POLICY GUIDANCE ON INTEGRATING CLIMATE CHANGE ADAPTATION INTO DEVELOPMENT CO-OPERATION

28-29 May 2009

Joint High-Level Meeting of the OECD Development Assistance Committee (DAC) and the Environment Policy Committee (EPOC)

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INTEGRATING CLIMATE CHANGE ADAPTATION INTO DEVELOPMENT CO-OPERATION – ISBN-978-92-64-05476-9 © OECD 2009

Acknowledgements

This Policy Guidance is a result of the work undertaken by a Joint OECD Environment-Development Task Team on Integrating Climate Change into Development Co-operation, led by Switzerland (Anton Hilber) and The Netherlands (Christine Pirenne, Jan-Peter Mout, Aart van der Horst). The work of the Task Team was jointly overseen by the Environment Policy Committee (EPOC) Working Party on Global and Structural Policies (WPGSP) and the Development Assistance Committee (DAC) Environet.

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The drafting of the Guidance was led by Shardul Agrawala, Remy Paris and Florence Crick, under the supervision of Helen Mountford and Alexandra Trzeciak-Duval at the OECD Secretariat. Arnoldo Matus Kramer, Cécile Bordier, Anna Brüderle and Tamara Levine provided substantive inputs and contributed to the finalization of the document. Maria Consolati and Elizabeth Corbett provided invaluable secretarial assistance to the work of the Task Team and the publication process. Julie Harris and Viviane Consoli provided editorial support and the graphics were produced by Peggy Ford-Fyffe King.

The efforts and contributions of all these individuals and organisations are gratefully acknowledged.

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Abbreviations and Acronyms

ADB	Asian Development Bank
ALM	Adaptation Learning Mechanism
CAS	Country assistance strategy
CBA	Cost-benefit analysis
CBD	Convention on Biological Diversity (United Nations)
CDM	Clean Development Mechanism
CEA	Cost-effectiveness analysis
CRED	Centre for Research on the Epidemiology of Disasters
CRiSTAL	Community-based Risk-Screening Tool – Adaptation and Likelihoods
DAC	Development Assistance Committee
DRR	Disaster risk reduction
EDPRS	Economic Development and Poverty Reduction Strategy
EIA	Environmental Impact Assessment
EPOC	Environment Policy Committee
GEF	Global Environmental Facility
GHG	Greenhouse gas
GTZ	*Deutsche Gesellschaft für Technische Zusammenarbeit* / German Technical Cooperation
HIPC	Heavily indebted poor countries
IFRC	International Federation of Red Cross and Red Crescent Societies
IISD	International Institute for Sustainable Development
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
JAS	Joint assistance strategy
LDC	Least developed country
MCA	Multi-criteria analysis
MDG	Millennium Development Goals
MTEF	Medium-term expenditure framework
NAPA	National Adaptation Programme of Action
NGO	Non-governmental organisation
PAF	Performance assessment framework
PFM	Public financial management
PPPs	Policies, plans and programmes
PRS	Poverty reduction strategy
PRSPs	Poverty Reduction Strategy Papers
SEA	Strategic Environmental Assessment
SEI	Stockholm Environment Institute

SDC	Swiss Agency for Development Cooperation
SWAp	Sector-wide approach
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNPD	United Nations Population Division
USAID	United States Agency for International Development

Executive Summary

Climate change impacts such as drought, floods, severe weather and sea-level rise are likely to result in food shortages, increases in vector-borne diseases, infrastructure damage, and the degradation of natural resources upon which livelihoods are based. The negative impacts of climate change will hit poor people and poor countries disproportionately. Development choices made today will influence adaptive capacity and also determine future greenhouse gas emissions. In other words, climate change threatens development objectives and is in turn affected by development choices. Furthermore, the impacts of climate change are likely to become progressively more significant in the years and decades beyond the 2015 target date for the achievement of the Millennium Development Goals.

In principle, a range of development activities could help reduce vulnerability to many climate change impacts. In some cases, however, "development as usual" may inadvertently increase vulnerability. For instance, new roads might be weatherproofed from an engineering standpoint, even taking future climate into account, but they might trigger new human settlement in areas highly exposed to particular impacts of climate change, such as coastal zones vulnerable to sea-level rise. This is known as *maladaptation*. The risk of maladaptation points to the need for partner countries to systematically assess climate risks and vulnerabilities, and to include potential adaptation measures in development policies, plans and projects.

Yet, many development policies, plans and projects currently fail to take into account climate variability, let alone climate change. While efforts to integrate climate change adaptation into development will be led by developing country partners, donor agencies have a critical role to play in supporting such efforts as well as in integrating such considerations within their own organisations. To this end, partners and donors alike need adequate guidance.

Objectives and approach of this Policy Guidance

This Policy Guidance is intended to provide policy makers and practitioners in development co-operation agencies with information and advice on how to mainstream climate change into development. It is a joint endeavour by the OECD's Environment Policy Committee (EPOC) and Development Assistance Committee (DAC) in response to the 2006 *OECD Declaration on Integrating Climate Adaptation into Development Co-operation,* which commits OECD members to "work to better integrate climate change adaptation in development planning and assistance, both with their own governments and in activities undertaken with partner countries."

The objectives of this Policy Guidance are to:

- promote understanding of the implications of climate change on development practices and the associated need to mainstream climate adaptation in development co-operation agencies and partner countries;
- identify appropriate approaches for integrating climate adaptation into development policies at national, sectoral and project levels and in urban and rural contexts;
- identify practical ways for donors to support developing country partners in their efforts to reduce their vulnerability to climate variability and climate change.

In line with the principles and objectives of the *Paris Declaration on Aid Effectiveness,* the focus is on strengthening partner countries' capacity to identify and prioritise adaptation responses and, where necessary, integrate them through relevant measures at various levels. Another key objective is to support the harmonisation of donor practices in these areas.

Target audience

This Policy Guidance is formally targeted at development co-operation agencies. It should, however, also be of direct interest and relevance to policy makers and practitioners in developing countries, given that it is organised around partner countries' institutions and processes, as called for by the Paris Declaration on Aid Effectiveness.

While development practitioners are the core audience, the Policy Guidance can also help inform climate change negotiators, practitioners and policy analysts about the development processes and governance contexts within which decisions to implement adaptation might eventually be taken. Therefore, it may be of relevance to these communities as well.

Structure

The Policy Guidance is divided into three parts:

Part I – *Understanding the Challenge* – introduces human-induced climate change, places it within the context of weather and natural climate variability, and discusses its implications in key developing country regions. In addition, it introduces the concepts of adaptation and mitigation, and the need to integrate climate change responses into regular development activity.

Part II – *Integrating Climate Change Adaptation at National, Sectoral and Project Levels* – takes a partner country perspective and discusses in detail how to assess and address climate risks and opportunities, and how to integrate adaptation responses within development at key decision-making levels: national, sectoral and project.

Part III – *Integrating Climate Change Adaptation at the Local Level* – examines the specific challenges and opportunities arising from climate change in urban and rural contexts and discusses how to incorporate adaptation considerations within government- and community-level processes in both contexts.

Approach

Adaptation to climate change will involve specific dedicated measures as well as the integration of adaptation considerations into existing development processes and activities. The emphasis of this Policy Guidance, however, is on the latter. In line with donor efforts to work through and support partner countries' own systems, the Policy Guidance primarily highlights partner country processes and institutions where climate change adaptation could be integrated.

The Policy Guidance takes an integrated approach to adaptation. Core decision-making and policy processes as well as key actors are identified at each of the levels considered in Parts II and III. The governance architecture and steps within the policy cycle relevant to each level are described. The objective in each chapter is to identify particular *entry points* along the cycle where considerations of climate change adaptation could be incorporated. These entry points provide opportunities for the identification, integration and implementation of measures and investments specifically designed to enable and support adaptation to climate change but which had not been envisaged in the initial plan, programme or project. At each of the stages where adaptation considerations could be incorporated, specific *interventions* are identified. Interventions will generally take a very different form at different points in the cycle, since they apply to very different processes and at different authority/jurisdiction levels. For example, enhancing the climate resilience of a long-term policy will be very different from enhancing the climate resilience of a set of discrete project proposals for which many key parameters (*e.g.* geographical location, scale, and technology choice) are known.

In examining potential interventions, the Policy Guidance advances the notion of applying a *climate lens*. A climate lens is an analytical tool to examine a strategy, policy, plan, programme or regulation. The application of such a climate lens at the national or sectoral level involves examining: *(i)* the extent to which a measure – be it a strategy, policy, plan or programme – under consideration could be vulnerable to risks arising from climate variability and change; *(ii)* the extent to which climate change risks have been taken into consideration in the course of the formulation of this measure; (*iii)* the extent to which it could increase vulnerability, leading to maladaptation or, conversely, miss important opportunities arising from climate change; and (*iv)* for pre-existing strategies, policies, plans and programmes which are being revised, what amendments might be warranted in order to address climate risks and opportunities. For example, planned development of certain geographical zones (*e.g.* coastal areas vulnerable to sea-level rise and storm surges) or sectors (such as hydropower in the energy sector) may be viewed in a different light when the medium- to long-term risks posed by climate change are taken into consideration.

