

ADAPTATION TO CLIMATE CHANGE: THE NEW CHALLENGE FOR DEVELOPMENT IN THE DEVELOPING WORLD

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Capacity development for policy makers: addressing climate change in key sectors

The United Nations Development Program (UNDP) "Capacity development for policy makers" project seeks to strengthen the national capacity of developing countries to develop policy options for addressing climate change across different sectors and economic activities, which could serve as inputs to negotiating positions under the United Nations Framework Convention on Climate Change (UNFCCC). The project will run in parallel with the "Bali Action Plan" process – the UNFCCC negotiations on long-term cooperative action on climate change set to conclude in December 2009 in Copenhagen at the fifteenth Conference of the Parties.

This paper is one of a series produced for the project that provides in-depth information on the four thematic building blocks of the Bali Action Plan – mitigation, adaptation, technology and finance – as well as on land-use, land-use change and forestry. The project materials also include executive summaries for policymakers, background briefing documents and workshop presentations. These materials will be used for national awareness-raising workshops in the participating countries.

Disclaimer

The views expressed in this publication are those of the author(s) and do not necessarily represent those of the United Nations, including UNDP, or their Member States.

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Acronyms

AAUs	Assigned Amount Units	MDGs	Millennium Development Goals
ADB	Asia Development Bank	NAPAs	National Adaptation Programs of Action
AfDB	African Development Bank	NGO	Non-Governmental Organization
ALM	Adaptation Learning Mechanism	NWP	Nairobi Work Programme
Annex I	Annex to the Convention listing industrialized and transitioning countries	ODA	Overseas Development Assistance
Annex II	Annex to the Convention, listing mostly OECD countries, with additional commitments to assist developing countries with funding and technology transfer	REDD	Reducing Emissions from Deforestation and Forest Degradation
AOSIS	Alliance of Small Island States	SBI	Subsidiary Body for Implementation
APF	Adaptation Policy Framework	SBSTA	Subsidiary Body for Scientific and Technological Advice
AR4	Fourth Assessment Report (of the IPCC, see below)	SCCF	Special Climate Change Fund
AWG-LCA	Ad hoc Working Group on Long-Term Cooperative Action under the Convention	SIDS	Small Island Developing States
BAP	Bali Action Plan	SNC	Second National Communication
CBA	Cost Benefit Analysis	SPA	Strategic Priority for Adaptation
CDM	Clean Development Mechanism	UKCIP	UK Climate Impacts Programme
CEA	Cost Effectiveness Analysis	UNDP	United Nations Development Programme
CEC	Commission of the European Countries	UNGA	United Nations General Assembly
CGE	Consultative Group of Experts on National Communications from Parties not included in Annex I	UNFCCC	United Nations Framework Convention on Climate Change (the Convention)
COP	Conference of Parties (to the UNFCCC)		
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol		
CRMA	Climate Risk Management and Adaptation		
DEFRA	Department of Environment, Food and Rural Affairs of the UK		
EC	European Commission		
EGTT	Expert Group on Technology Transfer		
ETF	Environmental Transformation Fund		
EU	European Union		
FDI	Foreign direct investment		
GDP	Gross domestic product		
GEF	Global Environment Facility		
GIS	Geographic Information System		
HDR	Human Development Report		
IATAL	International Air Travel Adaptation Levy		
ICAO	International Civil Aviation Organisation		
IPCC	Intergovernmental Panel on Climate Change		
LDC	Least Developed Countries		
LDCF	Least Developed Countries Fund		
LEG	Least Developed Countries Expert Group		
MCA	Multi-Criteria Analysis		
MDBs	Multilateral Development Banks		

1 INTRODUCTION

The global climate is changing: the impacts associated with the accumulation of greenhouse gases in the atmosphere from human activities—changes in mean temperature, shifts in seasons and an increasing intensity of extreme weather events—are already occurring and will worsen in the future. Millions of people, particularly those in developing countries, face shortages of water and food and greater risks to health. Adaptation measures that reduce vulnerability to climate change are critical, especially in many countries where the risks are here and now.

The Intergovernmental Panel on Climate Change (IPCC) predicts serious effects of climate change across sectors and scales. By 2020, up to 250 million people in Africa could be exposed to greater risk of water stress. Other impacts include an increased risk of floods as glaciers retreat, sea level rise inundating coasts worldwide and completely inundating some small island States, and an increased severity and frequency of tropical cyclones (IPCC 2007). In 2007, the IPCC concluded that the unavoidable impacts and changes resulting from climate change will go beyond current coping capacity, and society and ecosystems will have to implement adaptation measures.

The approximate costs of adaptation are high by all estimates. The UN Climate Change secretariat has estimated that by 2030 developing countries will require \$28–67 billion to enable adaptation to climate change.¹ This corresponds to 0.2–0.8% of global investment flows, or just 0.06–0.21% of projected global GDP in 2030. Incremental costs to adapt to projected climate change in developing countries are likely to be of the order of \$10–40 billion per year (World Bank 2006). In addition, the Stern Review on the Economics of Climate Change estimates that if no action is taken to mitigate climate change, overall damage costs will be equivalent to losing at least 5% of global GDP each year, with higher losses in most developing countries (Stern, 2007). Current global funding for adaptation is a fraction of the amount needed.

Adaptation to climate change is a complex and multi-faceted topic that presents a number of challenges, particularly for the developing world. Climate

change impacts are already affecting developing countries, particularly the poor and most vulnerable, because they have fewer social, technological and financial resources for adaptation. Climate change also affects the sustainable development of countries, as well as their abilities to achieve the United Nations Millennium Development Goals (MDG) by 2015. The 2007/8 Human Development Report (HDR) warned that the achievements of a number of MDG targets, most notably in poverty reduction, will be compromised by five climate change-induced human development tipping points: reductions in agricultural productivity; heightened water insecurity; exposure to extreme events; collapse of ecosystems; and increased health risks (UNDP HDR, 2007).

Successful adaptation strategies require action at different levels: community, national, regional and/or international. There is growing scientific, economic, political and social consensus that these adaptation measures will require long-term thinking and explicit consideration of climate change risks at the regional (cross-national), national, sub-national, and local levels. They require a combination of many components, such as an assessment of vulnerabilities to climate change, appropriate technologies, capacity assessment, local coping practices and government actions.

The many aspects of adaptation cannot be addressed in a single document. This paper will therefore limit its scope to the key aspects of these issues and provide policymakers with a starting point, including background information and questions for further reflection.

The paper focuses on:

- The contours of the adaptation issue, as well as its relationship to other important issues;
- The consideration of adaptation within the current international negotiations under the United Nations Framework Convention on Climate Change (UNFCCC), including the issues relating to adaptation finance;
- The challenge of approaching adaptation at every level in a country: community, local, regional, sectoral and national.

Issues relating to finance are crucial for addressing adaptation and this paper highlights many of the fundamental aspects. A fuller discussion of issues relating to adaptation financing is available in a separate paper produced for this series.²

¹ <http://unfccc.int/4053.php>.

² See the paper by Erik Haites in this series titled, *Negotiations on additional investment and financial flows to address climate change in developing countries*.

2. WHAT IS ADAPTATION?

Adaptation to climate change is a complex topic that presents a number of challenges. Indeed, one important challenge lies in defining adaptation and understanding the full scope of its implications. Adaptation is currently the topic of numerous studies that offer a range of definitions. The IPCC offers a starting point by providing a broad definition of adaptation: adjustment in natural or human systems to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. However, adaptation is increasingly difficult to define in practical and operational terms. To aid in this effort, some key points can be identified to provide a helpful framework for understanding the complex nature of adaptation.

Adaptation involves a process of sustainable and permanent adjustment in response to new and changing environmental circumstances. Although humanity has constantly adapted to their surroundings, planned anticipatory adaptation has only recently emerged as a response to the impacts of anthropogenic climate change around the world. Policy makers have accepted that the world is facing a real and immediate threat and adapting to the change is necessary. Adaptation has been identified as an appropriate response because it is associated with supporting development processes and can facilitate the continuation and improvement of existing livelihoods.

Climate change will affect every aspect of society, environment and economy. This means adjusting behavior, livelihoods, infrastructure, laws and policies and institutions in response to experienced or expected climatic events. These adjustments can include increasing flexibility of institutions and management systems to deal with uncertain future changes, or they can be based on experienced impacts and threats and/or predicted changes. Planned adaptation requires careful thinking about how systems will function in the short, medium and long term.

An overview of climate change impacts and vulnerability is contained in Annex 1.

2.1 Adaptation and development

Adaptation is closely linked with development and this linkage is critical to reducing vulnerability to climate change. Economic growth is essential for developing countries to improve the health, economic livelihood and quality of life of their citizens. It is also essential to increase the capacity of developing countries to

adapt to the negative impacts of climate change. However, development in line with ‘business-as-usual’ is often not sufficient to adapt to climate change. Indeed, some dimensions of development can impede the adaptation process, focusing on growth at the cost of higher exposure and sensitivity to climate change. There is also a risk that development efforts will be misaligned with future changes in climate, leading to maladaptation, i.e., a process that initially looks like a response to a hazard but ultimately exacerbates vulnerability to the hazard.

All of the development objectives that fall under the MDGs influence how vulnerable any individual, group or society is to climate change. The IPCC agrees that “sustainable development can reduce vulnerability to climate change” (IPCC, 2007). At the same time, climate change is a direct threat to sustainable development. One of the pivotal issues underlying the growing popularity of adaptation is the belief that adaptation is fundamentally linked to sustainable development and must be part of the development and planning process.

Most development processes that are sustainable and equitable will also be able to bridge the “adaptation deficit” – i.e., the gap between the adaptation that is possible without additional policy or projects and the level that is needed to avoid adverse effects of climate change (Burton, 2004). The adaptation deficit describes the additional effort needed to manage the impacts of climate change in order to make up for the failures in managing existing climate variability, emphasising the massive scale of the gap. Indeed, this “deficit” is a central element drawing together adaptation and sustainable development. Adaptation measures are concerned with human development, because factors that constrain and facilitate adaptation are often the same factors that constrain or enable human development. While some survive under difficult conditions with current weather patterns, the addition of climate change impacts may push the system over a threshold into unviable existence.

Efforts to “mainstream” adaptation can be found in national development plans (as in Bangladesh and the Caribbean), development projects (by non-governmental organizations (NGOs) and institutes carrying out action research) and in aid agencies of countries such as Denmark, the UK, Germany and Norway. This work is in early stages, with few results on which to assess levels of success. Nevertheless, even in the most climate sensitive countries, numerous other priorities remain ranked above

climate change, coupled with a general lack of clarity on how to integrate it into planning.

Another aspect of mainstreaming adaptation into development relates to different approaches to adaptation across sectors, where one sector may take an approach that is inconsistent with the approach taken in another sector. For example, if energy managers decide to build new dams for hydropower, while the agriculture managers advocate expanded irrigation downstream, there could be inconsistencies and adverse consequences for the downstream farmers, whose water supply might become more unreliable.

Lastly, it is important to understand adaptation as a process and think carefully about how it is implemented. In particular, thinking about adaptation as a process explains why measures to adapt now may need to be adjusted in the future in response to changes, including environmental, social, political and financial. Framing adaptation in this way also explains why adaptation is not a tangible outcome that can be measured exhaustively at any given time, but an evolving objective.

2.2 Adaptation and disaster risk reduction

Frequently there are conceptual and practical linkages drawn between adaptation and disaster risk reduction. It may seem obvious that these two approaches function together as part of a repertoire of risk reduction techniques. **But on the ground, the two approaches are supported by entirely different sets of institutions, individuals, methodologies and policy frameworks.** Further discrepancies range from the intellectual development of the fields to implementation of risk reduction measures, resulting in policy inconsistency, redundant investment, and competing approaches to addressing the same problems, among other things.

Recently, dialogue between the disaster risk reduction and climate change adaptation communities has focused on creating stronger linkages, putting greater effort on learning more from each other, and collaborating conceptually and practically. In part, this common interest has come from a simultaneous recognition that risk reduction requires a far more holistic approach than has been previously been applied.

This convergence in efforts recognises that neither disaster risk reduction nor climate change adaptation is about disasters or climate change only, but rather about

all of the social, physical and economic factors that influence the magnitude of and are affected by the threat. Consequently, the cycle of disaster management has been expanded to incorporate lessons from disaster impacts into planning, placing more focus on making profound changes to reduce risk, rather than focus on reconstructing the same conditions as prior to a disaster, as is often the case when disaster management is limited to humanitarian relief efforts.

