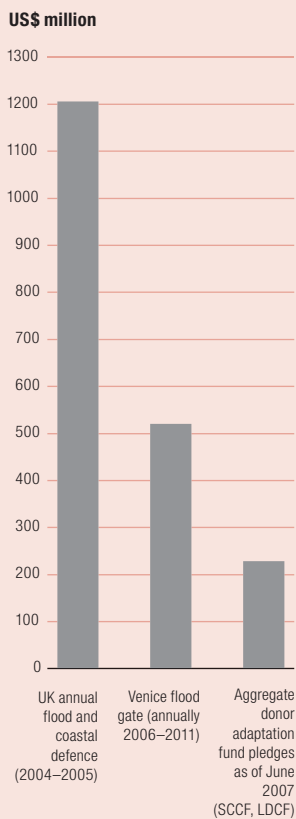
- *Inadequate financing.* Under the LDC Fund each country is initially allocated up to US\$200,000 to fund the formulation of a NAPA. That figure represents a small fraction of what some districts and cities in Europe have spent on analytical risk and vulnerability assessments. Financial constraints have limited the scope of governments to consult with at-risk communities or conduct national research.
- *Underestimation of adaptation costs.* While NAPAs are not intended as stand-alone exercises, their financing provisions are unrealistically low. The proposed average financing envelope for the first 16 NAPAs is US\$24 million, stretched over a budget cycle of 3–5 years. Countries in an advanced state of project preparation under the LDC Fund will receive an average of US\$3–3.5 million each to start implementing the first priorities identified by their NAPAs. Even for countries at the higher end of this range, the headline figures are difficult to square with the urgent and immediate needs facing poor households. For example, the US\$74 million proposed for Bangladesh and the US\$128 million for Cambodia fall far short of requirements.
- *Project-based bias.* Most NAPAs focus entirely on small-scale, project-based interventions to be cofinanced by donors. For example, Niger identifies 14 projects in areas such as watershed management and livestock fodder development. Bangladesh

identifies a range of projects for coastal defence. While well designed projects are necessary to address the urgent needs of the most vulnerable, they cannot provide the basis for an effective adaptation strategy. As in other areas of aid, project-based support tends to come with high transaction costs, with an in-built bias towards donor preferences and priorities. Effective adaptation planning has to be developed through national programmes and national budgets, with governments setting the priorities through political structures that are responsive to the needs of those most affected. There is little evidence to suggest that this has been achieved on anything like the necessary scale.

- *Weak links to human development.* Some NAPAs provide important insights into the impact of emerging climate change risks on vulnerable groups. However, they do not provide a basis for integrating adaptation into national poverty reduction strategies. The focus is almost entirely on ‘climate-proofing’, to the exclusion of social protection and wider strategies for empowering poor households. The political disconnect between adaptation planning and poverty-reduction planning is evident in Poverty Reduction Strategy Papers (PRSPs), the documents that set out national development goals and priorities supported through aid partnerships. In a review of 19 PRSPs carried out for this report most identified climate events and weather variability as important drivers of poverty and constraints on human development. Yet only four countries—Bangladesh, India, Malawi and Yemen—identified specific links between climate change and future vulnerability. In many cases, adaptation planning is happening on an entirely separate track from poverty-reduction planning. For example, Mauritania did not include the findings of its 2004 NAPA in its 2006 PRSP—an outcome suggesting that climate change adaptation does not figure prominently in defining aid partnership priorities.

Source: Government of the People’s Republic of Bangladesh 2005b; Matus Kramer 2007; Reid and Huq 2007; Republic of Niger 2006; Royal Government of Cambodia 2006.

Figure 4.5 Developed country investments dwarf international adaptation funds



Source: Abbott 2004; DEFRA 2007 and GEF 2007.

to a total of US\$279 million. These funds will be disbursed over several years. Contrasts with the adaptation effort in rich countries are striking. The German state of Baden-Württemberg is planning to spend more than twice as much as the entire multilateral adaptation effort on strengthening flood defences. Meanwhile, the Venice Mose plan, which aims to protect the city against rising sea levels, will spend US\$3.8 billion over five years (figure 4.5).⁶³

The concern of rich countries to invest in their own climate change adaptation is, of course, entirely legitimate. The sustained and chronic under-financing of adaptation in developing countries is less legitimate, not least given the role of rich countries in creating climate change risks.