The application of a climate lens to a policy, strategy, regulation, plan or programme can help improve its general directions and priorities. However, its real impact will materialise only at the stage where it is translated into actual enforcement of decisions, and implementation of activities and investments on the ground. The sectoral planning, programming and project implementation stages, in particular, provide opportunities for the translation of results and recommendations of the climate lens into actions on the ground. The implementation of the interventions identified at these stages should lead to enhance climate-resilient programmes and, ultimately, on-the-ground projects.

Approaches for climate integration: key findings and recommendations

National level

The national level is critical for mainstreaming climate change adaptation. At this level, strategic decisions are taken which create the enabling environment for public- and private-sector actors as well as communities and households. It is also at this level that medium- to long-term development and poverty reduction strategies and objectives are established, through national visions, national development plans and strategies.

At the national level, several types of initiatives can be undertaken to enable the integration of adaptation into development processes. A "whole of government" approach needs to be adopted. This involves the engagement of key stakeholders, improving the co-ordination with existing mechanisms for disaster risk reduction and the implementation of relevant multilateral and regional environmental agreements. It also entails reviewing and adjusting relevant regulations and standards to reflect climate change impacts. In addition, an important prerequisite for informed decision making on adaptation is that it should be based upon the best available information on the implications of both the current and the future climate in the country. To this end, the availability and quality of climate information needs to be improved. This will involve improving the coverage and quality of climate monitoring data, commissioning assessments of climate change impact, vulnerability and adaptation if they are not already available, and using multi-model ensembles with a clear articulation of associated uncertainties.

Adaptation should also be incorporated at several stages of the national policy cycle. A *climate lens* should be applied at the policy formulation stage to national visions, strategies and policies. The application of a climate lens to national policies and to planning and regulatory frameworks can allow, *inter alia*, the identification of particularly vulnerable geographical zones or sectors. In addition, a climate lens can be applied at the planning stage to bottom-up sectoral proposals, which would lead to better ("climate-proofed") plans or proposals. The results of this analysis can be acted upon in the course of translating national policies and plans into sectoral-level directives or orientations at appropriate entry points in the policy cycle where interventions are identified. This includes, in particular, the allocation of corresponding financial resources to the sectoral-level authorities responsible for translating national priorities into action on the ground. The national policy cycle also provides the opportunity for several other types of interventions. At the planning stage, a suggested intervention is the proactive inclusion of programmes and projects specifically aimed at enabling adaptation to climate change. At the resource allocation stage, interventions may involve reallocating funding to (or increasing budget for) more vulnerable sectors and regions and funding adaptation-specific activities.

Priorities at the national level include:

- Improving the coverage and quality control of climate monitoring data. Commissioning national-level assessments of climate change impacts, vulnerabilities and adaptation options. This will lead to improved and more targeted information on how climate change affects specific national priorities and core government functions.
- Moving the co-ordination for adaptation into powerful central bodies, such as the Office of the President or Prime Minister or planning agencies.

- Including considerations of climate change risks within long-term visions, poverty reduction and sustainable development strategies.
- Making a sound economic case for investing in adaptation. Ensuring adequate resource allocation (for example through a *horizontal fund for adaptation*) for the incorporation of adaptation considerations in policies, plans and programmes.
- International donors can encourage action on adaptation through budgetary support mechanisms, country and joint assistance strategies.

Collecting climate-related information will take time, and uncertainties will always remain. Fortunately, many measures provide a host of development benefits in addition to fostering climate change adaptation. They can be implemented even in the presence of remaining uncertainties about future climatic conditions. These are often called *no regrets* or *low regrets* measures. Policies to integrate climate change adaptation need not and should not be put on hold pending the availability of all desired information.

International donors have a key role to play in supporting the above actions to facilitate the integration of climate change adaptation at the national level. They can support capacity building efforts to better monitor climate, as well as to assess future climate change impacts and adaptation priorities at the national level. In this context there is a need for awareness-raising about the risks posed by climate change within donor agencies. Donors can also use high-level policy dialogues as a vehicle to raise the profile of adaptation with senior officials in partner countries in key ministries like Finance and Planning.

In addition to capacity development support, donor agencies can provide financial support by, for example, contributing to a *horizontal fund for adaptation* managed by a central body such as a Planning or Finance Ministry and which sectoral ministries could tap to meet the additional costs of integrating the needed adaptation measures into their planned activities or investments. Finally, donors need to better co-ordinate and harmonise their efforts on adaptation at the country level.

Sectoral level

Many climate adaptation measures and investments will be undertaken by sector-level authorities. In the case of "public service delivery" sectors, this may primarily involve strengthening the monitoring of key climate-relevant variables which have an impact on their activities and factoring in the consequences, as well as ensuring that facilities which are established under their sectoral authorities' responsibility are not located in particularly vulnerable areas or are capable of withstanding climate conditions. In the case of sectors which primarily undertake physical investments, the key will be to ensure that planned infrastructure investments are designed and located so as to withstand future expected climatic conditions. Particular emphasis should be placed on sectors or domains where investments or decisions have long-term consequences and that would be very costly to modify later. Similar considerations apply to authorities responsible for land-use planning.

At the sector level, climate change adaptation can be integrated at several stages along the policy cycle. A climate lens can be applied at the sectoral policy formulation and sectoral planning stages. Applying a climate lens to sectoral strategies and policies and to the corresponding sectoral plans is critical to avoid maladaptation risks and to allow for the identification of new opportunities emerging from climate change. Several

interventions have also been identified at the different stages of the policy cycle. At the planning stage, the intervention involves building in necessary adaptation-specific activities. At the resource allocation and programming stage, three interventions are suggested: *(i)* incorporating the adaptation activities and projects identified during the planning stage; *(ii)* including climate change risks to the screening criteria used to assess project proposals before their inclusion into the investment programme; and *(iii)* making "room" in the budget for adaptation responses identified in the context of cross-sectoral plans, or claiming resources from a horizontal fund for adaptation. Finally, at the monitoring and evaluation stage, interventions to incorporate adaptation consist of mobilising the necessary resources to strengthen monitoring and evaluation systems and capacities, and producing indicators to track performance against adaptation.

A number of priority actions are suggested:

- carry out an assessment of the available sector-specific information on climate change impacts and vulnerabilities;
- raise awareness among both sectoral planners and their counterparts within donor agencies of the implications of climate change on their specific areas of activity;
- in cases where sectoral regulations and other decision-making processes are based entirely on historical climate information, there might be a need to introduce greater flexibility – such as more frequent updating of the climatic baseline (*e.g.* in the case of water resource management);
- boost in-house capacity within sectoral ministries and donor agencies to better evaluate the implications of climate change for specific sectors;
- collect better information on the costs and benefits of adaptation actions so that decision makers at various levels can factor such information into their decision making on how to implement adaptation-related actions.

Through sector-level budget support and sector-wide approaches, donor agencies can support many of the above actions. They can help mobilise the additional resources required to integrate the needed adaptation measures in the context of sectoral strategies, plans and programmes. In addition, they can provide support for capacity development needed to apply *climate lenses* (including climate information gathering and monitoring at the sectoral level) and for the implementation of the different interventions associated with these. This implies supporting the development and application of sector-specific methodologies to identify, assess, cost and prioritise the needed climate adaptation measures and investments. Finally, donor agencies can encourage and support the monitoring and evaluation of progress towards integrating climate adaptation into sectoral strategies, plans and programmes. This includes providing financial and technical support for the implementation of reporting tools and indicators as well as performance assessment frameworks.

Project level

A development project may be directly or indirectly vulnerable to the impacts of climate change. At the same time, a project may increase or decrease the vulnerability of recipient communities or systems to climate change. The vulnerability of a project to climate risks is a function of the type of infrastructure it establishes, the activities it supports, and its geographical location. In addition, the expected lifetime of project activities is likely to be a critical factor determining the need to assess climate change

vulnerability. For example, investment in long lived infrastructure (such as a dam or irrigation network), should consider the effect of future climate conditions on the viability of the project, since climate change impacts will most likely become relevant during its planned useful life.