2.3 Adaptation and climate data

There are many challenges to planning successful adaptation. One of these is the need for information about impacts of climate change and their secondary effects. Climate variability and change add uncertainty to decision making, but the uncertainty in these phenomena add even more complexity to the planned adaptation process.

Uncertainty dominates all of the approaches aimed at understanding the potential impacts of climate. Attempts to overcome these uncertainties mean designing adaptation strategies that would be robust against a range of future climate outcomes. However, it is difficult to imagine an adaptation option that would address extended wetter and drier conditions simultaneously – these would likely need to be addressed by different strategies.

So-called ‘win-win’ or ‘no-regrets’ adaptation measures are those whose benefits outweigh their costs. These often address adaptation, while simultaneously meeting other needs. They are not in conflict with development objectives, nor do they lead to circumstances that will increase vulnerability to climate change in the short and medium term. These could potentially be designed without accurate climate information.

Climate data is not always necessary to warrant adaptation actions. For example, if model projections for the future suggest that an already observed trend will continue, detailed climate data will not be necessary to justify adaptation measures. It is important to recognise that in such cases, lack of climate data should not inhibit action.

2.4 Adaptation and finance

Adaptation will require substantial funding. As noted earlier, all indicative estimates available suggest that the costs of adapting to climate change in the developing world are in the order of tens of billions. However, there

are many difficulties and limitations in estimating the exact costs of adapting under various scenarios, as well as the ability of countries to self-finance adaptation. These include:

- (1) **Differences in adaptive capacity:** Adaptive capacity is a key limitation in estimating the costs of adaptation. Adaptive capacity is essentially the ability to adapt to stresses such as climate change. It does not predict what adaptations will happen, but gives an indication of the differing capacities of societies to adapt on their own to climate change or other stresses.
- (2) **Most adaptation measures need not be implemented solely for the purpose of adapting to climate change:** Most activities that need to be undertaken to adapt to climate change will have benefits even if the climate does not change. For example, improvements in the management of ecosystems to reduce stresses on them or water conservation measures can typically be justified without considering climate change. Climate change provides an additional reason for making such changes because benefits of the adaptations are larger when climate change is considered. Indeed, the need for these adaptations may not depend on specific greenhouse gas concentration levels and thus climate change associated with scenarios. It may well be justified to introduce water use efficiency or reduce harm to coral reefs no matter what scenario is assumed.
- (3) **The uncertainties associated with any readily available methods to estimate adaptation costs:** Most all methods for estimating adaptation costs contain a number of uncertainties. For example, the existing information for using a complete “bottom-up approach”, which involves estimating costs of specific adaptations across the world, is far from being comprehensive and complete. For other methods, uncertainties can arise because the assumptions that must be made can result in quite different estimates of magnitudes.
- (4) **The existence of an adaptation deficit:** In many places, property design and activities are insufficient-

ly adapted to current climate, including its variability and extremes. Evidence for the existence and size of the adaptation deficit can be seen in the mounting losses from extreme weather events such as floods, droughts, tropical cyclones and other storms. These losses have been mounting at a rapid rate over the last 50 years. This widespread failure to build enough weather resistance into existing and expanding human settlements is the main reason for the adaptation deficit. This topic is also considered in section 2.1 of this paper.

Beyond the difficulties in estimating the global cost of adaptation to climate change, other areas of uncertainty or lack of clarity also influence the level of financing available. For example, the absence of a universally accepted operational definition of adaptation could affect the level of financing to be expected in the light of the commitments under the UNFCCC. Questions also arise with regard to how adaptation finance should be delivered and how its effectiveness can be tracked.

In addition, questions arise with regard to how different costs will be covered under different development scenarios. While mainstreaming adaptation measures into a sustainable development policy scenario would cover some of the expected costs, some costs for adaptation may arise from measures that address adaptation alone.

Despite these difficulties and uncertainties, one fact remains clear: the amounts needed to adapt to climate change will be considerable and far exceed what is currently available through existing UNFCCC funds and other sources. There are a number of different proposals that have been recently submitted to the UNFCCC negotiating process or have been discussed in other related forums that focus on ways to increase the level of funding for adaptation. For further information on these proposals, see a separate paper on adaptation funding produced for this series.³

Questions:

- What are the key development priorities in your country; for which would adaptation be necessary? What would be the first steps to integrate adaptation into such priorities?

- In what sectors would you see possible “win-win” options that could promote adaptation while benefiting other national priorities through the same activities?
- What do you think are the key data limitations to assess vulnerability and identify adaptation options in your country?
- Are you involved in, or aware of, the Hyogo Framework for Action for building resilience to disasters?⁴ Does your country have a coordinated strategy regarding climate change and disaster risk reduction?
- What has been the experience of your country in developing and considering the funding needed for projects? What, in your view, are the important elements to consider?

³ See the paper by Erik Haites in this series titled, *Negotiations on additional investment and financial flows to address climate change in developing countries*.

⁴ Disaster risk reduction efforts are guided by the Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters to which 168 Governments agreed in Hyogo, Kobe, Japan, in 2005. The Framework aims for “the substantial reduction of disaster losses, in lives and in the social, economic and environmental assets of communities and countries.” As part of its text, governments agreed to integrate climate change adaptation and disaster risk reduction.

3. ADAPTATION IN THE UN CLIMATE NEGOTIATIONS

The UNFCCC, also referred to as the Convention, provides the basis for international action to mitigate climate change and to adapt to its impacts. The UNFCCC entered into force in 1994 and now has 191 Parties (member countries). It commits these Parties to: launch national strategies for adapting to expected impacts including the provision of financial and technological support to developing countries by developed countries and to cooperate in preparing for adaptation to the impacts of climate change. It also refers to adaptation in several of its articles.

In addition, the supreme body of the Convention, the Conference of the Parties (COP), has made several decisions over the years pertaining to adaptation. These decisions relate to support and funding by developed country Parties to assist developing countries with impact, vulnerability and adaptation assessment; capacity-building, training, education and public awareness; implementing concrete adaptation activities; promoting technology transfer; and exchanging experience through regional workshops. Adaptation is also addressed by ongoing work relating to national communications, research and systematic observation, and guidance to the Global Environment Facility (GEF).

3.1 Milestones in the process

Although early on the focus of the UNFCCC was mainly on mitigation, adaptation is now recognized as an important component of any response to climate change. The IPCC Fourth Assessment Report (AR4) in 2007 made it clear that accumulated historical emissions have already “committed” the Earth to some level of warming and that the impacts of this warming are already being felt. Accordingly, efforts to understand how adaptive capacity might be enhanced and how adaptation is supported have increased exponentially in the last few years.

3.1.1 Initial discussions

When the UNFCCC was adopted at Rio in 1992, only the First Assessment Report of the IPCC had been completed and although the nature of the climate change problem was well defined, there were many uncertainties. While it was known that human activities had been substantially increasing the atmospheric concentration of greenhouse gases, all the consequent impacts were to be seen and addressed in the future. The focus of the Convention was on reducing emissions of greenhouse gases (in industrialized countries), with the aim of reducing the cause of the problem so its effects could be minimized and easily managed. Capacity to adapt was considered to be inherent in ecosystems and society, therefore not requiring explicit policy.⁵ Furthermore, adaptation was seen at the time as a defeatist recourse that reflected a failure to meet the mitigation challenge.

UNFCCC Parties, at the first session of the Conference of the Parties (COP 1) in 1995, agreed to create an ad hoc group⁶ to address mitigation and negotiate what ultimately became the Kyoto Protocol. Adaptation was considered to be a lower and longer-term priority and early discussions on the topic took place in the context of the negotiations on guidance to the financial mechanism of the Convention and the negotiations on guidelines and support for preparing national communications.⁷

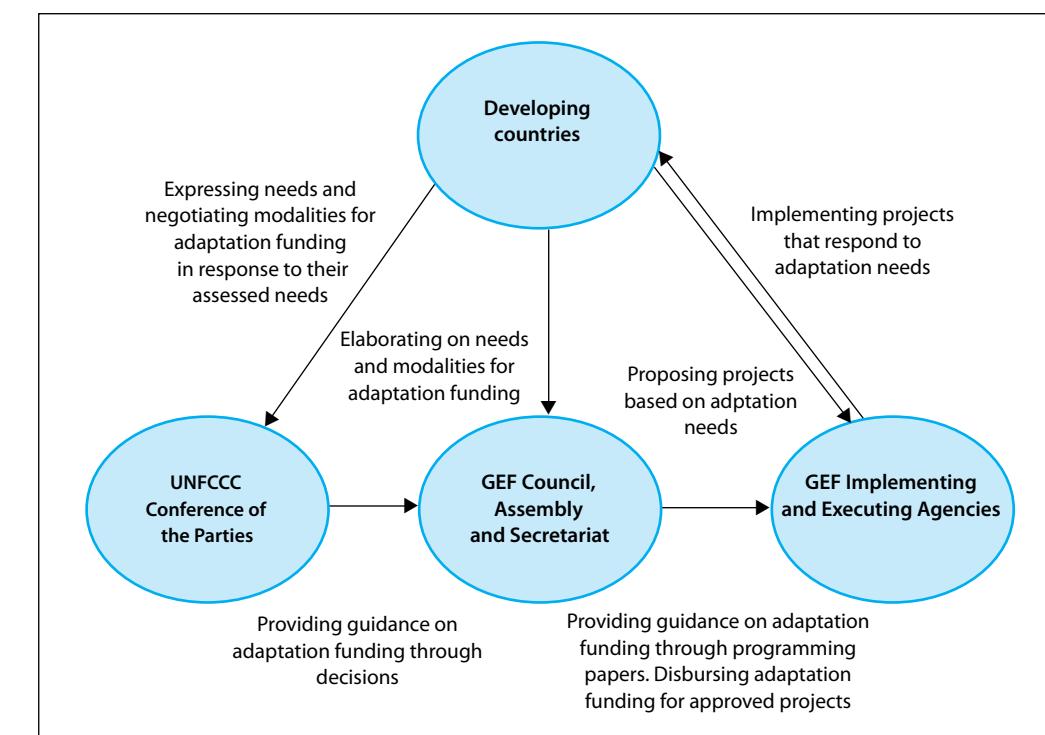
The UNFCCC commits developed countries to assist developing countries in meeting costs of adaptation to the adverse effects of climate change. This assistance is operationalized primarily through the financial mechanism of the Convention, which is currently operated by the GEF, subject to review every four years. The financial mechanism is guided by, and accountable to, the COP, which decides on its climate change policies, program priorities and eligibility criteria for funding, which is normally adopted based on advice from the Convention’s Subsidiary Body for Implementation (SBI).

Since the initial phases of the Convention, it was recognized that developing countries needed financial and technical support to assess their vulnerabilities to impacts of climate change and develop plans to adapt to these impacts during the preparation of their national communications. Parties agreed that adaptation should be implemented in the context of short, medium and long-term strategies, and set up a three-stage approach to adaptation funding in developing countries:

- Stage I and II encompass planning, vulnerability assessments, developing policy options and capacity building for adaptation; and,
- Stage III envisions actual measures to facilitate adequate adaptation.

The COP requested the GEF to provide full-cost funding for adaptation activities in the context of formulating national communications. See Figure 1 for information on the development of financial instruments for adaptation under the UNFCCC and the GEF.

Figure 1: Development of financial instruments for adaptation under the UNFCCC and the GEF



Source: Adapted from Möhner and Klein (2007).

⁵ UNGA: Paragraph 14.

⁶ This group subsequently became known as the Ad Hoc Group on the Berlin Mandate.

⁷ Parties to the Convention must submit national reports on implementation. The required contents of national communications and the timetable for submission are different for Annex I Parties (developed countries) and non-Annex I Parties (developing countries). This reference pertains to discussions on non-Annex I national communications.

3.1.2 COP 7 (2001)

At COP 7 in 2001, Parties made major strides forward on the issue of adaptation.

The COP adopted a decision dedicated to the issue of adaptation (decision 5/CP.7), which identified 14 adaptation-related activities needing support and further work. These included: enhancing technical training for integrated climate change impact, vulnerability and adaptation assessments; promoting the transfer of adaptation technologies; establishing adaptation pilot projects; and, supporting systematic observation and monitoring networks and early warning systems in developing countries.