Aid portfolios under threat

Have other donors compensated for the shortfall in aid delivery through dedicated climate change adaptation funds? There are problems in assessing the wider aid effort, not least because there is no common definition of what represents an adaptation activity. However, detailed analysis suggests that the integration of adaptation planning into aid policies remains at an early stage.

Bilateral and multilateral donors are gradually increasing support for adaptation, from a low base. One review of 10 bilateral agencies accounting for almost two-thirds of international development assistance attempted to identify projects in which climate change adaptation was an explicit consideration. It documented total commitments of US\$94

million over a 5-year period from 2001 to 2005—less than 0.2 percent of average development assistance flows.⁶⁴ Of course, this figure captures only what has happened in the past. There are signs that donors are starting to respond to climate change adaptation needs. Between 2005 and 2007 the World Bank's adaptation-related activity increased from around 10 to 40 projects, for example.⁶⁵ However, planning and financing for climate change adaptation remain marginal activities in most donor agencies.

Failure to change this picture will have consequences not just for poverty and vulnerability in developing countries but also for aid effectiveness. While most donors have been slow to respond to the challenge of adaptation, their aid programmes will be directly affected by climate change. Rural development programmes, to take an obvious example, will not be immune to the consequences of changed rainfall patterns. An increase in the frequency of droughts in sub-Saharan Africa will impact very directly on programmes for health, nutrition and education. And an increase in the severity and frequency of storms and flooding will compromise aid programmes in many areas. Media images of schools and health clinics being swept away during the 2007 floods in Bangladesh graphically capture the way in which social sector investments can be compromised by climate-related disasters.

Across the developing world large amounts of aid investment are tied up in projects and programmes that are vulnerable to climate change. The OECD's Development Assistance Committee (DAC) has developed a framework for identifying aid activities that are sensitive to climate change. It has applied that framework to a number of developing countries. In the cases of Bangladesh and Nepal the DAC estimates that over one-half of all aid is concentrated in activities that will be negatively affected by climate change.⁶⁶

Using the DAC's reporting system, we have developed an 'aid-sensitivity' analysis for donor portfolios averaged across the period 2001–2005. Broadly, we identify development assistance activities that might be considered vulnerable to various levels of climate change risk. The

Table 4.1 The multilateral adaptation financing account

| Adaptation fund | Total pledged (US\$ million) | Total received (US\$ million) | Total disbursed (less fees) (US\$ million) |
|----------------------------------|------------------------------|-------------------------------|--|
| Least Developed Countries Fund | 156.7 | 52.1 | 9.8 |
| Special Climate Change Fund | 67.3 | 53.3 | 1.4 |
| Adaptation Fund | 5 | 5 | – |
| Sub-total | 229 | 110.4 | 11.2 |
| Strategic Priority on Adaptation | 50 | 50 | 14.8 ^a |
| Total | 279 | 160.4 | 26 |

a. Includes fees.

Note: data are as of 30th April 2007.

Source: GEF 2007a, 2007b, 2007c.

range for that risk extends from a narrow band of activities that are highly sensitive—such as agriculture and water supply—to a wider band of affected projects and programmes in sectors such as transport.⁶⁷

The results are striking. Our analysis suggests that 17 percent of all development assistance falls into the narrow band of intensive risk, rising to 33 percent for the wider band. Expressed in financial terms, between US\$16 billion and US\$32 billion are at immediate risk. These figures suggest that ‘climate-proofing’ aid should be viewed as an important part of the adaptation challenge. Approximate costs for such ‘climate-proofing’ aid are around US\$4.5 billion, or 4 percent of 2005 aid flows.⁶⁸ Bear in mind that this represents just the cost of protecting existing investments against climate change, not the incremental cost of using aid programmes to build resilience.

Beneath these headline numbers, there are variations between donors. Some major bilateral donors—including Canada, Germany, Japan and the United Kingdom—face high levels of risk exposure (figure 4.6). Multilateral agencies such as the African Development Bank (ADB) and the World Bank’s International Development Association (IDA) portfolios are in a similar position.