The project level is critical for the integration of adaptation considerations, and indeed much of the recent progress in this direction has been made at that level. The project cycle can be used as a framework to integrate the assessment of climate risks and the identification, analysis and prioritisation of adaptation options. In order to integrate adaptation at the project level, a number of interventions are identified along the project cycle; they include: incorporating considerations of climate risks and adaptation throughout the project cycle; developing, pilot testing and implementing climate risk assessments; developing appropriate metrics and indicators to assess the effectiveness of efforts to better integrate climate risks and adaptation considerations; and engaging a wide variety of stakeholders to identify adaptation options and indicators that monitor progress and success.

Several recommendations and key priorities for action are suggested at this level:

- increase emphasis on testing, comparing and reconciling the diverse tools for climate risk assessment;
- improve the availability and reliability of downscaled climate change projections and ensure that the uncertainties associated with various projections are communicated to project managers in transparent ways;
- increase analytical work on methodologies for prioritising and costing of adaptation measures;
- evaluate systematically the effects and effectiveness of implemented adaptation measures;
- invest more in capacity development and piloting of initiatives that can help project managers as well as other relevant decision makers to better understand the implications of climate change on their projects and to be better equipped to incorporate adaptation considerations within their decision frameworks.

Local level

The local level is important for mainstreaming climate change adaptation for three reasons. First, climate change impacts are manifested locally, affecting local livelihood activities, economic enterprises, health risks, etc. Second, vulnerability and adaptive capacity are determined by local conditions. Regional or national vulnerability indices often mask the dramatic variations in vulnerability at local levels. Third, adaptation activities are often best observed at the local level. Decisions about livelihood strategies and investments can represent real-life demonstrations of adaptation. These demonstrations allow for the monitoring and evaluation of how policies, programmes and projects are supporting adaptation. They also provide a basis for scaling up, revising and learning.

The process for integrating climate change adaptation into development policies and activities is broadly the same in urban and rural settings. In general, this involves linking two separate but related processes in order to achieve stated objectives: *i)* the process of

understanding climate risks and selecting adaptation options; and *ii)* the process of formulating and implementing development policies conducive to adaptation.

The successful integration of climate change adaptation into local development processes depends on a number of enabling conditions. In both urban and rural contexts, there needs to be broad and sustained engagement with and participation of local stakeholders, including local governments, communities, civil society and businesses. Local authorities need to adopt a collaborative approach where local actors are seen as legitimate decision-making agents. In addition, there needs to be greater awareness-raising and targeted messaging on climate change, as local actors need to know why they might have to take different decisions or call on different or additional resources in shaping their livelihoods. Awareness should be raised among a number of different local stakeholders, such as households, local organisations, opinion leaders and educators. Furthermore, appropriate information needs to be gathered and used to inform local-level adaptation decisions. Finally, responses to short-term climatic shocks and those called for by projected long-term climate change impacts need to be reconciled.

Four entry points are identified to facilitate the integration of climate change adaptation into local development planning processes: *(i)* consideration of the implications of climate change in development planning processes of local governments (village action plans and rural or district development plans, as well as city development plans or strategies); (*ii)* adjustment of local regulatory and service provision frameworks, to include provision of information based on likely local impacts of climate change; *(iii)* adjustment of local government accountability mechanisms; and *(iv)* engagement of private-sector and civil society organisations and processes, which can support adaptation at the local level by internalising and institutionalising climate risk management into their own decision-making processes and operations.

To facilitate the integration of adaptation at the local level, a number of priority actions to be taken at higher levels of government have been identified:

- Collect information on climate change adaptation and make it available. Obtaining this information will require a combination of drawing from the knowledge and experience at the local level and having access to information sources housed at higher levels.
- Provide human, financial and technical resources and services to support local adaptation.
- Provide social protection for the poorest and most vulnerable.
- Ensure a supportive policy and institutional framework. This means devising policy incentives for risk management behaviour, reviewing or revising policies that increase climate-related vulnerabilities, and strengthening the institutions needed to manage communication and decision-making processes. It can also mean introducing a greater measure of flexibility into the overall policy process, establishing provisions for increased bottom-up feedback, and more regular reviews.

Donors and *international agencies* can support the development of adaptive capacity within rural and urban settings in a number of ways. Depending on their policy priorities, mandates and capacities, different agencies may focus on one or several of the options provided. First, they could review sectoral priorities in light of climate change. In urban areas, this may mean drawing attention of partner governments to the urgent need to

increase funding for infrastructure, as the deficits in urban infrastructure provision and maintenance are serious constraints to adaptive capacity. In rural areas, this may mean a long-term increase in support for agriculture and rural development, as well as for sustainable land and water management. Second, they could explore different options for channelling funds and stakeholder engagement to build local adaptive capacity (*e.g.* by supporting municipal infrastructure funds). Third, they could support decentralisation processes that transfer authority to elected local governments. Support for decentralisation should be coupled with efforts to enhance local government capacity to take up the responsibilities afforded by decentralisation. Finally, donors could increase support to civil society organisations. Because these organisations interface most directly with communities, they represent a key constituent in local-level adaptation.

Part I

Understanding the Challenge

The issue of climate change can seem remote compared with such immediate problems as poverty, disease and economic stagnation, yet the ability to successfully address these core development priorities risks being seriously undermined by climate change. How development occurs also has implications for climate change itself and the vulnerability of societies to its impacts. Climate change is already under way and will increasingly affect the basic elements of life for people around the world. Part I of this Policy Guidance – Understanding the Challenge – *introduces human-induced climate change and places it within the context of weather and natural climate variability. This is followed by a discussion of the implications of climate change on key sectors and regions. It introduces the concepts of adaptation and mitigation, and outlines a generic approach for integrating adaptation to climate change within development policies, plans and projects.*

Chapter 1

Introduction and Scope

This chapter sets out the objectives and scope of this Policy Guidance; its target audience; and its structure.

The issue of climate change can seem remote compared with such immediate problems as poverty, disease and economic stagnation, yet the ability to successfully address these core development priorities risks being seriously undermined by climate change. How development occurs also has implications for climate change itself and the vulnerability of societies to its impacts. Climate change is already under way and will increasingly affect the basic elements of life for people around the world – access to water, food production, health, and the environment. If left unchecked, climate change could cause significant economic and ecological dislocations (IPCC, 2007). The negative impacts of climate change will disproportionately hit poor people and poor countries. For example, climate change is expected to bring greater water stress and scarcity and will pose a real threat to food security in many countries in Africa, Asia and Latin America. Other impacts of climate change such as heat-related mortality, spread of vector-borne diseases like malaria, and access to natural resources, meanwhile, will have direct implications for the achievement of several of the Millennium Development Goals (MDGs) and for related national poverty eradication and sustainable development objectives. Table 1.1 illustrates some of the potential impacts of climate change on achieving the MDGs.

The effects of climate change will continue to emerge – in fact, they will become progressively more significant in the years and decades beyond the 2015 target date for the achievement of the MDGs. In principle, a range of activities oriented towards reducing poverty, improving nutrition and education, environmental management and promoting sustainable livelihood opportunities would help reduce vulnerability to many climate change impacts. A healthier, better educated population with improved access to resources is also likely to be in a better position to cope with climate change. The development choices made and pathways followed will influence the vulnerability of countries to the future impacts of climate change.

Therefore, there clearly is a need to place climate change and its impacts into the mainstream of economic policies, development projects, and international aid efforts. This was recognised in a key report, *Poverty and Climate Change* (Multi Agency Report, 2003), prepared jointly by ten multilateral and bilateral agencies in 2003. Subsequently, in 2006, Development and Environment Ministers from OECD countries endorsed a *Declaration on Integrating Climate Change Adaptation into Development Co-operation*, in which they called for "meaningful co-ordination and sharing of good practices on integrating climate change adaptation in development co-operation" (OECD, 2006). A subsequent High Level Statement by the OECD Development Assistance Committee (DAC) in 2008 noted the progress made by donors on integrating adaptation and also highlighted that much more remains to be done, including working towards harmonised approaches for assessing and integrating climate risks at the project and programmatic level (OECD, 2008).

