

26 International Support for Adaptation

Key Messages

Adaptation efforts in developing countries must be accelerated. Adaptation is essential to manage the impacts of climate change that have already been locked into the climate system.

The poorest developing countries will be hit earliest and hardest by climate change, even though they have contributed little to causing the problem. The international community should support them in adapting to climate change. Without such support there are serious risks that development progress will be undermined.

Transfers to developing-country governments and civil society will be necessary to support adaptation. Additional costs to developing countries of adapting to climate change could run into tens of billions of dollars. **Donors and multilateral development institutions should mainstream and support adaptation across their assistance to developing countries.**

Public-private partnerships for climate-related insurance can help to support adaptation. At the household level, remittances are likely to have an important role in supporting autonomous adaptation.

The international community should also support adaptation through investment in global public goods, including:

- Improved monitoring and prediction of climate change;
- The development and deployment of drought- and flood-resistant crops;
- Methods to combat land degradation;
- Better modelling of impacts.

In addition, efforts should be increased to improve mechanisms for improving risk management and preparedness, disaster response and refugee resettlement.

The scale of the challenge makes it more urgent than ever for developed countries to honour their existing commitments - made in Monterrey 2002, and strengthened at the EU in June 2005 and at the G8 Gleneagles meeting in July 2005 - to double aid flows by 2010. Strong growth and development will enhance countries' ability to adapt.

Strong and early mitigation has a key role to play in limiting the long- run costs of adaptation. Without this, the costs of adaptation will rise dramatically.

26.1 Introduction

Adaptation is different from mitigation in two key respects: first, it will in most cases provide local benefits, and second, these benefits can be realized without long lead times (as discussed in Chapter 18). As a result, private actors - households, communities and firms - will carry out much adaptation on their own, without the active intervention of policy, in response to actual or expected climate change. People in even the smallest and poorest developing countries would benefit from any action they undertake to adapt their economies and societies in ways that make climate change less costly to them.

However, there are many barriers to effective adaptation – ranging from a poverty-driven low adaptive capacity to market failures, such as incomplete information. Government policy and support will therefore be critical in assisting and complementing individual responses, as set out in Part V. But governments in turn will require support from the international community. As Chapter 2 notes, the poorest countries are the most vulnerable to the impacts of climate change *and* are particularly short of the resources required to manage a changing climate. The ethical foundations for this support were discussed in Chapter 2. Briefly they are (i) that common humanity points to support for the poorest members of the world community, and to efforts to build a more inclusive society, (ii) the historical responsibility of industrialised

Part VI: International Collective Action

countries for the bulk of GHGs concentrations, and (iii) a common interest in avoiding the instabilities that could arise from the transfer of the dislocation of climate change.

The developed world should provide support for adaptation, including through existing aid delivery mechanisms for development and investment in global public goods. Under Article 4.8 and 4.9 of the UNFCCC, the least developed countries are recognized as being among the most vulnerable to the adverse impacts of climate change, and all signatory countries are obligated to help developing countries adapt. Furthermore, many developed countries have acknowledged that there is a strong case for assistance. At the ninth Conference of the Parties (COP), Canada, the EU, Iceland, New Zealand, Norway and Switzerland reconfirmed an earlier pledge of \$410 million by 2005 for the Special Climate Change Fund (SCCF) and the Least Developed Country Fund (LDCF).¹

This chapter is divided into four broad issues that will require international collective action: honouring and improving current international commitments to assistance for development and, specifically, adaptation to climate change (Section 26.2); recognising and facilitating the role of international private financing for adaptation (Section 26.3); promoting and providing global public goods (Section 26.4); and improving international support for disaster risk reduction (Section 26.5).

26.2 International assistance for adaptation

The scale of the challenge posed by climate change and adaptation makes it more urgent than ever that donor countries honour their commitments - made in Monterrey 2002, and strengthened at the EU in June 2005 and at the G8 Gleneagles meeting in July 2005 - to double aid flows by 2010.

As Part V explained, autonomous adaptation may consist of a single farmer changing crop varieties or changing planting dates, at the most basic level, to moving production or distribution facilities, or even leaving a country/region entirely. A major role of governments in tackling climate change will be to ensure that the private sector has the tools and incentives necessary to adapt autonomously. Helping people to build and develop their human capacity through investment in health and education, facilitating growth and diversification, and encouraging general development will be critical in supporting individual action to adapt. In addition, there will be an important role for Government:

- Providing and disseminating information about climate change, and its likely impacts;
- Providing the additional services, and infrastructure investment that may be required to manage and prevent the impacts of climate change. For example, better water management, flood defences and agricultural extension services.

For developing countries, and especially the poorest developing countries, adaptation to climate change will substantially raise the costs of some investments, and may also require investments in new areas. These new demands will place pressure on already very scarce public resources. Meeting the Millennium Development Goals already requires international assistance to support action by developing countries. Climate change – and the need for adaptation – will pose an additional challenge for countries' growth and poverty reduction ambitions.