Adapting disaster relief to climate change

Climate-related disasters pose a wider set of challenges for the donor community. Climate change will increase the frequency and severity of natural disasters. Increased investment in disaster risk reduction is an essential requirement for dealing with this challenge. However, the reality is that disasters will happen—and that the international community will have to respond through humanitarian relief. Increased aid provision and a strengthening capacity for supporting disaster recovery are two of the requirements.

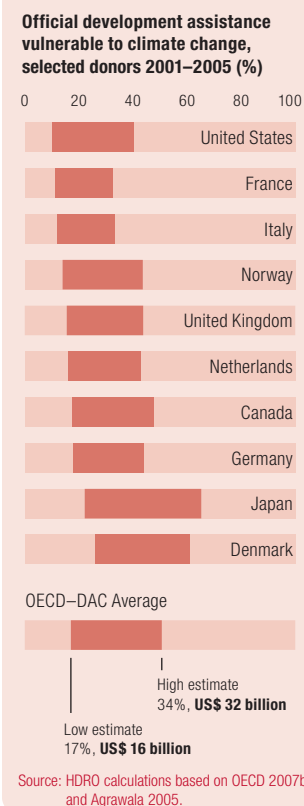
Disaster relief is already one of the fastest growing areas of international aid, with bilateral spending reaching US\$8.4 billion—or 7.5 percent of total aid—in 2005.⁶⁹ Climate-related disaster is among the strongest engines driving the increase in humanitarian aid, and climate

change will strengthen it still further. Exposure to the risk of climate disasters can be expected to rise with urbanization, the expansion of unplanned human settlements in slum areas, environmental degradation and the marginalization of rural populations. As shown in chapter 2, climate-related catastrophes can slow or stall progress in human development. But responding to the rising tide of disaster has the potential to divert aid from long-term development programmes in other areas—a prospect which points to the importance of new and additional aid resources to cope with future demands.

Aid quantity is not the only problem. Timing and fulfilment of pledges present further limitations. In 2004, for example, only 40 percent of the US\$3.4 billion in emergency funds requested by the UN was delivered, much of it too late to avert human development setbacks.⁷⁰ An increase in climate-related disasters poses wider threats to development that will have to be addressed through improvements in aid quality. One danger is that low-profile ‘silent emergencies’ linked to climate change will not receive the attention that they demand. Persistent local droughts in sub-Saharan Africa generate less media attention than earthquakes or tsunami-type events, even though their long-term effects can be even more devastating. Unfortunately, less media attention has a tendency to translate into less donor interest and the underfinancing of humanitarian appeals.

Post-disaster recovery is another area of aid management that has important implications for adaptation. When vulnerable communities are hit by droughts, floods or landslides, immediate humanitarian suffering can swiftly transmute into long-term human development setbacks. Support for early recovery is vital to avert that outcome. However, while aid flows for disaster relief have been rising, recovery has been systematically underfinanced. As a result, the transition from relief to recovery is regularly compromised by insufficient funds and the non-disbursement of committed resources. Farmers are left without the seeds and credit they need to rebuild productive capacities, slum dwellers are left to rebuild their assets by their own efforts,

Figure 4.6 Aid is vulnerable to climate change



The risks and vulnerabilities that come with climate change cannot be dealt with through microlevel projects and 'special initiatives'

and infrastructures for health and education are left devastated.

The foundations for a multilateral system equipped to deal with climate emergencies are just beginning to emerge. The Central Emergency Response Fund (CERF), managed under UN auspices, is an attempt to ensure that the international community has the resources available to initiate early action and to tackle 'silent emergencies'. Its aim is to provide urgent and effective humanitarian relief within the first 72 hours of a crisis. Since its launch in 2006, the CERF has received pledges from 77 countries. The current proposal is to have in place an annual revolving budget of US\$450 million by 2008. The wider multilateral system is also reforming. The World Bank's Global Facility for Disaster Reduction and Recovery (GFDRR) also includes a mechanism—the Standby Recovery Financing Facility—a multi-donor trust fund aimed at supporting the transition to recovery through rapid, sustained and predictable financing. Both the CERF and the GFDRR directly address failings in the current emergency response system. However, the risk remains that the growing costs associated with emergency responses will divert assistance from long-term development assistance in other areas.