Table 1.1. **Potential impacts of climate change on the Millennium Development Goals**

Millennium Development Goal	Examples of links with climate change
Eradicate extreme poverty and hunger (Goal 1)	Climate change is projected to reduce the assets and livelihoods of many poor people, for example health, access to water, homes, and infrastructure. Climate change is expected to alter the path and rate of economic growth because of changes in natural systems and resources, infrastructure, and labour productivity. A reduction in economic growth directly affects poverty through reduced income opportunities. Climate change is projected to alter regional food security. In particular in Africa, food security is expected to worsen. Adverse impacts on food security could be seen in Latin America, as well as in South and South-East Asia.
Promote gender equality and empower women (Goal 3)	In the developing world in particular, women are disproportionately involved in natural resource-dependent activities, such as agriculture, which are particularly vulnerable to climate change. Women's traditional roles as primary users and managers of natural resources, primary caregivers and labourers engaged in unpaid labour (*i.e.* subsistence farming) mean they are involved in and dependent on livelihood and resources that are put most at risk by climate change.
Health-related goals: Combat major diseases (Goal 6) Reduce child mortality (Goal 4) Improve maternal health (Goal 5)	Direct effects of climate change include increases in heat-related mortality and illnesses associated with heat waves (although fewer winter cold-related deaths may occur in some regions). Climate change may increase the prevalence of some vector-borne diseases (for example malaria and dengue fever), and vulnerability to water, food, or contagious diseases (for example cholera and dysentery). Children and pregnant women are particularly susceptible to vector and water-borne diseases. Anaemia – resulting from malaria – is responsible for a quarter of maternal mortality. Climate change will likely result in declining quantity and quality of drinking water in many locations, which is a prerequisite for good health, and exacerbate malnutrition – an important source of ill health among children – by reducing natural resource productivity and threatening food security, particularly in sub-Saharan Africa, but also in many other low latitude areas.
Ensure environmental sustainability (Goal 7)	Climate change is likely to alter the quality and productivity of natural resources and ecosystems, some of which may be irreversibly damaged, and these changes may also decrease biological diversity and compound existing environmental degradation.
Global partnerships (Goal 8)	Climate change is a global issue and response requires global co-operation, especially to help developing countries adapt to the adverse impacts of climate change.

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1.1. Objectives and scope of this Policy Guidance

This Policy Guidance has been developed in response to the OECD Ministerial Declaration which commits OECD members to: "work to better integrate climate change adaptation in development planning and assistance, both within their own governments and in activities undertaken with partner countries [and to]:

- promote understanding of climate change and its impacts within their development co-operation agencies and with partners in developing countries;
- identify and use appropriate *entry points* for integrating adaptation to climate variability and climate change into development co-operation activities, including country assistance strategies, sectoral policy frameworks, poverty reduction strategies, long-term investment plans, technical consultations and sector reviews, as well as strategic and project-level environmental impact assessments;
- assist developing country partners in their efforts to reduce their vulnerability to climate variability and climate change, to identify and prioritise adaptation responses, and, where necessary, to help integrate such considerations within a wide range of sectoral *interventions* and projects, in line with the principles and objectives of the Paris Declaration on Aid Effectiveness."

This Policy Guidance is intended to assist donors and partners in all these respects. The harmonisation of donor practices is another central objective. A critical reference point for this Policy Guidance is the Paris Declaration on Aid Effectiveness and especially its five overarching principles (see Box 1.1).

Box 1.1. **A critical reference point: The Paris Declaration on Aid Effectiveness**

The Paris Declaration on Aid Effectiveness (March 2005), and the follow-up Accra Agenda for Action (September 2008) provide a critical part of the context for this Policy Guidance. The Paris Declaration marks an unprecedented level of consensus and resolve to reform aid in order to make it more effective in combating global poverty and inequality, increasing growth, building capacity and accelerating achievement of the Millennium Development Goals. It lays down practical, action-oriented commitments for both donors and partner countries.

The five overarching principles of the Paris Declaration – ownership, alignment, harmonisation, managing for development results and mutual accountability – are major reference points for guiding policy dialogue and shaping development co-operation programmes in all sectors.

- *Ownership*: Partner countries exercise effective leadership over their development policies and strategies and co-ordinate development actions.
- *Alignment*: Donors base their overall support on partner countries' national development strategies, institutions and procedures.
- *Harmonisation*: Donors' actions are more harmonised, transparent and collectively effective.
- *Managing for Results*: Managing resources and improving decision-making for results.
- *Mutual Accountability*: Donors and partners are accountable for development results.

The Accra Agenda for Action articulates a set of ambitious actions by donors and partners to accelerate the full implementation of the Paris Declaration.

Each of the Paris principles has important implications for the focus, scope and contents of this Policy Guidance:

- **Ownership**: In line with this principle, the Policy Guidance seeks to take the perspective of the partner country's institutions (governmental or non-governmental) rather than the donor's perspective. It examines how climate change adaptation can be integrated in the context of national policies, plans and programmes, rather than focus narrowly on activities which receive donor support.
- **Alignment**: In line with this principle, the Policy Guidance seeks to advise donors on how they can support and strengthen existing domestic processes relevant to climate change adaptation, including through joint initiatives for capacity development.
- **Harmonisation**: To facilitate harmonisation, the Policy Guidance seeks to develop approaches and tools which can be used by all donors individually and collectively.
- **Managing for Results**: As far as possible, the Policy Guidance should point to approaches and indicators to monitor progress and results achieved by the policies, processes and instruments it recommends, building on existing monitoring systems wherever possible.
- **Mutual Accountability**: In formulating recommendations for policies and instruments, the Policy Guidance should take account of and reflect the multiple aspects of mutual accountability: between donors and partners, between civil society actors and partner country governments, and, in the context of regional approaches, between governments of developing countries.

1.2. Target audience

With regard to the *target audience*, in line with the DAC mandate to provide advice to its own members, the Policy Guidance is formally targeted on development co-operation agencies. It should, however, also be of direct interest and relevance to policy makers and practitioners in developing countries, given that it is organised around partner countries' institutions and processes, in line with the Paris Declaration.

While development practitioners are clearly the core audience, the Policy Guidance can also help better inform climate change negotiators, practitioners and policy analysts about the development processes and governance contexts within which decisions to implement adaptation might eventually be taken. Therefore, it may be of relevance to these communities as well.

1.3. Structure of the Policy Guidance

This Policy Guidance is divided into three parts:

Part I: *Understanding the Challenge* – introduces human-induced climate change and places it within the context of weather and natural climate variability (Chapter 2). This is followed by a discussion of the implications of climate change on key sectors and regions (Chapter 3). Chapter 4 introduces the concepts of adaptation and mitigation, and the need for mainstreaming climate change responses into regular

development activity, while Chapter 5 describes a four-step generic approach to address adaptation to climate change.

Part II: *Integrating Climate Change Adaptation at National, Sectoral and Project Levels* – discusses in detail how to assess and address climate risks and integrate adaptation responses within development activities at a strategic level – within centralised national government processes (Chapter 7), at the sectoral level (Chapter 8) and at the project level (Chapter 9).

Part III: *Integrating Climate Change Adaptation at the Local Level* – discusses in detail how to assess climate risks and incorporate adaptation considerations within government and community level processes at the local level – within both urban and rural contexts.

Chapter 2

Weather, Climate Variability and Climate Change

This chapter introduces fundamental concepts related to weather, climate variability and climate change. It also outlines the implications of climate change for weather extremes.

This chapter introduces fundamental concepts related to weather, climate variability and climate change, concepts which are important for placing the challenge of adaptation in context. *Weather* describes the actual state of the atmosphere in a given location at a given time in terms of such variables as air temperature, rainfall, and wind speed. *Climate* is typically defined as weather averaged over a period of time and possibly over a geographic region. A look at various weather and climate records shows variability on every time-scale, from daily, seasonal and annual to over hundreds or even thousands of years. Until very recently, the causes of such changes were entirely natural. They included the chaotic dynamics inherent to the climate system as well as changes in solar radiation, ocean circulation and reflectance of the earth's surface. Examples of natural shifts in the climate system include phenomena as diverse as the last ice age (which ended 10 000 years ago) and shorter-term fluctuations driven by the El Niño Southern Oscillation which occur every few years and typically last several months.

Upon this complex landscape of naturally occurring climatic fluctuations, human activity has superimposed a relatively recent trend: anthropogenic climate change or "global warming". There is now an international consensus among the world's leading experts, assembled under the auspices of the Intergovernmental Panel on Climate Change (IPCC) that concentrations of greenhouse gases (GHGs) are rising as a result of human activities, particularly since the dawn of the industrial revolution. In addition, the IPCC has established that this increase has already had a discernible influence on the earth's climate (IPCC, 2001 and 2007). The mean global temperature increased by almost 0.74°C over the course of the 20th century, with most of the warming occurring in the last few decades following a sharp increase in GHG concentrations since the 1950s. The IPCC estimates, on the basis of scenarios of future GHG emissions and projections from computer models of the climate, that the earth's average surface temperature will increase by between 1.1°C and 6.4°C (relative to 1990) by the end of this century. During the same period, global mean sea levels are projected to rise by at least 18-cm and perhaps by as much as 59-cm, and values of sea-level rise that are significantly larger than this range cannot be excluded as certain processes that could lead to substantial additional sea-level rise are still not well understood (Oppenheimer *et al.,* 2007). For example, Rahmstorf (2006) projected a mean sea-level rise of 50-cm to 140-cm by 2100.