In recognition of the special needs of the Least Developed Countries (LDCs), the COP adopted a work program to address the needs of LDCs (decisions 28/CP.7 and 29/CP.7). This work program, inter alia:

- Established a process for developing National Adaptation Programs of Action (NAPAs), through which LDCs identify the priority activities that respond to their urgent and immediate adaptation needs through a multi-stakeholder bottom-up assessment;
- Established the Least Developed Countries Expert Group (LEG) to provide advice to LDCs in preparing and implementing NAPAs.

The COP also created two special funds under the Convention to support adaptation, in order to enhance the support provided by the GEF trust fund⁸ (see Table 1):

- The Least Developed Countries Fund (LDCF) was established to support the above-mentioned work program, which currently assists the LDCs to carry out, inter alia, the preparation and implementation of NAPAs;
- The Special Climate Change Fund (SCCF) was established to finance projects relating to adaptation; technology transfer and capacity building; energy, transport, industry, agriculture, forestry and waste management; and economic diversification. This fund

should complement other funding mechanisms for the implementation of the Convention.

Parties also established the **Adaptation Fund**⁹ under the Kyoto Protocol to finance concrete adaptation projects and programs in developing countries that are Parties to the Kyoto Protocol. Unlike other funds in the Convention that rely mainly on donor contributions, this fund is to be financed with a 2% share of proceeds from clean development mechanism (CDM) project activities. However, it is also open to receiving contributions from other sources of funds. Because of its innovative means of funding, and because the Kyoto Protocol only entered into force in 2005, the Fund was only fully operationalized in 2007.

The Adaptation Fund has an innovative governance system, as it is managed by an “Adaptation Fund Board” which:

- Has government representation following UN regional distribution and a majority of developing countries;
- Is elected and directly accountable to the supreme body of the Kyoto Protocol, the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

The first two meetings of the Adaptation Fund Board were held in Bonn in March and June 2008. The members elected a chair and a vice-chair for 2008–2009. The Board agreed on: the role and responsibilities of the Adaptation Fund Secretariat,¹⁰ the 2008 work plan and budget, and draft legal arrangements for the Adaptation Fund Secretariat. The Board began, but did not complete, the rules of procedure of the Board, provisional operational policies and guidelines for Parties to access resources from the Fund, legal status of the Fund, monetization of CERs, the role and responsibilities of the Trustee, and the responsibilities of implementing and executing entities.¹¹ In summary, the Adaptation Fund is just becoming operational.

Further information on the Adaptation Fund, as well as other funds, is available in a separate paper produced for this series, *Negotiations on additional investment and financial flows to address climate change in developing countries*.

Table 1: Funding sources for adaptation under the Convention and Kyoto Protocol

FUNDS	CONVENTION/KYOTO PROTOCOL MANDATES	GOVERNANCE	CURRENT LEVEL OF FUNDS
GEF Trust Fund strategic priority for adaptation (SPA)	FCCC Art. 11: Financial Mechanism of the Convention	GEF Council	\$50 million (GEF 4, 2007-2010)
Special Climate Change Fund (SCCF)	FCCC Art. 11: Financial Mechanism of the Convention	SCCF Council (under the GEF)	\$74 million (until March 2008)
Least Developed Countries Fund (LDCF)	FCCC Art. 11: Financial Mechanism of the Convention	LDCF Council (under the GEF)	\$173 million pledged (until March 2008)
Adaptation Fund	Kyoto Protocol Art. 12.8: Clean Development Mechanism	Adaptation Fund Board (directly elected by the CMP)	Depending on quantity and price of CERs (until 2012). \$80–300 million per year

3.1.3 UNFCCC expert groups contributing to adaptation

In addition to the LEG, two other constituted expert groups under the UNFCCC also contribute to adaptation (see Table 2):

Table 2: Expert groups relating to adaptation

EXPERT GROUP	MANDATES	STATUS	FURTHER INFORMATION
Least developed countries expert group (LEG)	Advise on the preparation and implementation strategy for NAPAs	Mandate extended in 2007 for three more years. COP will review progress at COP 16 (2010)	http://unfccc.int/2666.php
Expert Group on Technology Transfer (EGTT)	Enhance the implementation of Article 4.5 of the Convention; Advance technology transfer activities under the Convention; Make recommendations to the SBSTA and the SBI	Mandate renewed in 2007 for additional 5 years. A work plan was prepared and agreed in June 2008	http://unfccc.int/1126.php
Consultative Group of Experts on National Communications from Parties not included in Annex I (CGE)	New mandate: Improve the process of the preparation of the second and subsequent national communications by providing technical advice and support	On hold – the mandate of this expert group has not been renewed since COP 13 in 2007. Its status is under negotiation	http://unfccc.int/2608.php

⁸ Information regarding the financial mechanism of the Convention, the LDCF, the SCCF and the Adaptation Fund can also be found at: <http://unfccc.int/2807.php>.

⁹ For more information on this fund please refer to: http://unfccc.int/cooperation_and_support/financial_mechanism/items/3659.php and to: <http://www.adaptation-fund.org/home.html>.

¹⁰ With the exception of one bracketed paragraph.

¹¹ Adaptation Fund Board, 2008.

- **The Consultative Group of Experts on National Communications from non-Annex I Parties (CGE)**, established at COP 5, offers technical advice and support in the area of tools, methodologies and process for vulnerability and adaptation assessments in the context of national communications; and
- **The Expert Group on Technology Transfer (EGTT)**, established at COP 7, provides an interface between planning and implementation through guidance on sources of funding and support for pilot projects in the area of the development and transfer of environmentally sound technologies for adaptation.

3.1.4 COP 10 (2004), COP 11 (2005) and COP 12 (2006)

By COP 10, Parties recognized that adaptation should be considered on a par with mitigation. By its decision 1/CP.10 (known as the Buenos Aires Programme of Work on Adaptation and Response Measures), the COP established two complementary tracks for adaptation:

- The development of a structured program of work on the scientific, technical and socio-economic aspects of vulnerability and adaptation known as the **Nairobi Work Programme on impacts, vulnerability and adaptation to climate change (NWP)**; and,
- The adoption of concrete implementation measures for furthering information and methodologies, concrete adaptation activities, technology transfer and capacity-building.

The NWP, launched in 2005, has a twofold objective:

- To assist countries, in particular developing countries, including the LDCs and small island developing States (SIDS), to improve their understanding and assessment of impacts, vulnerability and adaptation; and,
- To assist countries to make informed decisions on practical adaptation actions and measures to respond to climate change on a sound scientific, technical and socio-economic basis, taking into account current and future climate change and variability.

Initial activities were defined for the first two years. Three regional workshops and one expert meeting for SIDS were organized before COP 13 to facilitate the exchange of information and integrated assessments to assist in identifying specific adaptation needs and concerns.¹² In the first phase, these activities have enhanced capacity at international, regional, sectoral and local levels to understand and implement practical effective and high priority adaptation actions.

At the twenty-eighth session of the Convention's Subsidiary Body for Scientific and Technological Advice (SBSTA) in June 2008, Parties agreed to activities for the second phase of the NWP, to be implemented in the period leading up to the end of 2010. The program is an international framework implemented by Parties, intergovernmental organizations (IGOs), NGOs, the private sector, communities and other stakeholders. It is structured around nine areas of work, each vital to increasing the ability of countries to adapt and consistent with the action-orientated sub-themes of decision 2/CP.11.¹³

A comprehensive list of articles and decisions related to adaptation under the UNFCCC and the Kyoto Protocol is presented in Annex 2.

3.1.5 COP 13 (2007) and the Bali Action Plan

At its most recent session in Bali (COP 13), the COP adopted a decision entitled the Bali Action Plan that charts the course for a new negotiating process designed to tackle climate change, with the aim of completing this process by 2009. It also identified the need for enhanced action on adaptation. In particular, the Bali Action Plan process will address the issue of enhanced action on the provision of financial resources, investment and technology to support action on adaptation.

To conduct the process, a subsidiary body under the Convention was established called the Ad Hoc Working Group on Long-term Cooperative Action under the Convention (AWG-LCA). The AWG-LCA met for the

first time in Bangkok in April 2008. Parties agreed on a work program that structures the two-year negotiations on a long-term agreement. Given the strong interlinkages between the issues, they also agreed to discuss all five main elements – adaptation, mitigation, technology, finance and a shared vision for long-term cooperative action – in conjunction at each of the sessions in 2008. In addition, each session will address specific subjects under these elements.

At the second meeting of the AWG-LCA in June 2008, adaptation was considered at an in-session workshop on "advancing adaptation through finance and technology". As an outcome of these discussions, issues were identified under four clusters of adaptation categories that could serve as future tracks of discussion:

- National Planning for Adaptation;
- Streamlining and scaling up financial and technological support;
- Enhancing knowledge sharing; and
- Institutional frameworks for adaptation.

At the fourth AWG-LCA meeting, which will be held in Poznan in conjunction with COP 14, a special workshop will be dedicated to risk management and risk reduction strategies, including risk sharing and mechanisms such as insurance.

3.2 Negotiations on adaptation: the contours of the debate

Recognition of the need for all countries to take action on adaptation has grown over time, as the impacts of climate change have become increasingly evident. The international effort to date has delivered considerable information, resources and capacity building. However, progress on adaptation has also suffered from some of the ambiguities in the regime itself. Adaptation is not defined explicitly in the Convention, but is referenced only in the overall context of climate change.

How adaptation is defined in operational terms will ultimately have significant political and financial implications. It could affect level of financing to be expected in the light of the commitments under the Convention.

Much of the international negotiations to date on adaptation have therefore focused on finance and there has been lack of agreement on how it should be addressed (*see Box 1 next page*).

While all countries recognize that developed countries should fulfil their commitments under the Convention and provide finance, technology and capacity building support to developing countries, progress on these issues has been slow and unsatisfactory for many developing countries. Many have expressed frustration at the slow progress on the funding mechanisms. Indeed, it took about three years for funds (the SCCF, LDCF) to be made operational following their establishment in Marrakesh in 2001. Many of their concerns regarding finance to adaptation relate to:

- The relatively small amount of funds currently available to address adaptation under the Convention and, if the current replenishment trend continues, that these would not sufficiently address their needs;
- The experiences of developing countries in accessing and receiving support through existing funds, owing both to the complex design of the funds and to problems of implementation of the guidance;
- The recognition that additional financial flows will be needed to cope with adaptation needs (see also Stern (2008) and UNFCCC (2007)).

¹² Further information on these workshops can be found on the UNFCCC web site at: <http://unfccc.int/3582.php>.

¹³ The areas are: methods and tools; data and observations; climate modelling, scenarios and downscaling; climate related risks and extreme events; socio-economic information; adaptation planning and practices; research technologies for adaptation; and economic diversification. For detailed information on the NWP, see: <http://unfccc.int/3633.php>, http://www.wmo.ch/pages/prog/wcp/cca/documents/nwp_en_070523.pdf and http://unfccc.int/files/adaptation/sbsta_agenda_item_adaptation/application/pdf/ids_pledge_10dec.pdf.

Box 1: Overview of developed and developing country positions and views on adaptation

This list provides a general overview of positions and views on the issue of adaptation. There are variations and differences among the countries and groups of countries.

Common concerns

- The need for a methodological shift from climate change impacts studies to increased understanding of how to make adaptation happen
- How to examine adaptation needs and identify priorities
- The relative roles of adaptation and mitigation actions
- The lack of clarity on the relationship between climate change adaptation measures and the mainstream of development, particularly in relation to financial assistance
- What institutions and funding mechanisms are used for delivery at international and national level

Developed countries

- The need to meet obligations and provide financial assistance to cover costs of impacts caused by historically accumulated greenhouse gas stocks is generally accepted
- Issues relating to potential climate change impacts have been raised during discussions on support for in-country studies and on engaging developing countries more directly on mitigation
- The financial mechanism should deliver effectively for their taxpayers
- Overseas Development Assistance (ODA) should integrate climate change into its activities
- There should be no proliferation of new funds under the Convention
- There should be minimum conditions for accessing funding

Developing countries

- Equity and justice issues about damage of climate change to vulnerable countries due to emissions from "rich" developed countries are a primary concern
- Developed countries must deliver on their obligations under the Convention on finance, technology and capacity building
- Funding for adaptation should cover the additional costs of climate change and existing ODA commitments should not be diverted (also, no new conditionalities should be added to ODA)
- Governance of financial mechanisms should transparent, include an equitable and balanced representation by all Parties, and operate under the authority of the CMP. It should provide "direct access" to funding and ensure that recipient countries are involved during all stages. "Predictable" sources of funding are needed, not just more funding
- Support should be provided through the UNFCCC instruments rather than through fragmented efforts outside these instruments
- New institutional arrangements should be created, such as an adaptation committee or an expert body like the one covering technology transfer (EGTT) within the Convention

In addition to the levels of funding, part of the debate on adaptation finance has focused on how it should be delivered and how its effectiveness can be tracked.