Rising to the adaptation challenge—strengthening international cooperation on adaptation

Climate change adaptation has to be brought to the top of the international agenda for poverty reduction. There are no blueprints to be followed—but there are two conditions for success.

The first is that developed countries have to move beyond the current system of underfinanced, poorly coordinated initiatives to put in place mechanisms that deliver on the scale and with the efficiency required. Faced with the threat to human development posed by climate change, the world needs a global adaptation financing strategy. That strategy should be seen not as an act of charity on the part of the rich but as an investment in climate change insurance for the world's poor. The

aim of the insurance is to empower vulnerable people to deal with a threat that is not of their making.

The second condition for successful adaptation is institutional. The risks and vulnerabilities that come with climate change cannot be dealt with through microlevel projects and 'special initiatives'. They have to be brought into the mainstream of poverty reduction strategies and budget planning. One possible framework for action is revision of the Poverty Reduction Strategy Papers (PRSPs) that provide the framework for nationally owned policies and partnerships with donors.

Financing adaptation insurance

Estimating the financing requirements for climate change adaptation poses some obvious problems. By definition, the precise costs of interventions cannot be known in advance. The timing and intensity of local impacts remain uncertain. Moreover, because interventions have to cover a wide range of activities, including physical infrastructure, livelihood support, the environment and social policy, it is difficult to assign costs to specific climate change risks. These are all important caveats. But they do not constitute a justification for business-as-usual approaches.

Several attempts have been made to provide ballpark estimates of the financing required for adaptation. Most have focused on 'climate-proofing'. That is, they have looked principally at the cost of adapting current investments and infrastructure to protect them against climate change risks. The World Bank has provided one set of estimates based on a range of current investments and 'guesstimates' of adaptation costs. Updating the World Bank's figures for 2005 points to a mid-range cost estimate of around US\$30 billion (table 4.2). Importantly, these costs estimates are based on national economic indicators. Another valuable source of information comes from 'bottom-up' analysis. Extrapolating from current NAPA cost estimates, one study puts the financing needed for immediate 'climate-proofing' at between US\$1.1 billion and US\$2.2 billion for LDCs, rising to US\$7.7–33 billion for all developing

countries.⁷¹ The figures are based on project costs contained in the NAPA.

Using a different approach, Oxfam has attempted to estimate the broad financing requirements for community-based adaptation. Drawing upon a range of project-based per capita estimates, it reaches an indicative figure of around US\$7.5 billion in adaptation financing requirements for people living on less than US\$2 a day.⁷² Exercises such as this draw attention to some of the adaptation costs that fall directly on the poor—costs that are not captured in many national planning exercises.

All of these cost estimates provide an insight into plausible orders of magnitude for adaptation financing. Understanding the financial costs of ‘climate-proofing’ is critical for national economic planning. Governments cannot build credible plans in the absence of information on national financing requirements. At the same time, it is important for human development that community-based investments, many of which are not monetized, are also taken into account. Further research in these areas is critical to the integration of adaptation planning into long-term budget planning and poverty reduction strategies.

Consideration also has to be given to adaptation beyond ‘climate-proofing’. Protecting infrastructure against climate risks is one critical element in adaptation. Another element is the financing of recovery from climate-related disasters. However, building resilience against incremental risks is about more than investment in physical infrastructure and post-emergency recovery. It is also about empowering people to cope with climate shocks through public policy investments that reduce vulnerability. One of the most serious problems in current approaches to adaptation is the overwhelming focus on ‘climate-proofing’ infrastructure, to the exclusion of strategies for empowering—and hence climate-proofing—people. The latter is more difficult to put a price on, but no less critical to successful adaptation.

Increased financing for human development should be viewed as a central element in international cooperation on adaptation: uncertainties over costs cannot be allowed

to obscure the fact that climate change will diminish the benefits of aid flows and hold back the international poverty reduction effort. In effect, the incremental risks associated with climate change are pushing up the costs of achieving human development goals, especially the MDGs. That is why increased adaptation financing should be seen in part as a response to the increased financing requirements for delivering on the MDG targets, in 2015 and thereafter.