The rise in global temperature will also affect other climate variables. Higher temperatures will result in more precipitation falling as rain rather than snow and reductions in glaciers and many snowpacks. Although increasing global temperatures will result in increased global precipitation, the increase will not be spread evenly. In general, high latitude areas will see increased precipitation; mid-latitude areas will see a mix of changes, many subtropical areas will see a decrease in precipitation, and many equatorial areas could have increased precipitation. There are likely to be substantial variations in changes in precipitation patterns in particular regions within these latitudinal ranges. The seasonality of precipitation patterns is also likely to change in many locations.

2.1. Implications of climate change for weather extremes

While changes in average weather conditions are important, societies, particularly in developing countries, are especially vulnerable to extreme conditions, such as floods, droughts, heat waves and cyclones. Climate change will also cause changes in these weather extremes, which can have much more significant consequences on society than average increases in temperature or sea level. There is now a growing consensus that climate change is likely to result in more frequent heat waves, heavy precipitation events, droughts and incidences of extremely high sea levels. In addition, tropical cyclones are projected to become more intense, with larger peak wind speeds and heavier precipitation, primarily due to the warming of the tropical oceans – a trend that has already been observed in recent decades. This, combined with higher sea levels, will most likely result in higher storm surges. A more detailed assessment of confidence in observed changes in various weather and climate extremes during the 20th century and in projected changes during the 21st century has been documented in the IPCC Fourth Assessment Report (Table 2.1).

Table 2.1. **Recent trends and projections for extreme weather events**

Phenomenon and direction of trend	Likelihood that trend occurred in late 20th century (typically post-1960)	Likelihood of future trends based on projections for the 21st century
Warmer and fewer cold days and nights over most land areas	Very likely	Virtually certain
Warmer and more frequent hot days and nights over most land areas	Very likely	Virtually certain
Warm spells/heat waves. Frequency increases over most land areas	Likely	Very likely
Heavy precipitation events. Frequency (or proportion of heavy falls in total rainfall) increases over most areas	Likely	Very likely
Area affected by drought increases	Likely in many regions since the 1970s	Likely
Intense tropical cyclone activity increases	Likely in some regions since the 1970	Likely
Increased incidence of extreme high sea level (excludes tsunamis)	Likely	Likely

Source: Adapted from IPCC (2007), "Climate Change 2007: Impacts, Adaptation and Vulnerability", Working Group II Contribution to the *Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, "Chapter 17: Assessment of Adaptation Practices, Options, Constraints and Capacity", Cambridge University Press, Cambridge, pp. 717-743.

While there is strong agreement among computer models of the climate system about large-scale changes in temperature, and recent versions of the models tend to show improved agreement on changes in subcontinental climate patterns, there is more uncertainty regarding the precise changes in rain- and snowfall, and particularly changes in variability and extremes. This is especially the case at the smaller scales that are most relevant for development planning: climate models typically have a resolution of a few hundred by a few hundred kilometres, while in reality, geographical conditions vary strongly at much smaller scales. These uncertainties tend to be especially pronounced for many developing countries, which often lack the long records of dense high-quality weather observations available in developed regions, as well as the research capacity to properly analyse past data and future climate projections.

Therefore, while much of the available information is clear enough to warrant and guide decision making, climate science is not, and never will be, in a position to provide precise quantitative forecasts for all aspects of the climate in a specific location for the next few years, decades or centuries. Instead, uncertainties, often about the likely extent of the change, but sometimes even about the direction of change (*e.g.* for precipitation) are part of the challenge. However, uncertainty is not something development planners cannot handle. They already plan in light of uncertainty about future population levels, economic conditions, migration patterns, rules and regulations, and other factors. The general notion of rising risks with potentially severe socio-economic implications often provides a sufficient basis for considering the full spectrum of climate risks, including those related to variability and extremes as well as gradual changes in climatic conditions.

Chapter 3

Vulnerability of the Developing World to Climate Change

This chapter highlights the implications of climate change on key sectors important for development as well as the impacts of climate change on the developing world.

The vulnerability of countries and societies to the effects of climate change depends not only on the magnitude of climatic stress, but also on the sensitivity and capacity of affected societies to adapt to or cope with such stress (Box 3.1). Sensitivity to climatic stress is higher for activities entailing climate-dependent natural resources, such as agriculture and coastal resources – often critical for the livelihoods of the poor. The capacity to adapt and cope depends upon many factors, including wealth, technology, education, institutions, information, skills and access to resources, which are generally scarce in poor countries and communities. The concept of vulnerability recognises that socio-economic systems play a role in amplifying or moderating the impacts of climate change.

Box 3.1. **Climate change sensitivity, adaptive capacity and vulnerability**

Sensitivity is the degree to which a system can be affected, negatively or positively, by changes in climate. This includes change in mean climate and the frequency and magnitude of extremes. The effect may be direct (for example a change in crop yield due to a change in temperature) or indirect (such as damage caused by increased frequency of coastal flooding due to sea-level rise). Sensitivity includes exposure which considers the nature and magnitude of climate change and whether a system would be affected by such change. For example, the low-lying coastal areas of Bangladesh are exposed to sea-level rise, whereas the Rift Valley in Africa, because of its elevation, is not. Sensitivity also considers the extent to which an exposed system can be affected by climate change. Some crops such as maize are quite sensitive, while systems such as manufacturing are much less sensitive to climate change, although they can be affected by extreme events, reductions in water supplies, and power disruption.

Adaptive capacity is a system's ability to adjust to climate change (including climate variability and extremes), to moderate potential damage, to take advantage of opportunities or to cope with consequences. It is a function of the relative level of a society's economic resources, access to technology, access to information on climate variability and change, and skills to make use of the information, institutions (for example, the degree to which institutions can help to adapt), and equitable distribution of resources (societies with relatively more equitable resource distribution will be better able to adapt than societies with less equitable distribution). The level of adaptive capacity tends to be positively correlated with the level of development: more developed societies tend to have more adaptive capacity. However, possessing adaptive capacity is not a guarantee that it will be used effectively.

Vulnerability is the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude and rate of climate change, and the degree to which a system is exposed, along with its sensitivity and adaptive capacity. Vulnerability increases as the magnitude of climate change or sensitivity increases, and decreases as adaptive capacity increases.

Source: IPCC (2001), "Climate Change 2001: Impacts, Adaptation and Vulnerability", Working Group II Contribution to the *Third Assessment Report of the Intergovernmental Panel on Climate Change*, "Chapter 18: Adaptation to Climate Change in the Context of Sustainable Development and Equity", Cambridge University Press, Cambridge, pp. 877-912.

Empirical research has shown that both the entitlements to and the elements of adaptive capacity are socially differentiated according to lines of age, ethnicity, class, religion and gender (IPCC, 2007, Chapter 17). For example, the gender aspects of vulnerability and adaptive capacity are further detailed in Box 3.2.

Box 3.2. **Gender aspects of vulnerability and adaptive capacity**

Climate change will disproportionately affect poor regions, communities and people, as they have the least resources to adapt. Women are estimated to make up about 70% of the world's poor and, thus, are likely to be strongly affected by climate change (Mitchell *et al.*, 2007).Vulnerability and adaptive capacity are socially differentiated along lines of age, ethnicity, class, religion and gender. There are structural differences between men and women through, for example, gender-specific roles in society, work and domestic life. These differences affect the vulnerability and capacity of women and men to adapt to climate change. In the developing world in particular, women are disproportionately involved in natural resource-dependent activities, such as agriculture, compared to salaried occupations. As these activities are directly dependent on climatic conditions, changes in climate variability projected for future climates are likely to affect women through a variety of mechanisms: directly through the availability of water,, vegetation and fuel wood, and through health issues relating to vulnerable populations (especially dependent children and the elderly). Water scarcity and declining rainfall levels may force women to walk longer distances to have access to water and fuel wood, and thus reduce the amount of time they can spend cultivating their fields (resulting in lower yields) and/or earning money through a variety of income-generating activities.

Most fundamentally, the vulnerability of women in agricultural economies is affected by their relative insecurity of access to rights over information, knowledge, resources and sources of wealth such as agricultural land. For example, women have often been neglected by agricultural extension officers, therefore limiting their access to new crop varieties and agricultural technologies. In addition, it is well established that women, in many countries, are disadvantaged in terms of property rights and security of tenure, though the mechanisms and exact form of the insecurity are contested. This insecurity can have implications both for their vulnerability in a changing climate, and for their capacity to adapt productive livelihoods to a changing climate.

Source: IPCC (2007), "Climate Change 2007: Impacts, Adaptation and Vulnerability", Working Group II Contribution to the *Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, "Chapter 17: Assessment of Adaptation Practices, Options, Constraints and Capacity", Cambridge University Press, Cambridge, pp. 717-743.