The need for concerted international action on adaptation continues to receive increased attention under the UNFCCC process. The sense of urgency is particularly true for developing countries, as demonstrated at the UNFCCC meetings in June 2008, where nine different developing countries made presentations on adaptation on behalf of themselves or regional groups (AOSIS, LDCs).

Questions

- What were the key messages of your country's delegation or Minister at COP 13 in Bali (2007)?
- What is your country's negotiating position on adaptation? Does it need changes?
- What is the position on adaptation of the regional group/constituency to which your country belongs? Do you agree with this position?
- Has your country been represented or involved in any expert groups under the Convention?
- Has your country participated in regional workshops regarding implementation of adaptation measures and/or workshops relating to the Nairobi Work Programme?
- What has been the experience of your country in receiving support from the financial mechanism for adaptation?
- What is your country's position on the guidance to the financial mechanism and/or the Adaptation Fund? What should be emphasized? What arguments could you advance to enable your country to obtain urgent funding assistance on adaptation?
- Are you aware of the guidelines for preparation of national communications with regard to vulnerability assessment and selection of adaptation options for your country? Have you been involved in preparing the national communication of your country?
- How can the Nairobi Work Programme and work being developed by experts groups under the Convention be used to support adaptation in your country?
- What adaptation-related issues do you think should be further emphasized in a future climate change regime?

4. THE ADAPTATION CHALLENGE AT THE NATIONAL LEVEL

4.1 Approaching adaptation at national level

Adapting to climate change requires adjustments at every level in a country: community, local, regional, sectoral and national. Even though the choice of adaptation interventions depends on national circumstances and internal and priorities, it should be framed by, and influence, international negotiations and efforts.

Governmental institutions (ministries, regional governments and agencies), private entities and NGOs, must consider integrating climate change in their planning and budgeting in all levels of decision making, and coordinate their actions among themselves. At a local level, communities can build their resilience by adopting appropriate technologies, making the best use of traditional knowledge and diversifying their livelihoods to deal with climate threats.

Adaptation cannot be treated as a stand-alone issue, since climate change impacts will hinder almost all efforts of development. Synergies among the multiple objectives of sustainable development, poverty reduction, disaster risk reduction and adaptation policies are essential. Local strategies also need to be implemented in synergy

Box 2: Examples of adaptation measures

Sectoral adaptation measures look at actions for individual sectors that could be affected by climate change. For example, in agriculture, reduced rainfall and higher evaporation may call for the extension of irrigation; and for coastal zones, sea level rise may necessitate improved coastal protection such as reforestation. Often adaptation measures in one sector will involve a strengthening of the policy that already exists, emphasizing the importance of including long term climate change considerations along with existing local coping mechanisms and integrating them into national development plans.

Multi-sectoral adaptation options relate to the management of natural resources that span sectors, for example, integrated management of water, river basins or coastal zones.

Cross-sectoral measures also span several sectors and can include: improvements to systematic observation and communication systems; science, research and development and technological innovations such as the development of drought-resistant crop varieties or new technologies to combat saltwater intrusion; education and training to help build capacity among stakeholders; public awareness campaigns to improve stakeholder and public understanding on climate change and adaptation; strengthening or making changes in the fiscal sector such as new insurance options; and risk/disaster management measures such as emergency plans.

Source: Climate change: impacts, vulnerabilities and adaptation in developing countries. UNFCCC, 2007

with national government interventions. The design of adaptation plans and strategies is then crucial.

Climate change impacts do not happen in isolation. Sectors can be affected directly or indirectly by climate change and a change in one sector can offset the effects of climate change in another sector. Adaptation to climate change is essentially a cross-cutting issue and therefore should not be considered on a purely sectoral basis, but in a multi-sectoral and cross-sectoral way. As a first step, however, the simpler way is to analyze vulnerability and adaptation options at a national level, by sector, and then link it to other related issues (i.e., development, poverty and risk reduction). Another approach, which is particularly useful for community-level assessments, is to analyze vulnerability and adaptation options by hazard. However, one single community is sometimes threatened by more than one hazard, so a multi-hazard analysis may be needed.

Adaptation will also require the capacity for both short- and long-term planning. Strategies will be needed to address long-term climate change impacts, such as those predicted by the IPCC. At the same time, strategies for shorter-term adjustments may also be necessary, such as those prepare for shorter-term climate variability.

Regardless the area, sector or institution, some basic issues need to be considered in order to effectively implement adaptation. A description of these issues is presented below.

4.2 Take stock of the progress made in your country

As a party to the UNFCCC and the Kyoto Protocol, it is very likely that some adaptation efforts are already being implemented in your country with the support in most cases of international cooperation. Most developing countries that are a Party to the UNFCCC have already developed their first national communication and, in case of an LDC, a NAPA. Some of them are already developing their second national communication (SNC), which, according to the UNFCCC guidelines,¹⁴ will have some information about measures to facilitate adequate adaptation to climate change. Some of this information could include:

- Human systems, sectors and/or areas that are vulnerable (or most critical) to climate change;
- Main limitations of the vulnerability and adaptation assessments, i.e., methodological, technical, institutional and financial limitations;
- Vulnerabilities to current climate variability and future climate changes;
- Difficulties or barriers to adaptation in critical areas or sectors; and
- Opportunities and priorities for adaptation to climate change.

Some countries have developed or are also developing adaptation projects financed by sources such as the SPA, the SCCF and other bilateral and multilateral cooperation activities.¹⁵ The UNFCCC or GEF National Focal Points¹⁶ are also a source of information on projects.

Once this basic information is in your hands, you should identify the key sectors or areas in your country, and who the main players are or should be. A workshop could be organized in order to have an exchange of

experiences, information and perceptions about the importance of climate change adaptation. The workshop should be oriented towards collecting the following information:

- What sectors or areas are most vulnerable to climate change?;
- Who are the key actors and what are they doing regarding adaptation?;
- What has been done and which needs have been already identified?;
- What is being currently implemented? Are there synergies related to what could be done in your sector/area?;
- What needs to be done to further facilitate adaptation in your sector/area?

4.3 Identify adaptation options, set priorities, do adaptation planning and introduce it as part of your national policy framework and planning.

Adaptation will need a variety of responses and extensive resources to prevent future damage. It will also need to balance tradeoffs with sustainable development and poverty reduction efforts, as well as disaster risk reduction. A cost benefit analysis of different adaptation measures responding to different threats, among other criteria, should be applied in order to decide which policies and measures to implement or modify.

Unquestionably, poverty, access to resources, health and education and all of the other development objectives that fall under the MDGs influence how vulnerable any individual is to climate change. The following issues should therefore be considered in order to establish adaptation priorities:

- What is the vulnerability to climate change of national planning instruments and processes? Is compliance of national development objectives in jeopardy due to climate change? How should strategies and plans be realigned to deal with potential climate change impacts?;

¹⁴ Decision 17/CP.8 and decision 8/CP.11 refer specifically to SNCs. See http://unfccc.int/national_reports/non-annex_i_natcom/items/2816.php. See also "Reporting on climate change. User manual for the guidelines on national communications from non-Annex I Parties", (UNFCCC 2003).

¹⁵ See Funding for adaptation at <http://unfccc.int/2807.php>.

¹⁶ See <http://maindb.unfccc.int/public/nfp.pl>.

- Do national, regional, sectoral and/or local policy frameworks identify climate change as a threat? What policy changes should be made to cope with the current and expected impacts of climate change?

What are the steps for assessing vulnerability, identifying and prioritizing adaptation options, formulating adaptation plans and introducing them into the national policy framework? The practical steps needed to carry out the main activities of the adaptation process may vary within each region, country and community. However, there are a number of structured frameworks that countries can use to guide the process.

The UNDP Adaptation Policy Framework (APF) and the guidelines such for the formulation of NAPAs can provide us with as a set of practical actions and steps to be taken in order to achieve adaptation. In addition, the UK Climate Impacts Programme (UKCIP) risk decision framework¹⁷ and the Australian government's adaptation guide for business and government¹⁸ both contain a step-wise description of the process, detailed guidance on how to perform each step and pointers to sources of information and data underpinning the relevant steps.

This paper will focus on the APF, which contains an important principle to be considered during the process: "the adaptation strategy and the process by which it is implemented are equally important". Adaptation should be seen as a learning process. In addition, stakeholder involvement is key to achieve mainstreaming of adaptation at different levels. One of the challenges that climate changes poses is the urgent need of designing and implementing coordinated activities among different stakeholders and levels (international, national, regional, local, communities).

1. Developing vulnerability and adaptation assessments for prioritizing adaptation policies and measures

Vulnerability and adaptation assessments are aimed at informing the development of policies that reduce the risks associated with climate change, based on tools that combine qualitative and quantitative data. They can range from simple approaches based on household survey data and in-depth interviews with stakeholders, to complex models requiring extensive data input. They are normally based on knowledge about the physical impacts of climate change, and seek to understand the social and economic dynamics of these impacts and the possible solutions. They can provide a good overview of where and how adaptation could be beneficial or necessary. Vulnerability and adaptation assessments should serve as a basis to prioritize adaptation measures and policies.

How much information do we really need? The APF identifies four key assessments that need to be carried out in order to identify adaptation options: vulnerability, current climate risks, future climate risks, and current and changing socio-economic conditions. Table 3 shows steps to be taken within these assessments:

Table 3: Assessments needed as a base to identify adaptation options

ASSESSING VULNERABILITY	ASSESSING CURRENT CLIMATE RISKS	ASSESSING FUTURE CLIMATE RISKS	ASSESSING CURRENT AND CHANGING SOCIO-ECONOMIC CONDITIONS
1. Structure the vulnerability assessment: determine and agree on definitions, frameworks and objectives 2. Identify vulnerable groups in terms of exposure and assessment boundaries 3. Assess sensitivity (current vulnerability of the selected system and vulnerable Group) and adaptive capacity. 4. Assess future vulnerability 5. Link vulnerability assessment outputs with adaptation policy	1. Build conceptual models 2. Characterize climate variability, extremes and hazards 3. Do an impact assessment (by qualitative quantitative methods) 4. Define risk assessment criteria 5. Assess current climate risks 6. Define the climate risk baseline	1. Select an approach 2. Gather information on future climate (IPCC Emission Scenarios and projected climate changes) 3. Conduct sensitivity experiments 4. Select planning and policy horizons 5. Construct climate scenarios 6. Conduct climate change risk assessments	1. Set up study boundaries 2. Develop and use indicators 3. Characterize socio-economic conditions today 4. Explore specific characteristics (demography, economy, use of natural resource, governance and policy, culture) 5. Characterize current adaptation measures 6. Characterize changing socio-economic conditions using storylines and projections of socio-economic changes

Source: Elaboration based on the Adaptation Policy Framework, Technical Papers, UNDP

If urgent and immediate adaptation is needed, a different approach – such as the one for NAPAs – could be used. NAPAs use existing information; no new research is needed. Such an approach focuses on enhancing adaptive capacity to climate variability, which helps address the adverse effects of climate change. Existing coping strategies at the grassroots level must be taken into account and built upon to identify priority activities, rather than focusing on scenario-based modelling to assess future vulnerability and long-term policy at state level. The steps under this approach include: synthesis of available information; participatory assessment of vulnerability to current climate variability and extreme events and areas where risks would increase due to climate change; and, identification of key adaptation measures. It is important to highlight, however, that this should only be a first step in the adaptation strategy, since climate change scenarios will continue to pose challenges to vulnerable countries.

2. Identifying adaptation options to deal with vulnerabilities and increase adaptive capacity, and setting priorities

The process of identifying adaptation options should make use of different sources: scientific and technical

information (i.e., IPCC, UNFCCC); countries experiences (through, i.e., the NWP); local expertise; coping strategies; and traditional knowledge.

Once all options have been identified, a prioritization exercise should be performed (first, in cabinet, then with stakeholder involvement). It will have to be used to determine what current and future problems to solve first (i.e., on a sectoral and/or territorial level) and what adaptation options to use to deal with them. Some examples of criteria are: the level of current and future vulnerability, the percentage of population and/or poor population that will be benefit; technical and institutional feasibility; alignment with national priorities; replicability potential; sustainability; cost benefit; cost effectiveness; and, barriers to overcome.