The critical starting point is that adaptation financing has to take the form of new and additional resources. That means that the international effort should be supplementary to the aid targets agreed at Gleneagles and supplementary to the wider aspiration of achieving an aid-to-GNI level of 0.7 percent by 2015. Estimates of the financing requirements for adaptation cannot be developed through the application of mechanistic formulae. Provisions have to be calibrated against human development impact assessments and the experience of the poor. Adjustments will have to be made in the light of new scientific evidence and national assessments. Over the longer term, the scale of the adaptation challenge will be determined in part by the mitigation effort. All of these considerations point to the importance of flexibility. But recognition of the case for flexibility is neither a reason for delaying action, nor a justification for what is clearly an inadequate international effort. Climate change is a real and present danger for the MDGs—and for post-2015 progress in human development.

Addressing that danger will require an enhanced resource mobilization effort that

Increased adaptation financing should be seen in part as a response to the increased financing requirements for delivering on the MDG targets

Table 4.2 The cost of climate-proofing development

| | Developing countries (US\$ billion) 2005 | Estimated portion sensitive to climate change (%) | Estimated costs of climate adaptation (%) | Estimated cost (US\$ billion) 2005 | Mid range of estimated cost (US\$ billion) 2005 |
|--|--|---|---|------------------------------------|---|
| Investment (US\$ billion) | 2,724 | 2–10 | 5–20 | 3–54 | ~30 |
| Foreign direct investment (US\$ billion) | 281 | 10 | 5–20 | 1–6 | ~3 |
| Net official development assistance | 107 | 17–33 | 5–20 | 1–7 | ~4 |

Source: Data on investment from IMF 2007; data on foreign direct investment from World Bank 2007d data on ODA from Indicator Table 18; assumptions on climate sensitivity and cost from Stern 2006.

Developed countries would have to mobilize around 0.2 percent of GDP in 2015—roughly one tenth of what they currently mobilize for military expenditure

includes, but goes beyond, climate-proofing. Our rough estimate for financing requirements in 2015 is as follows:

- *Climate-proofing development investment.* Carrying out detailed costing exercises for the protection of existing infrastructure is a priority. Building on the World Bank's methodology outlined above and updating for 2005 data, we estimate costs for climate-proofing development investments and infrastructure to be at least US\$44 billion annually by 2015.⁷³
- *Adapting poverty reduction programmes to climate change.* Poverty reduction programmes cannot be fully climate-proofed. However, they can be strengthened in ways that build resilience and reduce vulnerability. National poverty reduction plans and budgets are the most effective channel for achieving these goals. Social protection programmes of the kind described earlier in this chapter provide one cost-effective strategy. At their 2007 summit, the G8 leaders identified social protection as an area for future cooperation on development. At the same time, the incremental risks created by climate change require a broader response, including, for example, support for public health, rural development and community-based environmental protection. These investments will have to be scaled up over time. The 2015 target should be a commitment of at least US\$40 billion per year—a figure that represents around 0.5% of GDP for low income and lower-middle income countries—for strengthening social protection programmes and scaling up aid in other key areas.⁷⁴

- *Strengthening the disaster response system.* Disaster risk reduction investments through aid will deliver higher returns than post-disaster relief. However, climate disasters will happen—and climate change will add to wider pressures on international systems for dealing with humanitarian emergencies. How these systems respond will have a critical bearing on human development prospects for affected communities across the world. One of the greatest challenges is to ensure that resources are mobilized swiftly to deal with climate-related emergencies. Another is to finance the transition from relief to recovery. Provisions should be made for an increase in climate-related disaster response of US\$2 billion a year in bilateral and multilateral assistance by 2015 to prevent the diversion of development aid.

The lower bound ballpark figures that emerge appear large. In total they amount to new additional adaptation finance of around US\$86 billion a year by 2015 (table 4.3). Mobilizing resources on this scale will require a sustained effort. However, the figures have to be put in context. In total, developed countries would have to mobilize around 0.2 percent of GDP in 2015—roughly one tenth of what they currently mobilize for military expenditure.⁷⁵

Rich countries' responsibility weighs heavily in the case for adaptation financing. The impact of climate change in the lives of the poor is not the result of natural forces. It is the consequence of human actions. More specifically, it is the product of energy use patterns and decisions taken by people and governments in the rich world. The case for enhanced financing of adaptation in developing countries is rooted partly in a simple ethical principle: namely that countries which are responsible for causing harm are also responsible for helping those affected deal with the consequences. International cooperation on adaptation should be viewed not as an act of charity, but as an expression of social justice, equity and human solidarity.