Climate change is also likely to differentially affect certain sectors and regions. For example, certain coastal and marine ecosystems, such as mangroves, salt marshes and coral reefs will be subject to multiple stresses. Climate change will affect many key resources that are critical for development. These impacts will generally become more significant and more widespread with increasing climate change. For example, water resources in some dry regions at mid-latitudes, including arid and semi-arid regions, and in the dry tropics will be affected by changes in rainfall and evapotranspiration. Low-lying coastal systems will be affected by sea-level rise and more frequent extreme weather events.

Also, it is likely that certain regions will be strongly affected by climate change. Africa is considered one of the regions most vulnerable to climate change because of its

low adaptive capacity. Asian and African mega deltas will also be at high risk due to their large populations and high exposure to sea-level rise, storm surges and river flooding. A summary of impacts on some key sectors and regions is provided in the following two sections.

3.1. Implications of climate change on key sectors important for development

Climate change will provide an additional stress on *water resources* through increased evaporation losses and water demands as a result of rising temperatures; reduced coastal freshwater supplies because of sea-level rise and salinisation; increased precipitation extremes in certain regions (such as high latitudes) which has implications for flooding risks; initial increase and eventual reduction in glacial meltwater as glaciers recede and possibly disappear in certain regions; reduced rainfall in other regions (such as southern Africa and the Mediterranean rim) leading to enhanced drought risk; displaced rainy seasons; and decreased water quality in many regions as a result of higher temperatures, increased loadings of pollutants from more intense precipitation, and lower flow conditions during some seasons.

Food production, meanwhile, is closely linked to water availability and will face increased stress in regions where water stress is exacerbated. Although higher concentrations of carbon dioxide are projected to increase yields for many crops, changes in temperature and precipitation may modify and even limit the direct effects of "carbon dioxide fertilisation". Overall, climate change is expected to lead to declining cereal production in developing countries, with risks of decreasing yields particularly high in Africa, South and South-East Asia, and Latin America (except for mid-latitude areas such as the pampas).

Climate change is also projected to have wide-ranging consequences for *human health* directly through increased temperatures, heat waves, floods, droughts and storms, as well as indirectly through its effects on water- and food-borne diseases, and on the geographical and seasonal ranges of vector-borne diseases.

Coastal zones, especially mega deltas in Asia and Africa, low-lying coastal urban areas and atolls are also particularly vulnerable to the impacts of sea-level rise, storm surges, and increases in the intensity of cyclones in certain regions. These increases in exposure to the risks of climate change are juxtaposed on the already high (and growing) vulnerability of coastal areas, which are home to 23% of the world's population and have population densities three times the global average.

In addition to the above, *ecosystems and natural resources,* which contribute a significant share of income in developing countries, are also vulnerable to rising temperatures, changes in rainfall and rainfall extremes, and sea-level rise. A critical reason for the vulnerability of ecosystems and natural resources around the world is that the combination of rapid climate change and stresses from human settlement, such as habitat fragmentation, population depletion (*e.g.* of many fisheries), blocked migration routes and pollution, is likely to result in the threat of widespread ecosystem dislocation and extinctions of many species.

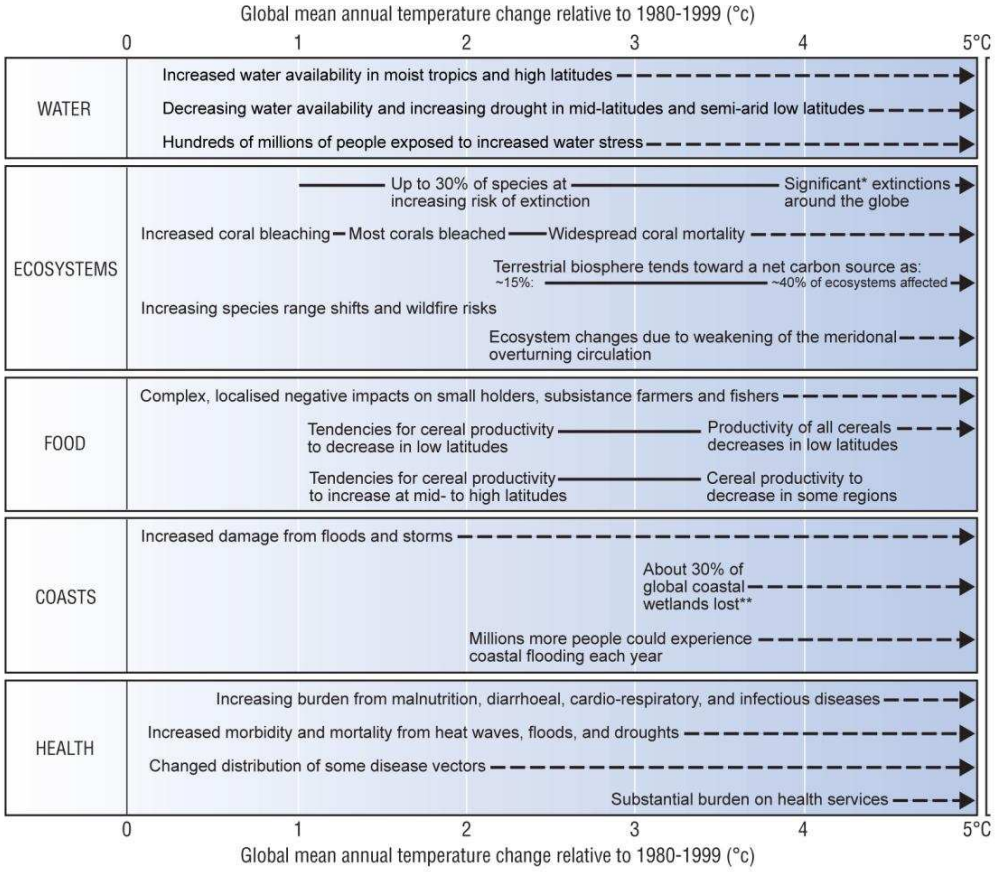
Mountain regions, meanwhile, are at the front lines of many of the impacts of climate change through near-term effects of rising temperatures on glacier retreat and resulting implications on water availability, glacial lake expansion, flooding from melting of

glaciers and bursting of glacial lakes and permafrost melt increases in the risk of related natural hazards.

Figure 3.1 provides an overview of the impacts on water resources, ecosystems, food, coastal resources and health as a function of increasing climate change, again based on the Fourth Assessment Report of the IPCC.

Figure 3.1. **Key impacts as a function of increasing global average temperature change**

Impacts will vary by extent of adaptation, rate of temperature change, and socio-economic pathway



Notes:

† Significant is defined here as more than 40%.

‡ Based on average rate of sea level rise of 4.2 mm/year from 2000 to 2080.

The black lines link impacts; dotted arrows indicate impacts continuing with increasing temperature. Entries are placed so that the left-hand side of the text indicates the approximate onset of a given impact. Quantitative entries for water stress and flooding represent the additional impacts of climate change relative to the conditions projected across the range of Special Report on Emissions Scenarios (SRES) scenarios A1FI, A2, B1 and B2. Adaptation to climate change is not included in these estimations. Confidence levels for all statements are high.

Source: IPCC (2007), "Climate Change 2007: Impacts, Adaptation and Vulnerability", Working Group II Contribution to the *Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, "Chapter 17: Assessment of Adaptation Practices, Options, Constraints and Capacity", Cambridge University Press, Cambridge, pp. 717-743.

3.2. Impacts of climate change on the developing world

Climate change will lead to differential impacts on countries and communities throughout the world. Developing countries are believed to be the most vulnerable to the negative impacts of climate change because they rely heavily on climate-sensitive sectors, such as agriculture and fisheries, and have a low GDP, high levels of poverty, low levels of education and limited human, institutional, economic, technical and financial capacity. Climate Change may also have implications for migration (Box 3.3).

Box 3.3. **Migration and climate change**

The number of environmental migrants could substantially rise in future because of the impacts of climate change. Migration, usually temporary and often from rural to urban areas, is a common response to natural disasters such as floods and famines, and large numbers of displaced people are a likely consequence of extreme events.

The increase in intensity and/or frequency of certain weather extremes due to climate change, in combination with population growth, unstable institutions and poverty, may increase migration pressures (WBGU, 2007).

Development strategies should therefore take greater account of climate change impacts at the local level, including the implications of such impacts on migration both within and between countries.

Africa is one of the most vulnerable continents to climate change and variability. It has more climate-sensitive economies than any other continent with 50% of its population living in dryland areas that are drought-prone. In addition, its agricultural sector contributes an average 21% of GDP in many countries, ranging from 10% to 70%. Climate models project a warming trend for the whole of Africa during this century, with the median temperature increase situated between 3°C and 4°C. Trends in annual rainfall vary between regions, with increases likely in East Africa and decreases likely in much of Mediterranean Africa, northern Sahara and on the western margins of southern Africa. A general increase in the intensity of high rainfall events is also expected in Africa.