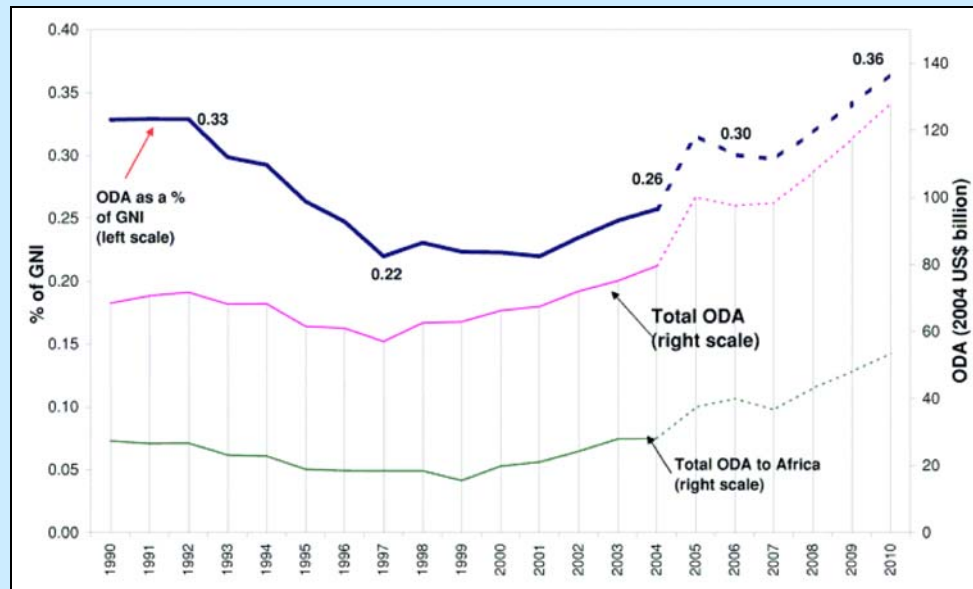
A major aspect of accelerating adaptation should be implementing good development practice. As Chapter 20 argued, many actions to promote growth and development should also help to reduce the vulnerability of developing countries to climate change and raise their ability and capacity to adapt. Scaling up development assistance will therefore be essential. And the developed country commitments to increase overall ODA – made at Monterrey in 2002, and reaffirmed at the G8 summit in Gleneagles in July 2005 – will therefore take on an even greater importance. The recent DFID White Paper on eliminating poverty summarises those historic commitments: donor countries pledged to “increase aid by \$50 billion a year by

¹ Nevertheless, many developing countries still believe too little is being done. For example, at Montreal in 2005, Bangladesh, suggested a shift from the politics of aid to one of legal obligation where there could be ‘compensation for damages due to unavoidable adverse impacts of climate change’, and suggested that ‘if voluntary obligations are not working then binding commitments might be necessary to secure adequate funds.’

Part VI: International Collective Action

2010, with \$25 billion of that to go to Africa; cancel debt worth another \$50 billion; and provide AIDS treatment to all who need it by 2010".² (See Figure 26.1 below). ODA from DAC donors alone could double between 2004 and 2015 if the commitments and EU targets for 0.7% GDP in ODA by 2015 are met. So far, five DAC donors have met the 0.7 ODA/GNI ratio, and five others have announced timetables to meet this target.³

Figure 26.1 Scale of ODA if DAC donors honoured their commitments



Source: OECD (2005)

Recent increases in the efficiency of aid should make these flows more effective in helping recipient countries to tackle the additional challenge of adaptation. As emphasized in the Commission for Africa report, three sets of factors have increased aid efficiency over the past decade or more: (i) improvements in policies, governance, and investment climate in recipient countries; (ii) aid allocations that have shifted more resources to countries that can use them well; and (iii) better quality of aid delivery.⁴ In addition, the projected phase-in of aid increases over several years will also make it easier for recipients to use aid efficiently.

Looking to the future, and as set out in Part III, the international community should also recognise the crucial role of mitigation in limiting the potential damage from climate change. Without strong and early mitigation, the long-run costs of adaptation will rise sharply, and substantial additional resources will be necessary to finance this and to realise the internationally agreed poverty reduction goals.

To complement the broader increases in development budgets, a range of different funds have been developed under the UNFCCC to develop and integrate approaches to adaptation.

The main mechanisms for supporting adaptation are donor contributions to the Global Environment Facility (GEF) special funds for adaptation, the Adaptation Fund, and ODA and concessional lending of which a very small proportion (significantly less than 1%) is specifically focused on adaptation.⁵ (See Box 26.1). World Bank (2006a) estimates of the costs of adaptation in developing countries are in the tens of billions of dollars (discussed in Chapter 20). Contributions to dedicated adaptation funds are projected to amount to between \$150 - \$300 million per year. In this context, the World Bank recently recognised the essential role of the International Financial Institutions in “ensuring that maximum impact is obtained from these funds by mainstreaming appropriate assessment and response to climate risk in the global development portfolio”.⁶

² UK Department for International Development (2006a)

³ Additional ODA growth will come from non-DAC donors who are growing in importance.

⁴ Commission for Africa (2005). See Chapter 9 *Where will the money come from: Resources*

⁵ World Bank (2006a)

⁶ World Bank (2006a:46)

Part VI: International Collective Action

International support to manage the effects of climate change will be significantly more effective if it fits with the rest of the international ODA architecture. This includes the Paris Declaration on Aid Effectiveness that focuses on the need to develop and reinforce national development plans, strategies and budget processes.⁷

⁷ Key principles include: ownership, alignment, harmonisation, managing for results, accountability and governance. www.oecd.org/dataoecd/11/41/34428351.pdf.

Box 26.1 Existing sources of dedicated funding for adaptation

A range of funding streams is available to support adaptation in developing countries:

GEF and associated funds

To help countries adapt to the adverse impacts of climate change, the Global Environment Facility (GEF) supports projects that reduce countries' vulnerability to climate change impacts and helps them build adaptive capacity. The GEF has adopted a three-stage approach to adaptation:

- Stage I: *planning* through studies to identify vulnerabilities, policy options, and capacity building.
- Stage II: *identifying measures to prepare* for adaptation and further capacity building.
- Stage III: *promoting measures to facilitate adaptation*, including insurance and other interventions.