According to the APF, four main methods should be particularly useful to the prioritization process. These are:

- Cost Benefit Analysis (CBA);
- Cost Effectiveness Analysis (CEA);
- Multi-Criteria Analysis (MCA);
- Expert judgement.

Formal methods for prioritization can most easily be applied to project-type adaptation measures. In the case of

¹⁷ "Climate adaptation: Risk, uncertainty and decision-making", UK Climate Impacts Programme, UKCIP Technical Report, May 2003. See: http://www.ukcip.org.uk/images/stories/Pub_pdfs/Risk.pdf. An online version (adaptation wizard) is also available: http://www.ukcip.org.uk/index.php?option=com_content&task=view&id=147&Itemid=297.

¹⁸ "Climate Change Impacts & Risk Management: A Guide for Business and Government", Australian Greenhouse Office in the Department of the Environment and Heritage, 2006. See: <http://www.climatechange.gov.au/impacts/publications/pubs/risk-management.pdf>.

cross-sectoral measures, such as institutional capacity building and legislation, it may be necessary to employ informal, qualitative and subjective methods.

[3. Adaptation planning: formulating an adaptation strategy](#)

According to the APF, the adaptation strategy consists of a plan containing the measures selected for implementation, a time frame and modalities for implementation. The five different activities involved in formulating an adaptation strategy (see Figure 2) are:

- Synthesize assessments and studies;
- Design the adaptation strategy;
- Formulate adaptation options for policies and measures;
- Prioritize and select adaptation policies and measures;
- Formulate an adaptation strategy.

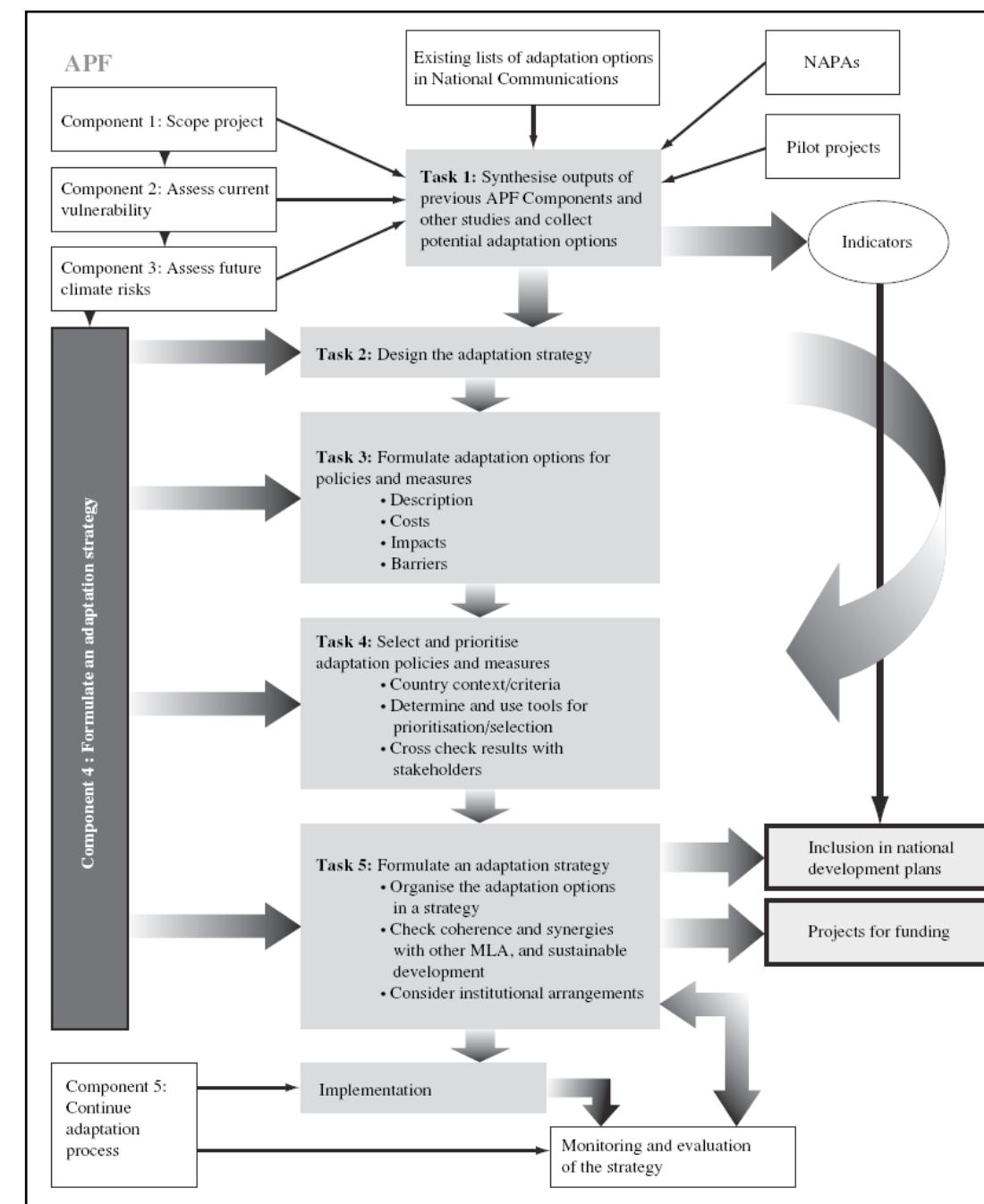
During this formulation and adoption process, it is important to include stakeholders at all levels (national to local) not only to gain public acceptance of the strategy, but also to include all traditional, local knowledge and priorities in the exercise. Also, it is important to establish and implement monitoring and evaluation mechanisms for the adaptation strategy.

[4. Introducing adaptation planning as a part of national policy framework and planning: mainstreaming adaptation into development](#)

Climate change adaptation will be cost effective if “mainstreamed” into the development processes. The APF provides basic steps for introducing adaptation planning as part of national policy framework and planning:

- Defining system boundaries and identifying entry points, this means being specific about the scale and type of intervention. Also, the entry point for the adaptation should be identified, a “top-down” approach could involve changes in policies and procedures at the strategic, programming and operational levels. For community-based actions, the entry points could be at the household level;
- Describing the socio-economic context and identifying opportunities;
- Analysing socio-economic barriers (such as legislation at national level or social institutions at a local level);
- Identifying partners and change agents.

Figure 2: Activities involved in formulating an adaptation strategy



Source: *Adaptation Policy Framework, Technical Paper 8: Formulating an Adaptation Strategy, UNDP*

National policies and instruments should be able to respond and anticipate the demands from local governments and communities, based on the studies and processes developed. A worthwhile exercise would be to identify whether national objectives are “vulnerable” to climate change and if so, what policies, objectives, measures and instruments should then developed or modified, and what processes and platforms should be put in place to go to its actual implementation at local levels.

One example of this is the need for an assessment of the way the national budget is allocated to poverty reduction programs. If regional vulnerability assessments to climate change are not developed, then the national budget would continue to be allocated in a traditional way, not taking into account that new threats need to be tackled to ensure sustainability of poverty investments, i.e., resources should not only be allocated to nutrition or water infrastructure;

Box 3: Adaptation options under the UNFCCC

- The Nairobi Work Programme provides information to help all countries improve their understanding and assessment of the impacts of climate change and to make informed decisions on practical adaptation actions and measures.
- The UNFCCC secretariat has developed a local coping strategies database to facilitate the transfer of long-standing coping strategies and knowledge from communities that have adapted to specific hazards or climatic conditions, to communities that may be starting to experience such conditions as a result of climate change.¹⁹
- The Adaptation Learning Mechanism (ALM), which is a knowledge sharing platform, contributes to the implementation of the Nairobi Work Programme, which aims to increase the ability of countries to adapt to climate change, with an emphasis on exchanging experience.²⁰
- Workshops covering adaptation issues have been held under different subsidiary bodies: During 2006-2007, a series of workshops and an expert meeting, mandated by decision 1/CP.10, helped facilitate information exchange and integrated assessments to assist Parties in identifying specific adaptation needs and concerns.
- The Ad Hoc Working on Long-term Cooperative Action under the Convention (AWG-LCA) also held a focused workshop on “advancing adaptation through finance and technology, including national adaptation programs of action”.
- The NAPAs provide an important way to prioritize urgent adaptation needs for LDCs. They are developed based on existing information and community-level input to identify adaptation projects required in order to enable these countries to cope with the immediate impacts of climate change.

but to economic diversification of agricultural communities (very vulnerable to climate change) that would make communities able to respond properly to climate change.

Another example is analyzing the Macroeconomic Framework Objectives, i.e., GDP growth. If it is not recognized that climate change poses new threats, then measures to prevent losses will not be prioritized, such as: implementing or strengthening hydrometeorological and ocean observation systems; developing climate change scenarios to guide investments and poverty strategies; implementing guidelines for climate proofing public investments; and, creating capacities in local governments to deal with the new challenges of climate change.

Box 3 provides information on a number of platforms and options under the UNFCCC that would be useful for the process.

4.4 Institutional arrangements needed to plan and implement adaptation: What roles should the different stakeholders have? How would you ensure public, private and social participation?

Due to the cross cutting nature of the issue, there is a need for stakeholder engagement in the development of adaptation plans or strategies. Climate change calls for wide participation, since structural changes and changes in paradigms are likely to be needed.

Table 4: Potential roles and responsibilities of stakeholders²¹

INSTITUTION	POTENTIAL ROLES AND RESPONSIBILITIES
National government and its ministries: economy and finance, agriculture, health, education, housing	Leadership regulation, introducing economic instruments and setting performance management frameworks. Appropriate policies, standards, regulations and design guidance, and where necessary, appropriate funding Guidance on climate proofing to justify additional investment or ensure sustainability of investments
Local governments	Many of the changes that need to be delivered in housing, transport and other issues will depend on local authorities. They bring together economic, social and environmental concerns and they have the potential to link their own actions with others through community strategies.
Private sector	There will be a variety of roles depending on the organization, its size and its purpose. However the key issues concerning climate adaptation that need to be considered by all include: <ul style="list-style-type: none"> • Awareness raising within the organization • Preparing for the loss and opportunities • Using the available tools to investigate the impacts • Contribute to sustainable investments and development gaps
Scientific and academic organizations	<ul style="list-style-type: none"> • Provide policy oriented research • Information for decision makers
Investment promotion agencies	<ul style="list-style-type: none"> • Ensure climate proof investments and promote investments to bridge development gaps
Poverty reduction agencies	<ul style="list-style-type: none"> • Address climate change impacts as part of their priority actions
Risk reduction community	<ul style="list-style-type: none"> • Address climate change impacts as part of the risk

A wide range of sectors will need to adapt and there are considerable implications for policy development, businesses and communities. The implementation of adaptation will be carried out mainly at a local level and by public and private sector stakeholders. It is then helpful to define how the roles and responsibilities are currently seen, taking into account that they will change over time as new policies develop or are adjusted (see Table 4). It is vital to ensure wide, continuous and coordinated participation from different stakeholders.

¹⁹ See <http://maindb.unfccc.int/public/adaptation>.

²⁰ For more information on the ALM, see: <http://www.adaptationlearning.net/>.

²¹ Based on “Adaptation Policy Framework”. The UK Department for Environment, Food and Rural Affairs (DEFRA), 2005.

4.5 The need to catalyze investments: the role of public and private entities

Adaptation has to be mainstreamed in investment planning, whether public or private. Feasibility studies need to include risk assessments that take into account climate change in order to promote the construction of infrastructure strong enough to cope with extreme climate variability and to face climate events such as El Niño. Besides preventing disasters, the development of community-infrastructure can also anticipate future stresses, i.e., it can help gather and store water to help reduce vulnerability and enhance the capacity to face droughts.

There is, therefore, a need to consider what governmental structure is needed to ensure that climate change is mainstreamed into development planning and poverty reduction plans. Would an inter-ministerial committee be useful to give national priority to adaptation and address its international dimension?

A large part of investments come from the private sector, and the amount of money that needs to flow in order to address adaptation strategies surpasses the capacities of governments. Governments therefore need to devise policies, incentives and regulation to turn private initiative toward strengthening adaptation. A combination of markets and public policy could refine risk sharing through: innovative insurance schemes and improved natural resource management; the creation of environmental markets and climate-proofing infrastructure; and, public-private partnerships.

Investment is required in various sectors, where funding from both public and private sources are needed.