Asia is the world's largest and most populous region. Although a number of Asian nations have had rapid economic growth and reductions in poverty, nearly one in three Asians today lives on less than one US dollar per day. The region's governments are struggling to cope with the effects of rapid deforestation, soil erosion, recurrent floods and other major disasters, environmental pollution and the social consequences of depleted natural resources (Estes, 2007). Climate change will reinforce some of these problems and lead to new problems and stresses, which Asian governments will have to respond to. The climate models project a warming of at least 2.5°C over Asia by the end of the century. Winter rainfall (December-March) is projected to increase in northern Asia, the Tibetan plateau, eastern Asia and the southern parts of South-East Asia. Summer rainfall is likely to increase in northern, East and South Asia and most of South-East Asia, but is likely to decrease in central Asia. In addition, extreme rainfall and winds associated with tropical cyclones are likely to increase in East, South-East and South Asia. It is also projected that heat waves will be of longer duration, more intense and more frequent in East Asia.

Latin America is a region heavily dependent on natural resources with, for example, 30% to 40% of its working population employed in the agricultural sector. The impacts of climate change on agriculture will, therefore, affect the region's economy, development, and poverty reduction efforts. Despite the region's progress in reducing poverty in recent years, 38.5% of people still live in poverty (Inter-American Development Bank, 2006) and inequities in the distribution of wealth among the population of this region are among the highest in the world. These factors contribute to make this region one of the most vulnerable to climate change. The mean warming projected for this century in Latin America ranges from 1°C to 6°C. Annual rainfall is estimated to decrease in most of Central America, resulting in a drier spring season, and in the southern Andes, where rainfall changes are projected to be largest in summer. Winter rainfall in Tierra del Fuego and summer rainfall in south-eastern South America is likely to increase. It is uncertain how annual and seasonal average rainfall will change over northern South America, including the Amazon forest. However, there is consistency in the projections for some areas: rainfall increasing in Ecuador and northern Peru, and decreasing at the northern tip of the continent and in southern north-east Brazil. Over Central America, tropical cyclones may become an additional source of uncertainty for regional scenarios of climate change, since the summer rainfall over this region may be affected by systematic changes in hurricane tracks and intensity.

Small island states are a heterogeneous group of countries, which vary by geography, location, stage of economic development, and physical, social, political, cultural and climatic character. However, they share common characteristics that underscore their overall vulnerability to climate change: limited physical size; limited natural resources; high susceptibility to natural hazards, such as tropical cyclones, storm surges, and droughts; thin water lenses that are highly sensitive to sea-level changes; generally high population densities and in some cases high population growth rates; frequently poorly developed infrastructure; and limited funds and human resource skills (IPCC, 2001). All Caribbean, Indian Ocean and North and South Pacific islands will warm during this century, albeit at a slightly lower rate than the global annual mean warming. Summer rainfall in the Caribbean is likely to decrease in the vicinity of the Greater Antilles but changes elsewhere and in winter are uncertain. Annual rainfall is likely to increase in the northern Indian Ocean with increases likely in the vicinity of the Seychelles in December, January and February (DJF), and in the vicinity of the Maldives in June, July and August (JJA), while decreases are likely in the vicinity of Mauritius in JJA. Annual rainfall is likely to increase in the equatorial Pacific, while decreases are projected for just east of French Polynesia in DJF. Sea levels are likely to rise during the century around the small islands of the Caribbean Sea, and the Indian and Pacific Oceans.

Eastern Europe has witnessed rapid socio-economic changes, especially during the transition from socialist to market economies. The income per capita varies widely with the highest levels in countries close to Western Europe and lower levels to the east and south. With this disparity in income, the adaptive capacity of Eastern European countries is likely to differ. Annual average temperature is likely to increase by 3 to 5°C over central and south-east Europe by the year 2100. There is a pronounced difference in model projections for north-east and south-east Europe. The climate models tend to project increased precipitation approximately north of about 50°N and reduced precipitation approximately south of 45°N. Annual average rainfall is expected to increase by up to 10% in most central European regions, although this increase occurs mainly in winter. Summer rainfall is expected to decrease, particularly in the south, thus increasing the risk of summer droughts.

A summary of some illustrative regional impacts of climate change is provided in Table 3.1.

Table 3.1. **Illustrative regional impacts of climate change**

Africa
• Agricultural production, including access to food, will be severely compromised and the area suitable for agriculture, the length of growing seasons and yield potential, particularly along margins of semi-arid and arid areas, are expected to decrease. • By 2020, crop yields from rain-fed agriculture may be reduced substantially. • By 2020, between 75 and 250-million people are projected to be exposed to increased water stress due to climate change. By 2050, between 350 and 600-million people are projected to be at risk of water stress. There will be a significant increase in the number of people experiencing water stress in northern and southern Africa. • By 2050, production of many crops in Egypt will be reduced by up to 11% for rice and by 28% for soybeans. • Sea-level rise will have significant impacts on coastal areas. By 2050, in Guinea, between 130 and 235 km^2 of rice fields (17% and 30% of existing rice field area) could be lost as a result of permanent flooding due to sea-level rise. • By 2050, a large part of the western Sahel and much of southern-central Africa are likely to become unsuitable for malaria transmission. Meanwhile, previously malaria-free highland areas in Ethiopia, Kenya, Rwanda and Burundi could experience modest incursions of malaria.
Asia and Central Asia
• By 2020, an additional 49-million people are projected to be at risk of hunger. Some projections suggest a 7% to 14% increase in risk of hunger. • Significant regional differences in wheat, maize and rice yields are expected. Yields might increase by up to 20% in East and South-East Asia and decrease by up to 30% in Central and South Asia. • Climate change is likely to lead to an increase in agricultural areas needing irrigation, as usable water resources decline. A 1ºC increase in temperature is projected to result in a 10% increase in agricultural irrigation demand in arid and semi-arid regions of East Asia. • By 2050, an additional 132 million people are projected to be at risk of hunger. • By 2050, in Bangladesh, rice and wheat production might drop by 8% and 32% respectively. • By 2050, freshwater availability in Central, South, East and South-East Asia, particularly in large river basins such as Changing, is likely to decrease as a result of climate change, while demand is likely to increase with population growth and rising standards of living. This could adversely affect more than a billion people in Asia by the 2050s. • Climate change-related melting of glaciers could affect a half billion people in the Himalaya-Hindu-Kush region and a quarter billion people in China who depend on glacial melt for their water supplies. • Coastal areas, especially heavily populated mega delta regions in South, East and South-East Asia, will be at greatest risk of increased flooding from the sea and, in some mega deltas, flooding from rivers. • By 2050, more than one million people may be directly affected by sea-level rise in each of the Ganges-Brahmaputra-Meghna deltas in Bangladesh and the Mekong delta in Viet Nam. • Endemic morbidity and mortality due to diarrhoeal disease primarily associated with floods and droughts are expected to rise in East, South and South-East Asia according to projected changes in the hydrological cycle. • Climate change is projected to compound the pressures on natural resources and the environment associated with rapid urbanisation, industrialisation and economic development. Up to 50% of Asia's total biodiversity is at risk. • 24% to 30% of coral reefs may be lost in the next 10 to 30 years.
Latin America and the Caribbean
• By 2020, generalised reductions in rice yields and increases in soybean yields (with CO_2 effects considered) are projected. • By 2020, an additional 5 million people could be at risk of hunger (CO_2 effects not considered). • Greater heat stress and dryer soils may reduce yields to a third in tropical and subtropical areas where harvests are near maximum heat tolerance. • By 2020, in temperate areas such as the Argentinean and Uruguayan pampas, pasture productivity could increase by between 1% and 9%. • By 2020, net increases in the number of people experiencing water stress are likely to be between 7 and 77-million. • Over the next decades, Andean inter-tropical glaciers are projected to disappear, affecting water availability and hydropower generation. • In Peru, the retreat of glaciers will affect the availability of water supply for 60% of the population. • In terms of health impacts, main concerns are heat stress, malaria, dengue fever, cholera and other water-borne diseases. • By 2050, desertification and salinisation are projected to affect 50% of agricultural lands. • By 2050, an additional 26 million people could be at risk of hunger (CO_2 effects not considered). • For smallholders, a mean reduction of 10% in maize yields could be expected by 2055. • By mid-century, increases in temperature and associated decreases in soil water are projected to lead to gradual replacement of tropical forest by savannah in eastern Amazonia. • Risk of significant biodiversity loss through species extinction is projected in many areas of tropical Latin America. • Extinction of 24% of the 138 tree species of the central Brazil savannas (*cerrados*) could result from the projected increase of 2°C in surface temperature. Tropical cloud forests in mountainous regions will be threatened if temperatures increase by 1°C to 2°C.