GEF resources (established under the Climate Convention) include:

Least Developed Country Fund (LDCF): The GEF established the LDCF to address the extreme vulnerability and limited adaptive capacity of Least Developed Countries (LDCs). The LDCF initially supported preparation of National Adaptation Programmes of Action (NAPAs). To date, a majority of LDCs have received funds to prepare their NAPAs, many of which are now close to completion. The NAPAs conclude with a list of prioritized project profiles to be subsequently implemented with support from the LDCF. Pledges and contributions to the LDCF amount to \$89 million as of April 2006.⁸

Special Climate Change Fund (SCCF): Adaptation activities to address the adverse impacts of climate change have top priority for funding under the SCCF, which is aimed at supporting activities in adaptation, technology transfer, economic diversification, and energy, transport, industry, agriculture, forestry, and waste management. The SCCF addresses the special needs of developing countries in long-term adaptation, with priorities given to health, agriculture, water and vulnerable ecosystems. To date, \$45 million has been pledged in contributions to support adaptation and the transfer of technology.⁹ There is currently a lack of agreement over the operational guidelines on economic diversification for this fund that has proved to be a constraint.¹⁰ This issue relates to whether oil-producing countries should be compensated for lost revenues as a result of global agreement on reducing carbon emissions.

Neither fund is subject to the resource allocation framework of the main GEF Trust Fund and may receive between \$100 million to \$200 million per annum in donations.

Adaptation Fund

With the entry into force of the Kyoto principle, a 2% levy on most Clean Development Mechanism (CDM) transactions will be directed to an adaptation fund. The size of funding this will generate depends on both the extent to which the CDM is used and the carbon price (discussed in Chapter 23). The World Bank (2006a) has estimated that the Adaptation Fund will generate funding in the range of \$100-\$500 million through to 2012. The priorities and management of the Adaptation Fund is still being negotiated.

Procedures for accessing international funding streams should be simple and transparent to ensure easy access by developing countries. Some commentators have suggested that the current adaptation funds should be unified and the process for access simplified to facilitate uptake by developing countries.¹¹ The role and demand for these funds should be kept under review to ensure that they are well placed to develop approaches to adaptation, are adequately resourced, and support the overall goal of ensuring that the pressures and risks posed by climate change are taken into account across all aspects of development.

⁸ World Bank data

⁹ World Bank data, as of 25th September, 2006

¹⁰ World Bank (2006a)

¹¹ For example Burton (2005), Huq (2006), Bouwer and Aerts (2006)

New mechanisms to raise additional funding for development have also been proposed, with proposals for funding streams earmarked to particular activities, including adaptation.

A variety of additional mechanisms to scale up international funding for development have been proposed.¹² For example, the French government is introducing an air ticket tax linked to funding for HIV/AIDS. A number of specific suggestions have been made for mechanisms earmarked for adaptation. Box 26.2 summarizes briefly some of those options.

Box 26.2 Some alternatives for new dedicated funding streams for adaptation

A number of commentators have suggested possible dedicated financing mechanisms for adaptation in developing countries:

Levies on Joint Implementation Projects: As noted above, a 2% levy is applied on projects included within the CDM. This levy could apply also to Joint Implementation projects undertaken in transition countries. However, it should be noted that the existing levy has a perverse effect: while supplying funds for adaptation, the levy reduces the incentive for the private sector to invest in mitigation in developing countries and thus, ultimately, countries will have to adapt further.¹³

Adaptation levy: Some commentators have proposed the use of adaptation levies.¹⁴ In particular, they suggest an air ticket levy may be particularly relevant given the low levels/exemptions from taxation from which it has benefited historically, and the projected growth in aviation emissions.¹⁵ Such a levy could distinguish between short- and long-haul flights and classes of travel, and could be argued to have advantages on grounds of both equity (taxing “luxury” emissions rather than “survival” emissions) and efficiency (using a price instrument rather than quantity).¹⁶ This type of levy would help to create disincentives to emit GHGs. The idea, which has been mooted by various commentators, has already been put into practice in the context of funding for health and education, among other sectors. The UK and France have recently made announcements in this area. France began collecting an air ticket levy in July 2006 and expects it to generate annual revenues of euros 200 million. They will hypothecate part of the duties raised to provide a long-term source of funding to an international drug purchase facility called UNITAID. The UK has an existing air ticket tax – the Air Passenger Duty – and some of the revenue from this will be allocated to the International Financing Facility for Immunisations (IFFIm).¹⁷

Auctioning of emissions permits: If auctioning were used to allocate some of the permits to emit GHGs, it would be theoretically possible to apportion a part of the auctioning revenue to help fund adaptation. There will, however, be many calls on the revenue that this generates. Finance Ministers will have to take decisions with regard to priorities, what will achieve the best value for money and the likely effects on the economy as a whole.

A new GDP-based levy on Annex 1 countries: Some commentators have suggested that a new levy on Annex 1 countries, set at a fixed percentage of GDP and allocated to adaptation, would be one way to give a clear funding commitment under the UNFCCC.¹⁸ This option should be distinguished from using ODA increases, since this levy would provide a separate dedicated funding stream.

¹² Atkinson (2004)

¹³ This assumes that the CDM levy is kept - from an efficiency perspective it would be better to remove the levy from the CDM entirely.

¹⁴ Mueller and Hepburn (2006).

¹⁵ According to the IPCC (1999) this amounts to up to 15% of global emissions by 2050.

¹⁶ Benito Mueller (2006)

¹⁷ The IFFIm will use up-front long-term financial commitments from donors to provide additional resources more quickly and predictably.