None of this is to understate the scale of the challenge facing donors. Mobilizing resources on the scale required for climate change

Table 4.3 Investing in adaptation up to 2015

| Estimated donor country cost | Estimated cost | |
|--|-----------------------|----------------------|
| | % of OECD GDP 2015 | US\$ billion 2015 |
| Climate-proofing development investment | 0.1 | 44 |
| Adapting poverty reduction to climate change | 0.1 | 40 |
| Strengthening disaster response | (.) | 2 |
| Total | 0.2 | 86 |

Source: HDRO estimates based on GDP projections from World Bank 2007d.

adaptation will require a high level of political commitment. Aid donors will need to work with developing country governments in identifying incremental climate change risks, assessing the financing requirements for responding to those risks, and engaging in dialogue on adaptation policies. At the same time, donors themselves will have to forge a far stronger consensus on the case for international action on adaptation, going beyond statements of principle to practical action. Given the scale of resource mobilization required, donors may also need to consider the urgent development of innovative financing proposals. There are several options:

- *Resource mobilization through carbon markets.* The Kyoto Protocol Adaptation Fund already establishes the principle that adaptation financing could be linked to carbon markets. That principle should be acted on. Mobilizing resources for adaptation through markets for mitigation offers two broad advantages: a predictable flow of finance and a link from the source of the problem to a partial solution. Carbon taxation provides one avenue for resource mobilization (see chapter 3). For example, a tax of just US\$3/tonne CO₂ on OECD energy-related emissions would mobilize around US\$40 billion per year (at 2005 emissions levels). Cap-and-trade schemes provide another market-based route for mobilizing adaptation finance. For example, the European Union's ETS will allocate around 1.9 Gt in emission allowances annually in the second phase to 2012. Under current rules up to 10 percent of these allowances can be auctioned. For illustrative purposes, an adaptation levy set at US\$3/tonne CO₂ on this volume would raise US\$570 million. With an increase in auctioning after 2012, the EU ETS auctioning could provide a more secure foundation for adaptation financing.
- *Wider levies.* In principle, adaptation financing can be mobilized through a range of levies. Applying levies to carbon emissions has the twin benefit of generating revenues for adaptation while at the same time improving the incentives to promote

mitigation. One example is an air-ticket levy. In 2006, France began collecting an 'international solidarity contribution' on all European and international flights.⁷⁶ The aim is to generate revenues of US\$275 million to finance treatment for HIV/AIDS and other epidemics. An international drugs purchase facility has been created to disburse revenues from the scheme. The United Kingdom uses part of its Air Passenger Duty tax to fund immunization investments in developing countries. Establishing a levy of US\$7 per flight would be unlikely to deter air transport on any scale, but it would yield around US\$14 billion in revenues that could be allocated to adaptation.⁷⁷ Levies could be extended through taxation in other areas, including petrol, commercial electricity supply and CO₂ emissions from industry. An adaptation levy graduated to reflect the high level of CO₂ emissions of sports utility vehicles and other low fuel-efficiency vehicles could also be considered.

- *Financing linked to income and capabilities.* A number of commentators have argued for adaptation commitments to be linked to developed country wealth. One proposal is for all Annex I Parties under the Kyoto Protocol to set aside a fixed share of their GDP to finance adaptation.⁷⁸ Another advocates the development of a formula for contributions to adaptation financing that links responsibility for carbon emissions (as reflected in historic shares) and financing capabilities (measured by reference to the HDI and national income).⁷⁹

Proposals in all of these areas merit serious consideration. One obvious requirement is that revenue mobilization to support adaptation should be transparent and efficient. There are potential pitfalls with the creation of special financing mechanisms and dedicated funding sources. Over-reliance on supplementary levies has the potential to introduce an element of unpredictability into revenue flows. Given the far-reaching and long-term nature of the adaptation financing challenge, there is a strong case for rooting it in normal budgetary processes. However, this does not rule out an expanded

Donors may also need to consider the urgent development of innovative financing proposals

The best PRSPs link well-defined targets to an analysis of poverty and to systems of financial allocation under annual budgets and rolling medium-term expenditure frameworks

role for supplementary financing, whether in the direct financing of adaptation or in mobilizing additional budgetary resources.