- In infrastructure:** Developed countries have recognized that preventing disasters is less expensive than investing in reconstruction projects. Hence, it has become an important strategy to encourage governments to invest in infrastructure. Thus, when designing new buildings, climate change considerations should be taken into account to avoid inadequate housing conditions. The development of adequate infrastructure can be an efficient way of improving disaster risk management.

- In preventing water scarcity:** Irrigation systems need to be technified, and water must be recycled and re-used in houses, offices, cities, businesses and agricultural activities. Water also needs to be preserved.

This requires the improvement of water quality standards and the treatment of industrial grey-water before dumping to the sea, lakes and rivers. Moreover, Payment for Environmental Services schemes can be implemented in order to protect and preserve water in the upper watersheds, where reforestation projects could also be developed.

- In agriculture:** In countries where agriculture activities are crucial and producers are working in water-stressed rain fed environments, some investment has been made to develop water harvesting systems that enable the conservation of rainfall. Additionally, research on the generation of new crop varieties is in progress in some regions, which in turn promotes improved management practices, new irrigation systems and reduced fertilizer use. Hence, investment in technology transfer is also crucial for adaptation in agriculture.

The insurance sector has a vital role to play in adaptation, since its business requires that it evolve in order to cope with the new varieties of risks that climate change poses. Currently, insurance covers around 4% of losses in the world's poorest countries, mainly because the cost of insurance products is not affordable for poor people or is not designed for covering their needs. Insurance is mainly created to provide relief after losses occur. However, insurance type approaches or credit schemes could also be designed to motivate proactive risk or vulnerability reduction efforts. Innovative risk-sharing mechanisms are needed to respond to the new challenges posed by the adverse effects of climate change, including biodiversity loss and land degradation.

4.6 Determine resources needed to implement adaptation

Developing countries need international assistance and resources to support adaptation in the context of national planning for sustainable development, capacity-building, transfer of technology and finance. Systematic planning and capacity-building are also needed to reduce the risk of disasters and increase resilience of communities to more frequent and intense extreme climate events such as hurricanes, droughts and floods. As previously mentioned, existing estimates indicate that additional funding needed for adaptation for developing countries is around tens of billions of dollars annually. At a national level, however,

much needs to be done to determine how much is required for adaptation to climate change and where these resources should be allocated.

4.7 Technology: a means for adaptation

Different forms of technology will be often employed, whether "hard" forms, such as new irrigation systems, or "soft" technologies, such as insurance schemes. Or, they could use a combination of hard and soft, as with early warning systems that combine hard measuring devices with soft knowledge and skills that can raise awareness and stimulate appropriate action (see Box 4 for more information about adaptation technologies for coastal zones).

Many of these technologies are already available and

widely used. The global climate system has always confronted human societies with extreme weather events. Thus it should be possible to adapt to some extent by modifying or extending existing technologies.

Whatever the level of technology, its application is likely to be an iterative process. Although many of these technologies are already available and in place, they often need further investment to make them more effective. Such technology transfer has mostly been for purposes of mitigation, for the energy sector and has typically involved transferring ideas or equipment from developed to developing countries. Unlike mitigation, which is a relatively new approach, adaptation is generally the continuation of an ongoing process for which many of the technologies are already being applied even in some of the LDCs.

Box 4: Adaptation technology for coastal areas: protect, retreat, accommodate

Sea-level rise, floods and storms are a threat to coastal cities, with the consequent loss of crops, lands and impose damages to human settlements. Therefore, climate change poses a big challenge to developing countries that are located below sea level. Some developed countries face big challenges against the risk of abrupt sea-level rise and are already investing in the construction of appropriate infrastructure like dykes and dams. Many cities have expanded and moved to coastal areas, which means that currently there is more population exposed to the impacts of climate change. With climate change coastal areas will become more hazardous. Therefore, adaptation technologies that consider coastal areas are most necessary. There are three strategies for adaptation in this case: Protect, Retreat and Accommodate. Examples of each strategy are outlined in the table below.

More importantly, information is crucial. There is a need to gather information in order to acknowledge the current conditions of the coastal areas that can be done by satellite observation complemented by human experience in the areas. Also, Geographic Information Systems (GIS), which combine data coming from different sources and presents them as maps, can be very useful. GIS applied in coastal areas can show the zones that could be impacted by overlaying scenarios of sea level rise on land elevation.

PROTECT	RETREAT	ACCOMMODATE
<ul style="list-style-type: none"> • Hard Structures - dykes, sea-walls, tidal barriers, detached breakwaters • Soft Structures - dune or wetland restoration or creation, beach nourishment • Indigenous options walls of wood, stone or coconut leaf, afforestation 	<ul style="list-style-type: none"> • Establishing set-back zones • Relocating threatened buildings • Phasing out development in exposed areas • Creating upland buffers • Rolling easements 	<ul style="list-style-type: none"> • Early warning and evacuation systems • Hazard insurance • New agricultural practices, such as using salt-resistant crops • New building codes • Improved drainage • Desalination systems

Source: UNFCCC Technologies for Adaptation to Climate Change: 2006

Moreover, adaptation, rather than being concentrated in one sector, will essentially be dispersed across all socio-economic sectors including water, health, agriculture and infrastructure, each of which presents its own challenges, and will involve stakeholders in different if overlapping groups.

Adaptation measures are also likely to be less capital intensive and more amenable to small-scale interventions. They should therefore be more flexible and adaptable to local circumstances, which means that in addition to being socially and legally acceptable they can be made reasonably cost-effective. Policymakers need to ensure that new forms of adaptation do not heighten inequality but rather contribute to a reduction in poverty.

4.8 New and strengthened scientific and technical capabilities

Information and research is needed in order to take the right decisions. Nonetheless, most countries lack information. Climate change requires adequate information development and management. And for that, policy oriented research needs to be enhanced. New and strengthened scientific and technical capabilities (hardware, software, know how) will have to be put in place to face adaptation challenges. Some of the key ones are: systematic climate, hydrological and ocean observation systems; developing climate change scenarios and downscaling them to regional and local areas; performing policy relevant vulnerability and adaptation assessments.

Vulnerability and adaptation assessments should serve as a basis to prioritize adaptation measures and policies. Some of the challenges with vulnerability assessments however are related to the lack of underlying data to identify the impacts of climate change. Generally, a limited number of hydro-meteorological stations are available in developing countries, and data have in some cases only been collected recently. Mountainous countries have an additional challenge: their topography is such that very little can be said about averaged climate data for an area, since this will include peaks of several thousand metres above sea-level down to low valleys. This means that the strengthening of Systematic Observation systems need to be a priority at a national level and investments should be strengthened to this end. This would not only generate information for better short-term weather forecasts, but would help reduce uncertainties of Global

Circulation Models that are used to develop global climate scenarios that are downscaled to national and local scales for vulnerability assessments.

4.9 Supporting institutions for the implementation of adaptation

In addition to funds generated from the international level, in terms of implementing and funding adaptation, as well as establishing regional networks and executing adaptation projects, the work of global and regional development banks and other institutions is worth highlighting. Annex 3 provides more information resources on these and other initiatives.

4.10 Public awareness and participation

Global awareness of the risks posed by climate change is rising rapidly. Nonetheless, there is still much to do, especially in developing countries, where policy makers, policy takers, and the public in general still need to understand the importance of integrating concerns of climate change into their daily operations, as well as their policies, programming and projects. Nearly all sectors of society – spanning from businesses to humanitarian aid organizations to schools – have to do their part in it in order to create awareness and make society participate in the whole process leading to adaptation to climate change. In the end, the world needs a behavioral change through education, public information campaigns and regulation. NGOs and media, with their experience in generating political incidence and participation and inclusion processes, have a big role to play in this.

Questions:

National planning

- What are key sectors/areas for which adaptation options are identified in your national communications and/or NAPA? Do these correspond to national development priorities?
- What should in your view be priority sectors/areas of action regarding adaptation?
- What are the existing national institutional frameworks for coordinating climate change in your country? Is there a specific group for coordination action and positions on adaptation? What kind of

stakeholders are involved in such institutional framework?

- What are the key stakeholders playing a role in promoting adaptation measures in your country? Which ones need to be further involved? How would you go about promoting further awareness?

Resources and funding

- What level of funding does your country need for meeting its national adaptation needs?
- To what areas and activities would these resources be allocated?
- What criteria should be used to allocate resources?
- How should adaptation options be prioritized? What criteria should be used?
- Could these criteria be also used for allocating resources through international funds?

International and national level linkages

- What kinds of networks, mechanisms and platforms at an international level would be useful for implementing adaptation at a national level?
- Do current UNFCCC instruments (i.e., National Communications, NWP) need to be adjusted?
- What should be done to place climate change at the top of the international agenda?
- What policies and incentives could be put in place at national and international levels so that a substantial part of the necessary additional resources for adaptation can catalyse larger commercial flows?

5. CONCLUSIONS: KEY MESSAGES AND POINTS FOR FURTHER REFLECTION

The challenges for developing countries arising from climate change impacts and the need for adaptation are many. A number of the key challenges have been outlined in this paper and detailed questions have already been posed in several sections to provide a starting point for discussion. Developing country policymakers and negotiators may wish to consider these questions when developing and refining their adaptation policies, as well as their negotiating positions under the international climate change process. The following points and questions may also help provide a useful framework for further reflection:

What is adaptation?

An important challenge in considering adaptation is defining and understanding what is meant by the term “adaptation”. Given its far-reaching nature, it is a difficult topic to define, particularly in operational and financial terms. However, some key messages may provide a helpful framework for understanding adaptation:

- **Adaptation is not a “stand alone” issue.** It has clear synergies with important issues such as economic development, poverty reduction and disaster management strategies. A sustainable development path is vital for an adaptation process to succeed.
- **Adaptation will need to be integrated into all development planning.** This includes the national and international levels. Successful adaptation measures will require long-term thinking and explicit consideration of climate change risks at the regional (cross-national), national, sub-national and local levels.
- **Adaptation will also require the capacity for both short- and long-term planning.** Strategies will be needed to address long-term climate change impacts, such as those predicted by the IPCC. At the same time, strategies for shorter-term adjustments may also be necessary, such as those prepared for shorter-term climate variability.
- **Adaptation will require substantial funding.** All indicative estimates available suggest that the costs of adapting to climate change in the developing world are in the order of tens of billions. However, there are many difficulties and limitations in estimating the exact costs of adapting under various scenarios, as well as the ability of countries to self-finance adaptation.

Adaptation in the UN climate negotiations: possible next steps

Important decisions will be taken in the run-up to COP 15 in Copenhagen in late 2009. How could your country develop a national strategy for successfully engaging in the Bali Action Plan discussions on adaptation? Such a strategy could include:

- Understanding the issues in order to define positions and strategies, as well as background knowledge of the positions of other countries;
- Awareness of the country’s main vulnerabilities, adaptation options, priorities and needs for support, including among financing, capacity building and technology transfer;
- Awareness of national, sub-national and local experiences, processes and actors that have been dealt with adaptation to climate change; in addition to the country’s experience with the UNFCCC adaptation resources and initiatives.

When developing or refining national positions, the following questions may be helpful:

- How much will climate change impacts affect the economic growth and social development of the country and how much should the country invest to minimize those impacts?;
- What mechanisms should be put in place, nationally and internationally, to provide effective means for adaptation to climate change, including financing?;
- What adaptation-related issues should be further emphasized in a future climate change regime? Are current tools, process and platforms available through the UNFCCC enough or need to be changed in a future climate change regime?