¹⁸ Bouwer & Aerts (2006)

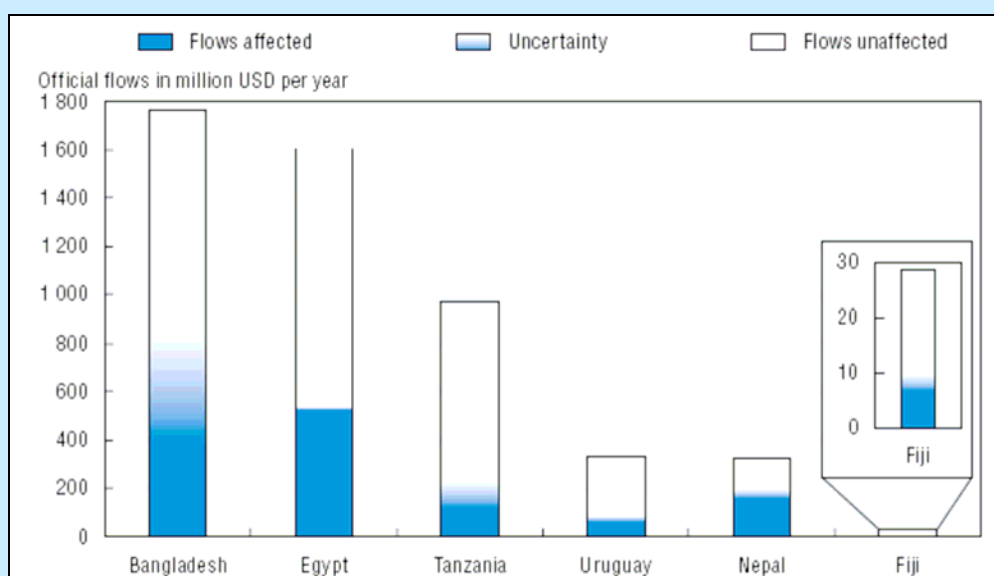
Part VI: International Collective Action

While some of these options may have potential, they all suffer from the disadvantages common to all dedicated funds. Public finance principles would generally militate against the earmarking of revenues, on the grounds that it prevents efficient resource allocation across government. Dedicated funding sources could also make it harder to mainstream adaptation, if the funded activities are viewed as being outside the normal budgetary process. Given the far-reaching nature of the adaptation challenge, stand-alone funds and activities financed by supplementary levies and divorced from overall development budgets might make more difficult the task of integrating adaptation into the mainstream of development and its funding. Any additional funding for adaptation should therefore aim to feed into normal budgetary processes, and clearly within national development plans.

Donors should mainstream adaptation across their development programmes, to address the affects of climate change in all countries and sectors.

Chapter 20 discussed the importance of national governments integrating adaptation into their budgets and programmes. The same is true for donors - there is a role for the international community, including the development banks, in working with partner countries to promote a coherent response to climate change. A major aspect of accelerating adaptation should therefore be ensuring that development projects take account of climate change. An OECD analysis of ODA flows to six developing countries indicates that a significant portion of this aid is directed to activities potentially affected by climate risks, including climate change. Estimates range from as high as 50-65% of total national aid flows in Nepal, to 12-26% in Tanzania.¹⁹ This is illustrated in Figure 26.2.

Figure 26.2 Annual official flows and share of activities potentially affected by climate change



Source: van Aalst and Agrawala (2005)

The international community has an important role in assisting countries as they develop their national development strategies (or poverty reduction strategies) to take account of adaptation across all government departments. Linked to this, the group of 50 LDCs have been asked to prepare National Adaptation Programmes of Action (NAPAs, discussed in Chapter 20). Effective NAPAs should help to ensure that national development strategies reflect adaptation priorities, and also help in the allocation of resources for adaptation. To date, five countries (Bangladesh, Bhutan, Malawi, Mauritania, and Samoa) have completed their NAPAs, and the costs of the priority projects they have identified total \$133 million. Whilst NAPAs are useful in identifying funding priorities, it is important that the priorities they highlight are factored into broader national planning to ensure they are sustainable and effective – especially where they involve long-term investment decisions. For example,

¹⁹ van Aalst and Agrawala (2005)

improving the resilience of drainage systems to the effects of climate change should be considered in the context of overall urban planning.

26.3 The role of international private financing for adaptation

Private-sector financing for adaptation will come not only from domestic firms and households, but also potentially from international sources.

Remittances are the largest source of external financing in many developing countries. In 2005, remittance flows are estimated to have exceeded \$233 billion globally, of which developing countries received \$167 billion. Unrecorded flows amount to an additional 50% of the recorded flows.²⁰ In Ghana, for example, remittances account for 10-15% of national income compared with 3% from foreign investment, whilst in Bangladesh the wealth of the diaspora and the prevalence of migrant labour have led to remittances totalling \$3.6 billion in 2005, more than double ODA.²¹ Remittances are especially important in times of crisis where they can provide very rapid and targeted financial assistance to those affected by climatic events and other crises. Banks and money transfer companies recorded sharp rises in remittances sent to the areas affected by the Pakistan earthquake and Asian tsunami immediately following those events, with increases of up to 400% in some cases. Because remittances usually accrue at the household level, they may be particularly important in funding autonomous adaptation of households.

Both private and public sector actions are needed to further unlock the potential of remittances to support adaptation. For example through making financial services, including remittance transfers, more accessible and better tailored for low-income senders and recipients. The public sector needs to ensure that favourable policies and legal environments are in place to encourage low value remittances to flow through licensed remittance providers (rather than informally), and that developing country payment systems are sufficiently well developed to distribute remittance flows efficiently and equitably to low income recipients too, who may not yet be banked with a country's largest banks.