'Mainstreaming' adaptation

Financing is not the only constraint on the development of successful adaptation strategies. In most countries adaptation is not treated as an integral part of national programmes. Both donors and national governments are responding to the adaptation challenge principally through project-based institutional structures operating outside planning systems for budgets and poverty reduction strategies.

This backdrop helps to explain the low priority attached to adaptation in current aid partnerships. While arrangements vary, in many developing countries adaptation planning is located in environment ministries which have a limited influence on other ministries, notably finance. Most PRSPs—the documents that set out national priorities and define the terms for aid partnerships—provide a cursory treatment of climate change adaptation (see box 4.7). One result is that much of the aid financing for adaptation happens through project-based assistance. Current multilateral delivery mechanisms and the approach followed under NAPA point to more of the same.

Some projects on climate change adaptation are delivering results. Looking to the future, projects will continue to play an important role. However, project-based assistance cannot provide a foundation for scaling up adaptation partnerships at the pace or at the scale required. Project-based aid tends to increase transaction costs because of in-built donor preferences for their own reporting systems, weak coordination and strains on administrative capacity. Aid transaction costs in these areas already impose a heavy burden on capacity. In 34 aid-recipient countries covered by one OECD review in 2005, there were 10,507 donor missions in the course of the year.⁸⁰

There is a danger that current approaches to adaptation could push up aid transaction costs. Developing countries already face constraints in integrating climate change adaptation into national planning processes. They are also

responding to pressing demands in many other areas—HIV/AIDS, nutrition, education and rural development, to name but a few—where they are often engaging with multiple donors. If the route to increased financing for adaptation to climate change is through several multilateral initiatives, each with its own reporting system, it can be confidently predicted that transaction costs will rise. Making the transition to a programme-based framework that is integrated into wider national planning exercises is the starting point for scaling up adaptation planning.

Small-island developing states have already demonstrated leadership in this area. Faced with climate change risks that touch all aspects of social, economic and ecological life, their governments have developed an integrated response linking national and regional planning. In the Caribbean, to take one example, the Mainstreaming Adaptation to Climate Change programme was initiated in 2002 to promote integration of adaptation and climate risk management strategies into water resource management, tourism, fisheries, agriculture and other areas. Another example is in Kiribati in the Pacific, where the Government has worked with donors to integrate climate change risk assessments into national planning, working through high-level ministerial committees. The 2-year preparation phase (2003–2005) is to be followed by a 3-year implementation period, during which donors are cofinancing incremental climate change adaptation spending in key areas.

Working through PRSPs

For low-income countries, dialogue on PRSPs provides an obvious vehicle for the transition to a stronger emphasis on programmes. The best PRSPs link well-defined targets to an analysis of poverty and to systems of financial allocation under annual budgets and rolling medium-term expenditure frameworks. Whereas projects operate on short-term cycles, adaptation planning and financing provisions have to operate over a longer time horizon. In countries with a proven capacity for delivery, channelling donor support through national budgets that finance

national and subnational programmes is likely to prove more effective than funding dozens of small-scale projects. The PRSP provides a link from poverty reduction goals to national budgets and is thus the best tool for rolling out public spending programmes geared to the MDGs and wider macroeconomic goals.

In many countries, increased programme-level support could deliver an early harvest of benefits from adaptation that bolster wider poverty reduction efforts. Bangladesh provides an example. Many donors in the country are engaged in a wide range of projects and programmes aimed at reducing climate risks. However, far more could be done to expand programme support in key areas. Two examples:

- *Social safety net programmes (SSNPs).* Through the PRSP, poor people themselves have identified strengthened safety net programmes as a vital requirement for reducing vulnerability. Currently, Bangladesh has a large portfolio of such programmes, with spending estimated at around 0.8 percent of GDP. These include an old-age allowance scheme, allowances for distressed groups, a Rural Maintenance Programme and a Rural Infrastructure Development Programme—respectively providing cash for work and food for work—and conditional cash transfers that provide food for education and stipends for girls.⁸¹ Apart from providing immediate relief, these programmes have offered a ladder for people to climb out of poverty. However, there are a number of problems. First, coverage is inadequate: there are around 24 million people in Bangladesh in the category of ‘extremely poor’, whereas safety nets only currently reach about 10 million. Second, there is no integrated national SSNP based on comprehensive and updated risk and vulnerability mapping. Each separate SSNP is funded by a range of donors and there are problems with unclear and overlapping mandates. Strengthened capacity and scaled up national programmes in these areas could provide millions of people facing immediate climate change risks with support for adaptation.⁸²