Adaptation at the national level: possible elements

Successfully adapting to climate change at the national level will likely require a set of conditions and elements at the national level. Some possible elements for a national level strategy could include:

- Adequate institutional arrangements, including systematic planning capacity in a cooperative institutional setting consistent policies and measures and regulatory frameworks;

References

- Adaptation Fund Board, 2008. Report of the Second Meeting of the Adaptation Fund Board, AFB/B.2/16. The Adaptation Fund, June 19, 2008. http://www.adaptation-fund.org/images/Report_of_the_Second_Meeting_of_the_Adaptation_Fund_Board_06.19.08.pdf. Access July 2008.
- Adaptation Working Group, 2008. Submission to GLOBE Brasilia. G8+5 Legislators Forum.
- DEFRA, 2005. Adaptation Policy Framework, a consultation by the Department for Environment, Food and Rural Affairs.
- IPCC, 2007. Fourth Assessment Report. Intergovernmental Panel on Climate Change Secretariat. Geneva, Switzerland. <http://www.ipcc.ch>.
- Klein, R.J.T., S. Huq, F. Denton, T.E. Downing, R.G. Richels, J.B. Robinson, F.L. Toth (2007) 'Inter-relationships between adaptation and mitigation' Chapter 18 in M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson (eds.) Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment.
- Möhner, Annett/Klein, Richard J.T. (2007). The Global Environment Facility. Funding for Adaptation or Adapting to Funds?
- OECD, 2008. Economic aspects of Adaptation to Climate Change: Costs, benefits and policy instruments.
- Oxford Institute for Energy Studies, 2008. Benito Mueller. International Adaptation Finance: The Need for an Innovative and Strategic Approach. Report of the Intergovernmental Panel on Climate Change, Cambridge University Press: Cambridge, UK.
- Stern, Nicholas, 2007. The Economics of Climate Change: The Stern Review. Cambridge University Press, Cambridge, UK.
- Stern, Nicholas, 2008. Key elements of a global deal on climate change.
- UNDP, 2007. Human Development Report, 2007/2008.
- UNFCCC Secretariat, 2008. Technologies for adaptation to climate change.
- UNFCCC Secretariat, 2007. Impacts, Vulnerabilities and Adaptation in Developing Countries.
- UNFCCC Secretariat, 2007. Analysis of existing and potential investment and financial flows relevant to the development of an effective and appropriate international response to climate change

World Bank, 2006. Clean Energy and Development: Towards an Investment Framework. DC2006-0002, World Bank, Washington, DC, USA.

Further reading

Adaptation Theory and Related Concepts

- Adger, W.N., S. Agrawala, M. Mirza, C. Conde, K. O'Brien, J. Puhlin, R. Pulwarty, B. Smit, K. Takahashi (2007) 'Chapter 17: Assessment of Adaptation Practices, Options, Constraints and Capacity', IPCC Working Group II contribution to the Fourth Assessment Report, Cambridge University Press: Cambridge.
- Burton, I., B. Challenger, S. Huq, R. Klein, G. Yohe (2007) 'Chapter 18: Adaptation to Climate Change in the Context of Sustainable Development and Equity', IPCC Working Group II contribution to the Fourth Assessment Report, Cambridge University Press: Cambridge.
- Smit, B., I. Burton, R.J.T. Klein, R. Street (1999) 'The Science of Adaptation: A Framework for Assessment' Mitigation and Adaptation Strategies for Global Change, 4 (3-4) 199-213.

Adaptation under the UNFCCC

- Burton, I., E. Diringer, J. Smith (2006) 'Adaptation to Climate Change: International Policy Options' Pew Center on Global Climate Change Research: Arlington, VA. http://www.climate-adaptation.info/wp-content/uploads/2007/08/pew_adaptation.pdf
- Harmeling, S., C. Bals (2008) 'Adaptation to climate change—where do we go from Bali? An analysis of COP-13 and the key issues on the road to a new climate change treaty' Germanwatch: Bonn.
- Lim, B., E. Spanger-Siegfried, I. Burton, M. Malone, S. Huq (2005). "Adaptation Policy Frameworks for Climate Change: Developing Strategies, Policies and Measures". A Project by the UNDP and GEF, Cambridge University Press: New York.
- Linnerooth-Bayer, J. M.J. Mace, R. Verheyen (2003) 'Insurance-Related Actions and Risk Assessment in the Context of the UNFCCC' Paper commissioned by the UNFCCC Secretariat for the UNFCCC Workshop on Insurance-Related Actions to Address the Specific Needs and Concerns of Developing Country Parties Arising from the Adverse Effects of Climate Change and from the Impact of the Implementation of

Response Measures", 14-15 May 2003, Bonn. Yamin, F. J. Depeltege (2004) The International Climate Change Regime: A Guide to Rules Institutions and Procedures, Cambridge University Press: Cambridge.

Adaptation and Development

- Agrawala, S. (ed.) (2005) 'Bridge over Troubled Waters—Linking Climate Change and Development', Organisation for Economic Cooperation and Development: Paris.
- Burton, I. (2000) 'Adaptation to Climate Change and Variability in the Context of Sustainable Development' in Gómez-Echeverri, L. (ed.) Climate Change and Development, Yale School of Forestry and Environmental Studies & UNDP: New Haven and New York.
- Burton, I., M. van Aalst (1999) 'Come Hell or High Water - Integrating Climate Change and Adaptation into Bank Work' World Bank Environment Department, Environment Department Papers No. 72, World Bank: Washington, D.C.
- Huq, S., A. Rahman, M. Konate, Y. Sokona and H. Reid (2003) 'Mainstreaming Adaptation to Climate Change in Least Developed Countries' IIED: London.
- Klein, R.J.T., S. Huq, J.B. Smith (2003) Climate Change, Adaptive Capacity and Development Imperial College Press: London.
- McGray, H., Hammill, A., Bradley, R. with Schipper, E. L., Parry, J.E. (2007) 'Weathering the Storm: Options for Framing Adaptation and Development' World Resources Institute (WRI) Report, WRI: Washington, D.C. http://pdf.wri.org/weathering_the_storm.pdf.
- Sperling, F. (ed.) (2003) 'Poverty and Climate Change: Reducing the Vulnerability of the Poor through Adaptation' Inter-agency report by the African Development Bank (AfDB), Asian Development Bank (ADB), Department for International Development (DFID, UK), Federal Ministry for Economic Cooperation and Development (BMZ, Germany), Directorate-General for Development European Commission (EC), Ministry of Foreign Affairs - Development Cooperation (DGIS, The Netherlands), Organisation for Economic Cooperation and Development (OECD), United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP), and the World Bank.
- UNFCCC (2008) 'Climate Change: Impacts, Vulnerabilities and Adaptation in Developing Countries' UNFCCC: Bonn.
- Adaptation and disaster risk reduction**
- Schipper, L., M. Pelling (2006) 'Disaster Risk, Climate Change and International Development: Scope for, and Challenges to, Integration', Special issue of Disasters, 30 (1): 19-38.
- Soussan, J., I. Burton (2002) 'Adapt and Thrive: Combining Adaptation to Climate Change, Disaster Mitigation, and Natural Resources Management in a New Approach to the Reduction of Vulnerability and Poverty', Paper presented at the UNDP Expert Group Meeting, "Integrating Disaster Reduction and Adaptation to Climate Change", Havana, Cuba. 17-19 June 2002, UNDP: Havana. http://www.climate-adaptation.info/wp-content/uploads/2008/05/undp_book1.pdf.
- Sperling, F., F. Szekely (2005) 'Disaster Risk Management in a Changing Climate' World Bank: Washington DC. http://www.climate-adaptation.info/wp-content/uploads/2007/08/varg-drmcc-fns-fs_-2005-full.pdf.
- Other Reports**
- Climate Proofing: A Risk-Based Approach to Adaptation: by the Asian Development Bank: <http://www.adb.org/Documents/Reports/Climate-Proofing/climate-proofing.pdf>.
- Final report of workshop on Climate Change, Humanitarian Disasters, and International Development: Linking Vulnerability, Risk Reduction and Response Capacity, Oslo, April 2007: http://www.climate-adaptation.info/wp-content/uploads/2007/08/final_workshop_report_03-07-07.pdf.
- IPCC WGII Summary for Policymakers of the IPCC Fourth Assessment Report volume on Impacts, Adaptation and Vulnerability. <http://www.ipcc.ch/SPM13apr07.pdf>.
- Climate Change Adaptation, Institute for Development Studies (UK), "In Focus," Issue 2, November 2007. http://www.ids.ac.uk/UserFiles/File/publications/in_focus/InFocus2.0ClimateChangeAdaptation.pdf.

ANNEXES

Annex 1: Impacts and vulnerability

The science is now “unequivocal” that human activity is contributing to climate change (WGI, IPCC 2007) and the impacts are already being observed in all sectors – food, water, health, agriculture, and energy (WGII, IPCC 2007). The Fourth Assessment Report (AR4, 2007) of the IPCC projects a warming of about 0.2°C per decade for the next two decades, which will bring about serious economic, social and environmental problems, all of which will cause even more poverty and less development, affecting all countries but especially the developing world. Therefore, to acknowledge the current and future impacts of climate change is of primary concern for any adaptation strategy. According to the Human Development Report (UNDP, 2007-2008) based on the IPCC AR4 (2007) scenarios, climate change is already having an impact on various systems and sectors of society and will continue impacting as follows:

1. Ecosystems and biodiversity

- Climate change is already transforming ecological systems. With an increase of up to 2.5°C between 20 to 30% of species of the earth could disappear.
- Marine ecosystems are suffering due to the accumulation of carbon dioxide, which will impact fish stocks, especially upon the main coastal cities and also small island states. This will have an impact over biodiversity and ecosystem goods and services such as water and food security.

2. Agriculture and Food Security

- The African region is threatened by declining crop yields, which affects food security of a population that already suffers of malnutrition, and threatens the dependence on agriculture activity for food security.
- Precipitation, temperature and water availability for agricultural purposes will be affected by climate change. Sub-Saharan Africa will be mostly affected and food security threatened, but also other regions of the world like Latin America and certain parts of Asia. By 2080 it is projected that approximately 600 million could suffer from malnourishment.

3. Sea level rise and exposure to meteorological disasters

- Sea level could increase rapidly due to accelerated ice sheet disintegration. Global temperature rise of 3 to 4 °C could cause the permanent or transitory

displacement of 330 million people due to flooding and threaten approximately 4 million km² of land, where 5% of the world's population is located.

This will affect millions of people from developing countries and from large coastal cities of the developed countries.

- During wet seasons floods will become more intense due to the melting glaciers, putting in risk water availability of one-sixth of the world's population, especially the South American Andean region, certain parts of China and the Indian sub-continent.

4. Human health

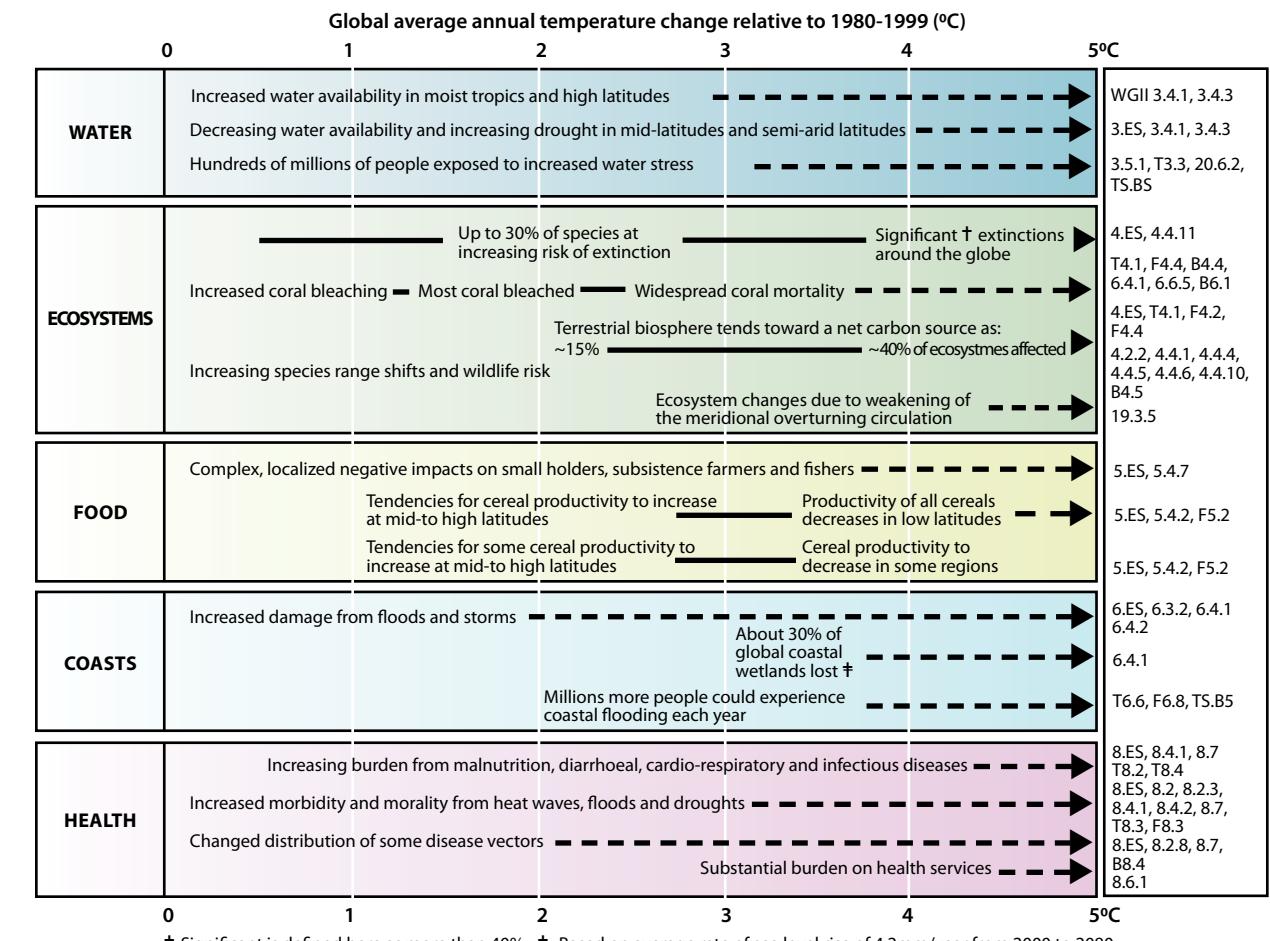
- The main impacts over health conditions will be felt especially on developing countries due to poverty conditions and limited capacity to have access to adequate public health systems.
- 200 to 400 million people could suffer malaria, which already kills around 1 million people per year. It is already possible to find cases of dengue at unusual high altitudes in Latin America and certain parts of Asia. Climate change could worsen this situation.