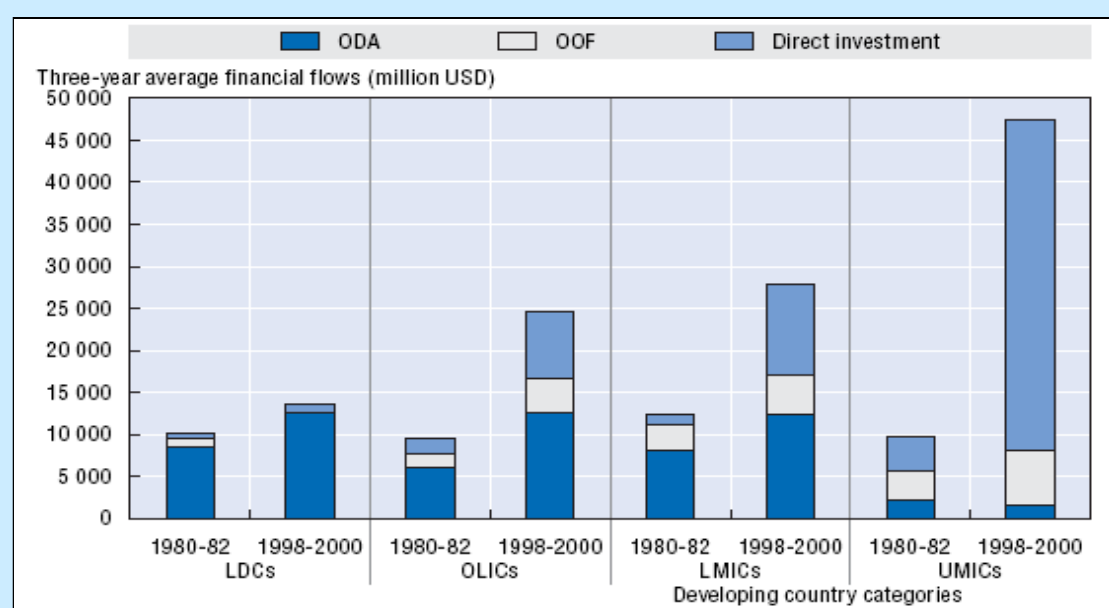
Foreign direct investment (FDI) has also become important in many developing countries, particularly those in the upper middle-income category. While FDI flows will continue to be driven by the profit motive, they may - in some instances - also help to meet the incremental investment costs of adaptation. This may be the case, if, for example, the host country has regulatory requirements in place (such as building codes and standards for infrastructure). In such circumstances, foreign investors have the potential to demonstrate new ideas and technologies for dealing with and accelerating adaptation. The significance of FDI in facilitating and supporting adaptation will, however, vary between developing countries according to the scale of flows. Official flows, in the form of grants and loans, are much more significant for low-income countries, as demonstrated in Figure 26.3, and thus a higher priority area for integrating into development activities.²²

²⁰ World Bank (2006b). Remittance flows are defined as the sum of workers' remittances, compensation of employees, and migrant transfers in the balance of payments statistics collected by the IMF.

²¹ IMF (2005)

²² van Aalst and Agrawala (2005)

Figure 26.3 Official and private financial flows to developing countries (2000-04)



Source: van Aalst and Agrawal (2005)

Public-private partnerships, which harness the power of the market for public goals, are an attractive mechanism for supporting adaptation. Donors are beginning to use PPPs to promote the development and use of climate-related insurance markets in developing countries. There is great potential for expansion in this area.

It is crucial to develop insurance markets that can spread the growing climate-change risks, especially away from the most vulnerable households and countries. Part V discussed the importance of national-level action to develop such markets, but this action will require international support. Scale is crucial for insurance to be effective in reducing risk, because of the benefits of diversification across individuals and communities with uncorrelated risks (through re-insurance, for example). International risk-sharing mechanisms can also help in providing an element of subsidy for the poorest people and the poorest countries.

One approach to providing this international support is through public-private partnerships (PPP), which unite public institutions, private companies, and NGOs in an attempt to meet public goals by harnessing private efficiency and resources. A new example of such PPPs in the area of insurance is the Global Index Insurance Facility (GIIF), now being set up by the World Bank and the EU. This will help countries to access insurance markets for weather and natural disasters.

The GIIF will combine private and donor capital to support index-based insurance schemes (like weather derivatives) in developing countries. This risk-taking entity would originate, intermediate and underwrite indexable weather, disaster and commodity price risks in developing countries. The GIIF would lower the entry barrier to international insurance markets by pooling smaller transactions, thereby scaling up the transfer of risk from developing countries to those better able to carry these risks. At the local level the GIIF will promote capacity development of the financial sector. Current estimates are that annual risks totalling \$0.2 - \$11.7 billion could be transferred to the market. A rough potential GIIF pipeline overview, based only on the projects led by the World Bank, suggests overall expected volumes of risk of \$136 million in 2006, \$214 million in 2007, and \$302 million in 2008.²³ Adoption of index-based insurance schemes will be more straightforward in those developing countries with relatively more sophisticated and deep financial systems (such as in South East Asia). The GIIF could help to stimulate adoption of insurance schemes in low-income countries, though may need to be supplemented with publicly-funded technical assistance.