- *Comprehensive disaster management.* Working with donors through a range of innovative programmes, Bangladesh has developed an increasingly effective disaster management system. Linked explicitly to the MDGs, it brings together a range of previously fragmented activities, including the development of early warning systems, community-based flood defence and post-flood recovery.⁸³ However, current funding—US\$14.5 million over four years—is inconsistent with the ambitious goal of reducing the vulnerability of the poor to ‘manageable and acceptable levels’.

While every country is different, these examples illustrate the wider potential for integrating strategies for adaptation into national planning. Dialogue on PRSPs provides a framework through which developed countries can support the efforts of developing country governments. It could also provide them with a mechanism through which to strengthen disaster risk management strategies.

Initial progress has already been made on multilateral assistance mechanisms. Under the Hyogo Framework for Action, an international disaster risk reduction framework signed by 168 countries in 2005, clear guidelines have been set out for the incorporation of disaster risk reduction into national planning processes. Elements of the architecture for turning guidelines into outcomes have started to emerge.⁸⁴ Similarly, the World Bank’s GFDRR supports the Hyogo Framework. One of its core objectives is to build the capacity of low-income countries to integrate disaster risk reduction analysis and action (including that brought about by climate change) into PRSPs and wider strategic planning processes.⁸⁵ Total programme financing requirements to 2016 are estimated at US\$2 billion.⁸⁶

Key lessons emerge from the adaptation experience of developing countries related to requirements for developing such strategies:

- *Reforming dedicated multilateral funds.* The major multilateral funds should be unified into a single fund with simplified uptake procedures and a shift in emphasis towards programme-based adaptation.

Increased programme-level support could deliver an early harvest of benefits from adaptation that bolster wider poverty reduction efforts

Successful adaptation coupled with stringent mitigation holds the key to human development prospects for the 21st Century and beyond

- *Revising PRSPs.* All PRSPs should be updated over the next two years to incorporate a systematic analysis of climate change risks and vulnerabilities, identify priority policies for reducing vulnerability and provide indicative estimates for the financing requirements of such policies.
- *Putting adaptation at the centre of aid partnerships.* Donors need to mainstream adaptation across their aid programmes, so that the effects of climate change can be addressed in all sectors. By the same token, national governments need to mainstream adaptation across ministries, with the coordination of planning taking place at a high political level.

Conclusion

The limitations of adaptation strategies have to be recognized. Ultimately, adaptation is an exercise in damage limitation. It deals with the symptoms of a problem that can be cured only through mitigation. However, failure to deal with the symptoms will lead to large-scale human development losses.

The world's poorest and most vulnerable people are already adapting to climate change. For the next few decades, they have no choice but to continue adapting. In a good-case scenario, average global temperatures will peak around 2050 before they reach the 2°C dangerous climate change threshold. In a bad-case scenario, with limited mitigation, the world will breach the 2°C threshold before 2050 and be set on course for still further rises. Hoping—and working—for the best while preparing for the worst, serves as a useful first principle for adaptation planning.

Successful adaptation coupled with stringent mitigation holds the key to human development prospects for the 21st Century and beyond. The climate change that the world

is already locked into has the potential to result in large-scale human development setbacks, first slowing, then stalling and reversing progress in poverty reduction, nutrition, health, education and other areas.

Developing countries and the world's poor cannot avert these setbacks by acting alone—nor should they have to. As shown in chapter 1 of this Report, the world's poor walk the earth with a light carbon footprint. With their historic responsibility for the energy emissions that are driving climate change and their far deeper current carbon footprints, rich countries have a moral obligation to support adaptation in developing countries. They also have the financial resources to act on that obligation. The business-as-usual model for adaptation is indefensible and unsustainable. Putting in place large-scale adaptation investments in rich countries while leaving the world's poor to sink or swim is not just a prescription for human development reversals. It is a prescription for a more divided, less prosperous and more insecure 21st Century.