5. Industry, settlements and society

- Those industries, settlements and societies located in coastal and river flood plains, or in areas where extreme weather event occur, and whose economies are dependent on climate-sensitive resources, are the most vulnerable to climate change.

The consequences of climate change will become disproportionately more damaging with increased warming (Stern Review 2006). With higher temperatures (see the chart below), the chance to face abrupt and large-scale changes will be harder and this will lead to regional disruption, migration and conflict.

**Examples of impacts associated with global average temperature change
(Impacts will vary by extent of adaptation, rate of temperature change and socio-economic pathway)**



† Significant is defined here as more than 40% † Based on average rate of sea level rise of 4.2mm/year from 2000 to 2080

Source: IPCC Fourth Assessment Report (2007)

The poorest countries and most vulnerable citizens will suffer the earliest and most damaging effects, even though they have contributed least to the problem and even if serious efforts to reduce emissions start immediately. Looking to the future no country, regardless its wealth or power, will be immune to the impact of global warming.

Annex 2: Decisions on adaptation under the UNFCCC and the Kyoto Protocol

COP decisions

ISSUE	DECISIONS	PROVISIONS
Nairobi Work Programme on impacts, vulnerability and adaptation to climate change	Decision 1/CP.10 Decision 2/CP.11	Buenos Aires program of work on adaptation and response measures Five-year program of work of the Subsidiary Body for Scientific and Technological Advice on impacts, vulnerability and adaptation to climate change
Non-Annex I national communications	Decision 10/CP.2 Decision 8/CP.5 Decision 31/CP.7	National communications to include information on policy frameworks for implementing adaptation measures and response strategies and technological needs related to facilitating adequate adaptation Establishment of the Consultative Group of Experts on non-Annex I national communications (CGE). CGE to link with LDC Expert Group (LEG) on adaptation issues
Annex I national communications	Decision 2/CP.1 Decision 4/CP.1 Decision 9/CP.2 Decision 4/CP.5	IPCC Technical Guidelines for Assessing Impacts and Adaptations be used for national communications National communications to include information on expected impacts of climate change, and action taken to implement Article 4.1 with regard to adaptation. Also report on meeting costs of adaptation
Technology transfer	Decision 13/CP.1 Decision 7/CP.2 Decision 9/CP.3 Decision 4/CP.4 Decision 4/CP.7 Decision 3/CP.13 Decision 4/CP.13	Development of technologies for adapting to climate change Synthesis and dissemination of information on adaptation technologies Secretariat to work on synthesis and dissemination of information, technologies and know-how relating to adaptation and to accelerate development of adaptation methodologies Tools to evaluate different adaptation strategies
Guidance to the financial mechanism (GEF)	Decision 11/CP.1 Decision 2/CP.4 Decision 6/CP.7	Definition of three stages of funding for adaptation GEF should provide funding for Stage I and II activities Establish pilot or demonstration projects on how adaptation planning and assessment can be translated into projects
Capacity building	Decision 2/CP.7 Decision 3/CP.7 Decision 5/CP.12	Capacity building for implementation of adaptation measures Capacity building for carrying out adaptation and vulnerability assessments and NAPAs
Adverse effects	Decision 3/CP.3 Decision 1/CP.4 Decision 5/CP.4 Decision 12/CP.5 Decision 5/CP.7 Decision 1/CP.10	Decision to start a process to consider Article 4.8 and 4.9 Process should identify adverse effects, impacts of the implementation of response measures, needs of developing countries arising from such impacts, and identification and consideration of actions to address these BAPA adopted to consider adverse effects, among other issues, before COP6 Program of work from COP4 to COP6 Decision to consider Article 4.8 and 4.9 at COP-6 and beyond <ul style="list-style-type: none"> • That the GEF and other bilateral and multilateral sources should fund work on vulnerability and adaptation assessments, training, capacity building, technology transfer relating to adverse effects • That adaptation fund and SCCF should fund the implementation of adaptation activities where sufficient information exists to warrant such activities • The Convention should support the NAPA process • Establishment of LDC Fund • Workshop requests
Funding under the UNFCCC	Decision 7/CP.7 Decision 27/CP.7 Decision 8/CP.8 Decision 6/CP.9 Decision 5/CP.9 Decision 1/CP.12	Establishment of SCCF to fund activities, programs and measures on adaptation Establishment of LDC Fund to fund NAPAs Guidance on LDC Fund for speedy disbursement of funds for NAPA preparation Further guidance on SCCF

ISSUE	DECISIONS	PROVISIONS
Funding under the Protocol	Decision 10/CP.7	Establishment of an Adaptation Fund to finance concrete adaptation projects and programs in developing countries that are also Parties to the Protocol Fund to be financed by share of proceeds from CDM activities
Least Developed Countries	Decision 28/CP.7 Decision 29/CP.7 Decision 9/CP.8 Decision 4/CP.10 Decision 3/CP.11 Decision 4/CP.11 Decision 8/CP.13	Guidelines for NAPA preparation Establishment of the LDC Expert Group to advise on NAPA preparation, and advise on other adaptation efforts relevant to LDCs Work of the Least Developed Countries Expert Group Extension of the mandate of the Least Developed Countries Expert Group Further guidance for the operation of the Least Developed Countries Fund
IPCC	Decision 10/CP.9 Decision 5/CP.13	The consideration of the scientific, technical and socio-economic aspects of impacts of, and vulnerability and adaptation to, climate change in the context of the IPCC TAR Fourth Assessment Report of the Intergovernmental Panel on Climate Change
Other	Decision 6/CP.1 Decision 13/CP.3 Decision 7/CP.4 Decision 11/CP.8 Decision 1/CP.11 Decision 1/CP.13	Adaptation technology to be addressed by SBSTA SBSTA, with SBI, to assess comprehensiveness and effectiveness of adaptation measures Inclusion of adaptation in work program on Kyoto Protocol, also under CDM to determine share of proceeds from CDM Delhi Work Programme on Article 6: consider linkages between implementing this and implementing P&Ms on adapting to climate change Dialogue on long-term cooperative action to address climate change by enhancing implementation of the Convention Bali Action Plan (enhanced action on adaptation)

CMP (Kyoto Protocol) decisions on issues related to adaptation

ISSUE	DECISIONS	PROVISIONS
Adaptation Fund	Decision 28/CMP.1 Decision 5/CMP.2 Decision 1/CMP.3	Initial guidance to an entity entrusted with the operation of the financial mechanism of the Convention, for the operation of the Adaptation Fund Details and guidance for the design of the Adaptation Fund Operationlization of the Adaptation Fund
Second Review of the Kyoto Protocol	Decision 7/CMP.2 Decision 4/CMP.3	Review aim to further enhance the implementation of the Protocol and elaborate in particular adaptation

Annex 3: Information resources guide

Publications

- Bo Lim, et al., *Adaptation Policy Frameworks (APF) for Climate Change*, United Nations Development Programme: 2004. <http://www.undp.org/climate-change/adapt/apf.html#about>.
- Frankel-Reed, Jennifer and Nick Brooks, *Proposed Framework for Monitoring and Evaluation Framework of Adaptation to Climate Change*, United Nations Development Programme: 2008.
- Lu, Xianfu and Nick Brooks, *Quality Standards for Climate Change Adaptation*, United Nations Development Programme: 2008.
- Nick Brooks, et al., *Operational Guidance for Climate Change Adaptation: Technical Papers for Six Priority Thematic Areas*, United Nations Development Programme: 2008.
- United Nations Development Programme, *Briefing Note: Adaptation to Climate Change: Doing Development Differently*, United Nations Development Programme: 2007. http://www.undp.org/climate-change/adapt/downloads/UNDPAdaptationBrief_Nov07.pdf.
- United Nations Development Programme, *Climate Change Adaptation: Knowledge Needs Survey*, United Nations Development Programme: 2007. <http://www.energyandenvironment.undp.org/undp/index.cfm?module=Library&page=Document&DocumentID=6508>.
- United Nations Development Programme, *Climate Risk Profiles*, United Nations Development Programme: 2008.
- United Nations Development Programme, *Hot Spot Analysis from Vulnerability and Hazard Data*, United Nations Development Programme: 2007.
- United Nations Development Programme, *Human Development Report 2007/08 – Fighting Climate Change: Human Solidarity in a Divided World*, United Nations Development Programme: 2007. <http://www.energyandenvironment.undp.org/undp/index.cfm?module=Library&page=Document&DocumentID=6505>.

Websites

- *Adaptation Basics*, provides an overview of the relationship between climate change impacts and development, including impacts by sector (e.g. land degradation, health, etc.) as well as impacts affecting

the achievement of the Millennium Development Goals. <http://www.undp.org/climatechange/adapt/basics1.html>.

- *Adaptation Definitions*, highlighting commonly used terminology. <http://www.undp.org/climatechange/adapt/definitions.html>.
- *Adaptation Learning Mechanism (ALM)*, a collaborative knowledge-sharing project, offers a library of case studies and a database of adaptation profiles for individual countries. www.adaptationlearning.net.
- *Country Adaptation Profiles database*, a UNDP-developed tool hosted by the Adaptation Learning Mechanism, provides information on climate change and the national initiatives for over 140 developing countries. <http://www.adaptationlearning.net/profiles/>.
- *National Communications Support Program (NCSP)*, jointly managed by UNDP and UNEP, provides support to more than 130 developing countries as they prepare Second (or Third) National Communications to the UNFCCC. Together with the implementing agencies, the NCSP provides technical and policy guidance on vulnerability and adaptation assessment, and on linking climate risks with national development priorities. <http://ncsp.undp.org/>.
- *UNDP Environment & Energy e-Library*, a broad-themed collection of climate change, energy and environment-related literature. <http://www.energyandenvironment.undp.org/undp/index.cfm?module=Library&page=DocumentList&LibraryID=8&AreaID=440>.
- *Web-based training module on Climate Change*, a 3-hour training including three lessons: The Science of Climate Change, Global Responses to Climate Change, and Climate Change and UNDP's Development Efforts. To be released in late 2008.

Global and regional development banks

- The **World Bank** has adopted a climate risk management approach to development, which calls for development that is resilient to both present-day variability and projected climate change. The Bank is increasing collaborative efforts on adaptation with other multilateral development banks and is working with the IFC on exploring ways to involve the private sector.
- The **African Development Bank (AfDB)** has some experience in the design of specific climate risk management and adaptation (CRMA) interventions.

A CRMA approach – the most effective strategy to address climate change, according to Bank Group experts – integrates the management of current climate variability and extremes with adaptation to climate change. The strategy will review and elaborate on the adequacy of existing financing and non-financing instruments. It will also assess Bank capacity to access external finance such as UNFCCC/GEF financing and explore opportunities to establish or access new internal and external financing mechanisms.

- The **Asia Development Bank (ADB)** has been working with partners across Asia and the Pacific to build knowledge of climate change impacts and adaptation measures for almost a decade. Bolstering these efforts are long-standing programs of support for disaster preparedness and response, as well as productive relations with development partners – from government agencies, to academia, think tanks, green businesses, civil society organizations, and both bilateral and multilateral development agencies. ADB also has direct access to climate change adaptation funds administered by GEF.