²³ CRMG (2006)

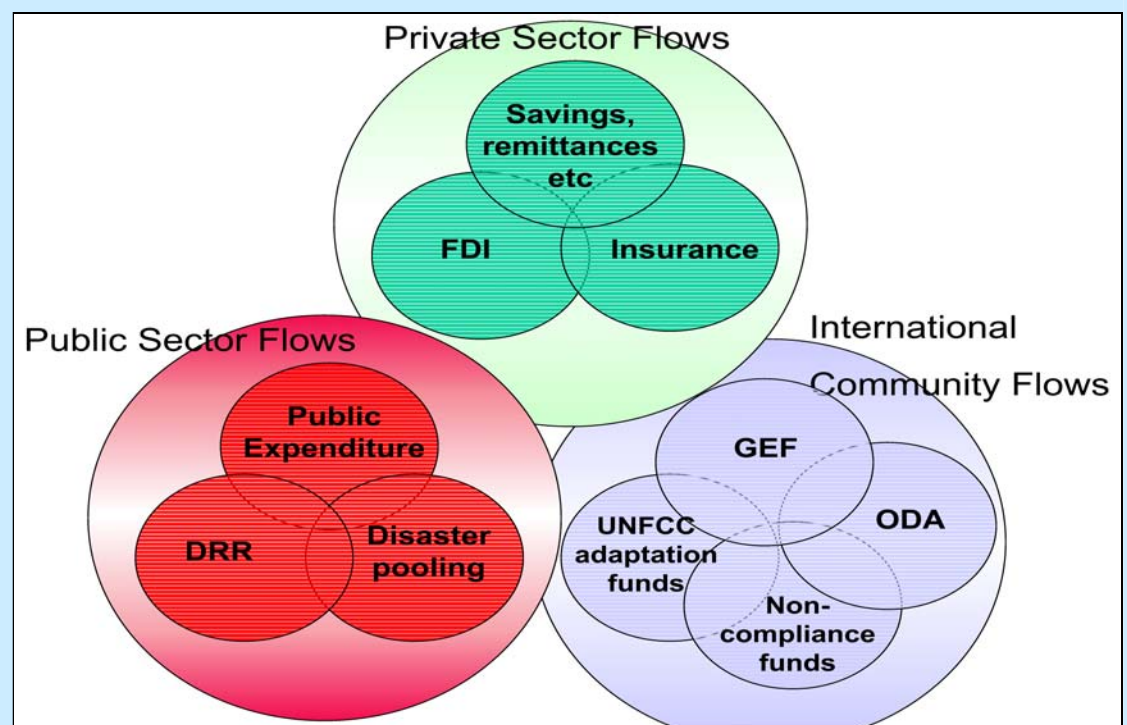
Part VI: International Collective Action

One concern about using market-based insurance mechanisms to share risk is that the poorest households and countries will not be able to afford the premiums. Specific support to address weaknesses in developing countries' financial markets – for example, through technical assistance and capacity building – can help to tackle gaps in the domestic market. Precedents already exist for donor-supported insurance mechanisms; for example, the World Bank provides low-interest capital backup to the (public-private) Turkish Catastrophe Insurance Pool (TCIP) to make it affordable to property owners. Such initiatives can be on a local level (the Ethiopian weather derivatives, for example), a national level (as with the TCIP), or regional level (as has been proposed for the Caribbean states). Again, it is essential for any scheme to include incentives for participants to reduce their risks and, in the process, accelerate adaptation (as discussed in Chapters 19 and 20).

While this section has focused on PPPs supporting development of insurance markets, the PPP approach can be used elsewhere for adaptation as well. To date, most PPP efforts have been limited to mitigation activities to reduce GHGs. A key area in which to explore PPP would be the development of climate-resilient crops. Experience from previous publicly supported crop research demonstrates the efficacy of this public-private approach. During the Green Revolution of the 1960s through 1980s, most crop research in wheat and rice particularly was financed by the public sector; now the majority is in the private sector. However, many advances are still prompted by publicly-funded research at universities and research institutions.

Figure 26.4 below summarizes current funding sources for adaptation from the public and private sectors and the international community.

Figure 26.4 Conceptual relationship between different sources of funds for adaptation in developing countries at the national level



26.4 Global public goods

In addition to providing financing directly to developing countries, the international community should invest in global public goods for adaptation.

Section 26.2 focused on mechanisms for direct international funding of the increased adaptation costs in developing countries. Given the arguments about mainstreaming, the key recommendation is for rich countries to deliver on their overall aid commitments. But there is much more that the international community can, indeed should, do to accelerate adaptation.

Ensuring global public goods (GPGs) are adequately financed will be especially important. While most adaptation measures will be at the individual, community, and country level, there are some global activities supporting adaptation where international co-ordination will be appropriate. These will tend to be characterized by benefits that can be shared widely at little cost, have economies of scale, and do not differ greatly across countries, so that the public good has international reach. Three important areas for global public good investment are discussed here:

- ***Monitoring, forecasting, and researching climate change:*** Adaptation will depend on comprehensive climate monitoring networks, and reliable scientific information and forecasts on climate change - a key global public good. Chapter 20 argued that developing-country governments should provide information to their own citizens but currently lack the capacity to do this, demonstrated by the shortage of weather watch stations. The international community should therefore support global, regional and national research and information systems on risk, including helping developing-country governments build adequate monitoring and dissemination programs at the national level. Priorities include measuring and forecasting climatic variability, regional and national floods, and geophysical hazards.²⁴ International networks of scientific organisations could enhance collaboration across national borders, such as the Global Climate Observation Systems (which are projected to cost \$62 million over 10 years). Following the Commission for Africa report, the G8 committed at Gleneagles in 2005 to help Africa obtain full benefit from the Global Climate Observing System with a view to developing fully operational regional climate centres in Africa. It is estimated that \$200 million over 10 years is required for the Climate for Development in Africa programme; so far, very few pledges have been committed. As another example of possible GPG contributions in this area, the UK's Hadley Centre has developed a portable version of its Regional Climate Model, which is freely available for researchers in developing countries to run on standard computers.²⁵
- ***Research to improve crop resilience and reduce GHG emissions from agriculture:*** The Consultative Group for International Agricultural Research (CGIAR) has proposed a new global challenge program that couples advances in agricultural science with research to mitigate climate change and adapt agriculture to its anticipated effects. That research could focus on development of rice varieties and water-management practices that reduce methane emissions; and crop varieties that resist higher temperatures, tolerate greater disease and insect pressures. They also need to withstand exposure to drought and excess water. Research is also needed into more efficient use of nitrogen fertilizers; simpler and more accurate ways to measure soil carbon; and farming systems that sequester carbon more effectively.²⁶ Such GPG investments have the potential for very high returns: evaluation research has estimated that the \$7.1 billion (in 1990 US\$) invested in CGIAR in the past has had a benefit-cost ratio of at least 9.0.²⁷ This type of research, particularly when coupled with the objective of strengthening national agricultural research systems, is highly valuable to developing countries. Box 26.3 describes the beneficial effects of research into improving rice plants and better use of fertiliser which enables positive adaptation by increasing rice yields in a changing climate. This is also an important example of an activity that combines both

²⁴ Benson and Clay (2004)

²⁵ <http://precis.metoffice.com>

²⁶ <http://www.cgiar.org/impact/global/climate.html>

²⁷ Under the plausible assumption the benefits will continue at present rates through 2011, the ratio rises to 17.3. Raitzer (2003)

adaptation and mitigation benefits as the outcome contributes to a reduction in GHG emissions.

Box 26.3 Adaptation and mitigation in rice production

Research into new rice plants could produce greater resistance to the changing climate and better grain quality. Wetland rice agriculture is also a major source of methane emissions due to anaerobic (without oxygen) decay of organic material caused by extended flooding periods. Higher yielding rice plants could utilise more carbon in its growth and hence reduce its emissions of methane. These higher yielding plants could also sequester more atmospheric CO₂ and utilize fossil fuel-based fertilisers more efficiently. New rice varieties could also yield higher revenues for rice farmers: for example, using one new rice variety, IR36, released in 1976 and planted on 11 million hectares in Asia in the 1980s, produced an additional 5 million tons of rice a year, boosting rice farmers' incomes by \$1 billion.

Changes in fertiliser use can also have the dual benefit of reducing nitrogen oxide emissions from fertilisers and reducing indirect emissions from producing and transporting it. Rice plants can use the higher CO₂ concentrations in the atmosphere to their advantage by assimilating more carbon and using it to produce higher yields. However this CO₂ uptake effect can only be used when the plant has a sufficient nutrient supply. Site Specific Nutrient Management (SSNM) is an approach to application of fertilisers that uses the local characteristics of the land to determine how fertilisers should be applied. Balanced fertilisation, as developed under SSNM could improve nutrient supply using 30-40% less nitrogen fertiliser.

Initial evaluations of the use of SSNM in a large number of farmers fields in Asia finds significant environmental and financial benefits of SSNM over a range of fertiliser and rice prices. The costs associated with SSNM include additional time requirements for farmers' decision-making, but no significant up-front investment costs. In many rice growing countries fertilisers are subsidised, so lower use would also bring savings to the public finances: for example, in Indonesia the government spends \$300 million on fertiliser subsidies and its minister of agriculture has requested a review of the subsidy level following roll-out of SSNM in the country.

Source: International Rice Research Institute (2006)

- **New methods to combat land degradation:** An important element of adaptation will be to prevent projected increases in the frequency of drought from leading to desertification. Approximately 2 billion people live in expanding drylands that currently cover 40% of the earth's surface. Protecting the biophysical foundations of agriculture – biodiversity, forests, livestock, soils, and water, are essential to combating the spread of desertification.²⁸ New techniques such as applying small amounts of fertilizer, or micro-dosing, increased grain yields by 30-50% in West Africa. Improved agro-forestry practices are helping regenerate nutrient-depleted soils in east Africa, while watershed programmes are reducing soil loss and increasing cropping intensity. Most adaptive practices will involve changes to farming or land management systems. Sometimes these systems can be transposed from elsewhere, others have to be developed and tested. This will require coherent programmes of information sharing, modelling of impacts, pilot programmes and extension services. Developing and testing such techniques is a global public good that would be a good focus for investments by the international community.

These global public goods are to some degree already funded internationally (for example, through the CGIAR or the World Bank), but they should be targeted more directly at adapting to future climate-change challenges, in addition to responding to current problems. Given the extent of the inevitable climate change that is already on the way work on these GPGs should be intensified.

²⁸ In recognition of the problem, the United Nations declared 2006 the International Year of Deserts and Desertification.

Investment in these global public goods should be scaled up; through existing mechanisms or through new instruments.

As already noted, for adaptation to climate change to be tackled effectively it should form an integral part of national development plans and budget planning. In addition, it is important to ensure the specific GPGs discussed above are funded fully. As such there may be a case for greater dedicated sources of funding to support these initiatives. This could be achieved either through existing mechanisms such as the GEF and the CGIAR, or through a new dedicated global fund and partnership.

Experience suggests that such dedicated funds can play a useful role where insufficient attention is being paid to an area, or where working across countries would add value.²⁹ These funds take advantage of returns to scale and collaboration in cases where action is urgently needed. Past efforts have had some success. A recent review by the World Bank of 26 global funds (including the Prototype Carbon Fund and the Fund for the Implementation of the Montreal Protocol (MLF)) found that programmes delivering global public goods often add value, and rate well in their impacts on tackling the policy, institutional, infrastructural, and technological constraints that developing countries face.³⁰

Effectiveness and efficiency suggests that the approach of choice should be built on existing mechanisms (such as the GEF). There are risks associated with a proliferation of vertical funds – in particular they can complicate efforts to co-ordinate aid and gain the full support of national governments.

26.5 Risk management and risk preparedness: responding to disasters and resettling refugees.

More investment is required to manage and reduce the consequences of climate change.

Given the projected increase in frequency and intensity of climate-related disasters, the international community should support greater investment in managing and reducing the consequences of climate change through better risk management and preparedness, including improving mechanisms for refugee resettlement. This is especially important given that a recent World Bank report concludes: “[r]e-allocation is the primary fiscal response to natural disasters. Disasters have little impact on trends in total aid flows”.³¹

Disaster risk reduction (DRR) includes the whole spectrum of prevention, preparedness, response and recovery. It focuses primarily on reducing the vulnerability of poor people by building capacity and livelihood resilience. DRR involves learning lessons from previous natural disasters, and working with governments at the local, national and regional levels to address the fundamental causes and consequences of the loss of lives and livelihoods. This includes:

- Reforming national disaster management agencies and establishing stronger co-ordination mechanisms between relevant line ministries;
- Linking community-level experience with national-level policy making;
- Strengthening building codes and land-use;
- Establishing well-resourced and prepared response systems with a focus on national and local capacity.

The key to successful DRR is ensuring it is integrated into development and humanitarian policy and planning. More effective financing for DRR should be based on country led approaches where national governments are accountable and committed to long-term investment.

²⁹ For a discussion of strengths and weaknesses of vertical funds, see DFID Practice Paper (2006b) How to work effectively with global funds and partnerships

³⁰ World Bank (2004)

³¹ Benson and Clay (2004)

Part VI: International Collective Action

While DRR will be essential in improving the resilience and capacity of poor people to manage a changing climate, it is impossible to avoid disasters altogether. Funding for humanitarian aid and improvement in the institutions and mechanisms for disaster recovery are critical. (See Parts II and V for a discussion of disaster recovery.) The international community has recognized the need for better, more integrated disaster-recovery systems that can react with greater agility, and has taken steps in that direction.

The disaster relief fund administered by the UN Office for the Co-ordination of Humanitarian Affairs has recently been renamed and re-launched as the Central Emergency Response Fund. The fund, launched in March 2006, has a target of \$500 million (of which \$222 million has been contributed so far).³² UN agencies will be able to access these funds within 72 hours of a crisis. Individual agencies are also proposing to increase the sums that they can allocate to emergencies.³³ As discussed in Chapter 20, this is reactive adaptation funding; but climate change will bring more disasters to react to, even with investment in preventive measures. This funding will need to continue to rise significantly.

At the macroeconomic level, the IMF has recently introduced an exogenous shocks facility (ESF) that should help with recovery from natural disasters or commodity price shocks, or indeed any “event that has a significant negative impact on the economy and is beyond the control of the government”. The ESF will become effective once the multilateral debt relief initiative is officially implemented. The IMF already has facilities to provide assistance to countries hit by certain types of shocks - those in post-conflict situations (Emergency Post-Conflict Assistance, or EPCA) and countries afflicted by natural disasters (Emergency Natural Disaster Assistance, or ENDA). Assistance is also provided under the Compensatory Financing Facility (CFF). These instruments have not been heavily used and the effectiveness of the ESF should therefore be monitored; but, in principle it is a sound idea, and the emphasis should be on ensuring it can work well and is co-ordinated with other facilities.

Even with strong and rapid action to manage the consequences of climate change through adaptation, in some cases the only effective adaptation response will be to migrate to higher land or safer areas with greater access to food and water. Adequate arrangements will be required in extreme cases where populations must be resettled, most notably in the case of the vulnerable small island states. (See Part II for details). The United Nations Refugee Agency, United Nations Office for the Co-ordination of Humanitarian Affairs, and the International Organisation for Migration (UNHCR, OCHA, and IOM) should take on expanded roles for resettlement if others do not step forward to do so, given the permanent nature of such migration in response to climate change.

Recipient countries should develop reception and resettlement terms and strategies, with possible cost sharing across a broader range of countries on equity grounds. There are some very limited precedents from other organized resettlements of populations, often in forced circumstances. For example, when volcanic eruptions made much of Montserrat’s housing uninhabitable in the 1990s, residents were given the option of moving to the UK or Antigua, and more than half of the population resettled. In that case, because Montserrat is a British overseas territory, responsibility for action was relatively clear. By contrast, in the future much of the resettlement may have to be across international borders, so arranging it and sharing costs will likely be much more complex.³⁴ Managing these resettlements will require not only funding, but also political will and co-operation.

26.6 Conclusion

Reducing the vulnerability of poor people to climate variability and climate change should be the starting point for adaptation efforts in developing countries. Poverty limits the ability to cope with and recover from climate shocks — particularly when combined with other stresses, such as a high disease burden, land degradation, weak institutions, governance challenges and conflict. Poor people do adapt, but are constrained by limited additional resources.

³² Note that this is not only for climate related disasters.

³³ For example, in 2006 UNICEF proposes to increase their Emergency Programme Fund ceiling from \$25million to \$75million per biennium.

³⁴ Commission for Africa (2005); UN Habitat

Part VI: International Collective Action

If the international community is to continue its commitment to ambitious development aspirations, support to developing countries in adapting to climate change will be essential. The key mechanism for doing this will be following through delivery on commitments to scale up aid for development, since adaptation is a crosscutting challenge that will affect all aspects of development. Specifically, it is crucial that developed countries live up to the commitments they made at Monterrey 2002, EU June 2005 and the G8 Gleneagles meeting in 2005 and related recent international fora. And mainstreaming climate change into development priorities and measures will help ensure consistency between action to achieve adaptation to climate change and action for growth and poverty reduction, on all its dimensions.

The other major area for action is in providing global public goods (GPGs) for adaptation. This will require increased international co-operation and perhaps also dedicated funding sources for GPGs. Key GPGs include improved monitoring and prediction of climate change, better modelling of impacts, the provision of drought- and flood-resistant crops. It also requires planning approaches and infrastructure design better suited to a world of climate change. Further investment will also be required to improve mechanisms for improving risk management and preparedness, disaster response and refugee resettlement.

Part VI: International Collective Action

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