Table 3.1. **Illustrative regional impacts of climate change** (continued)

Small Island States
• Subsistence and commercial agriculture will be adversely affected. Fisheries are also expected to be negatively affected. • Many islands in the Caribbean are likely to experience increased water stress. Climate change will reduce freshwater availability and increase salinisation of freshwater resources. • Sea-level rise is expected to exacerbate inundation, storm surge, erosion and other coastal hazards, thus threatening vital infrastructure, settlements and facilities that support island communities. • Deterioration in coastal conditions, for example through erosion of beaches and coral bleaching, is expected to affect local resources. • By mid-century, climate change is expected to reduce water resources in many small islands (*e.g.* in the Caribbean and the Pacific) to the point where they become insufficient to meet demand during low-rainfall periods. • By 2050, in the Pacific a 10% reduction in average rainfall is likely to correspond to a 20% reduction in the size of the freshwater lens on Tarawa Atoll, Kiribati. • Coral bleaching may become an annual or biannual event in the next 30 to 50 years or sooner. • By 2050, in the absence of adaptation, a high island such as Viti Levu, Fiji, could experience damages of USD 23 million to USD 52 million per year (equivalent to 2%-3% of Fiji's GDP in 2002).
Central and Eastern Europe
• In central and eastern Europe, the risk of floods is projected to increase, especially in northern areas. • Summer river flows may decrease by up to 50% in central Europe and by up to 80% in some rivers in southern Europe. • By 2020, in southern Europe annual river runoff decreases by 0 to 23% (compared to 1961-1990 baseline). • By 2020, snow-melt floods are likely to increase. • By 2050, in southern Europe, for spring sown crops, general decreases in yield (*e.g.* for legumes -30 to +5%; sunflower -12 to +3%; and tuber crops -14 to +7%) and increases in water demand (*e.g.* for maize +2 to +4% and potato +6 to +10%) are expected. • By 2050, annual runoff in south-eastern Europe is projected to decline by up to between 20% and 30%. • For the Baltic coasts, sea -level rise projections indicate an increased risk of flooding and coastal erosion after 2050. • Increased risks to health due to more frequent heat waves, particularly in central and southern Europe, are projected, as are flooding and greater exposure to vector- and food-borne diseases.

Chapter 4

Adapting to the Impacts of Climate Change

This chapter sets out what is involved in adaptation to the impacts of climate change and how adaptation is different from regular development.

There are two broad categories of responses to climate change: mitigation and adaptation (Box 4.1). Both mitigation and adaptation help to reduce the risks of climate change. Mitigation aims to avoid or at least limit climate change itself, by reducing the emissions of GHGs, for instance by promoting energy efficiency, the use of renewable energy such as solar and wind power, and avoiding deforestation. Adaptation consists of deliberate actions undertaken to reduce the adverse consequences, as well as to harness any beneficial opportunities.

Box 4.1. **Mitigation and adaptation**

Mitigation consists of activities that aim to reduce GHG emissions, directly or indirectly, by avoiding or capturing GHGs before they are emitted to the atmosphere or sequestering those already in the atmosphere by enhancing "sinks" such as forests. Such activities may entail, for example, changes to behaviour patterns or technology development and diffusion.

Adaptation is defined as adjustments in human and natural systems, in response to actual or expected climate stimuli or their effects, that moderate harm or exploit beneficial opportunities.

Source: IPCC (2001), "Climate Change 2001: Impacts, Adaptation and Vulnerability", Working Group II Contribution to the *Third Assessment Report of the Intergovernmental Panel on Climate Change*, "Chapter 18: Adaptation to Climate Change in the Context of Sustainable Development and Equity", Cambridge University Press, Cambridge, pp. 877-912.

Both mitigation and adaptation to climate change are essential and complementary. The extent and scope of regional climate change impacts will depend on the degree of mitigation. Reductions in GHG emissions will delay and reduce damages caused by climate change, and thus reduce the amount of adaptation that will be necessary. However, while mitigation of climate change is crucial to limit long-term impacts, climate change is already happening, and is bound to continue simply because of the GHGs that have already been emitted. Furthermore, GHG mitigation relies on difficult policy choices, as well as further technological development, so emissions are bound to keep rising before they may eventually taper off. For those reasons, climate change will inevitably continue, and even accelerate, at least for several decades to come. Adaptation to these impacts which are already "locked in" is therefore critical. The focus of this Policy Guidance is on adaptation and how to integrate it within development processes.

Adaptation and its implementation are consequently of growing significance within the context of the international negotiations on climate change (Box 4.2), as well as within international processes in related domains, particularly within the context of the Hyogo Framework on Disaster Risk Reduction (DRR). DRR and adaptation share commonalities in purpose in that they aim to reduce the vulnerability of societies to hazards by improving the ability to better anticipate, resist and recover from their impact. There is potential in drawing upon the national platforms and other DRR tools and experiences within and outside the Hyogo Framework for adaptation purposes. DRR, however, expands beyond weather-related disasters, while adaptation includes not only climate extremes, but also the more slowly evolving risks posed by climate change. Thus, while there are clear synergies which must be exploited, there are also some exclusive elements within DRR and adaptation which need to be addressed separately.

Box 4.2. **Adaptation within international negotiations on climate change**

Adaptation is a relatively recent concern within the context of international negotiations on climate change. Adaptation is mentioned in both the United Nations Framework Convention on Climate Change (UNFCCC) negotiated in 1992, and the Kyoto Protocol, negotiated in 1997. The implementation of adaptation has come into a much sharper focus since the Seventh Conference of the Parties (CoP-7) in Marrakech in 2001 which established three funds dealing with adaptation:

- *The Least Developed Countries Fund* is intended to address the particularly low adaptive capacity of the least developed countries (LDCs). The Marrakech Accords established the fund to help such countries prepare their National Adaptation Programmes of Action (NAPAs), which establish and prioritise adaptation needs. The fund also supports institutional capacity building and other activities.
- *The Special Climate Change Fund* finances a multitude of activities in both mitigation and adaptation in all developing countries. The activities can be specific to sectors – energy, transport, industry, agriculture, forestry and waste management – or aimed directly at adaptation, technology transfer and economic diversification.
- *The Adaptation Fund* – the only Marrakech fund linked to the Protocol rather than the Convention – provides funding only to parties to the Protocol. Like the other two funds, its resources come from voluntary contributions, but it also benefits from a 2% share of the proceeds of certified emissions reductions from projects under the Protocol's Clean Development Mechanism (CDM).

These funds are part of a more complex architecture of international funding sources for adaptation that also includes the Strategic Priority on Adaptation of the Global Environmental Facility and the World Bank Group Climate Investment Funds as well as bilateral initiatives.

Successive rounds of negotiations have sought to develop a more comprehensive approach to addressing adaptation. This includes a five-year (2005-10) programme – the Nairobi Work Programme on Impacts, Vulnerability and Adaptation to Climate Change – that is fostering a wide range of initiatives to help governments improve their understanding of the impacts, vulnerability and adaptation to climate change, and take informed decisions on practical adaptation actions. The programme aims to achieve the following outcomes:

- improve capacity at international, regional, national, sectoral and local levels to further identify and understand impacts, vulnerability, and adaptation responses, in order to effectively select and implement practical, efficient and high-priority adaptation actions;
- enhance and improve the level and amount of information and advice to the UNFCCC Conference of the Parties and its subsidiary bodies on the scientific, technical and socio-economic aspects of impacts, vulnerability and adaptation;
- enhance the degree of dissemination and utilisation of knowledge from practical adaptation activities;
- enhance co-operation among parties, relevant organisations, business, civil society and decision makers, in order to advance their ability to manage climate change risks; and
- enhance the integration of adaptation into sustainable development plans.

The Nairobi work programme serves as a platform for the dissemination of scientific and technical knowledge, and, in so doing, aims to support and catalyse the implementation of adaptation.

Enhanced action on adaptation is also highlighted as a priority within the "Bali Roadmap" to finalise a post-2012 climate regime by the end of 2009.

4.1. What does adaptation involve?

Adaptation reduces the impacts of climate stresses on human and natural systems. It consists of a multitude of behavioural, structural and technological adjustments. Adaptation measures can vary in their *timing* (anticipatory *vs*. reactive; *ex ante vs*. *ex post*), *scope* (short-term *vs*. long-term; localised *vs.* regional), *purposefulness* (autonomous *vs*. planned; passive *vs.* active) and *adapting agent* (private *vs.* public; societies *vs.* natural systems). Examples of adaptation measures include changing crop varieties and altering farming practices, developing heat- and drough- resistant crops, diversifying livelihoods, building flood defences and land-use planning.

Nevertheless, the need to adapt to changing environmental and climatic conditions is not a new one. Societies throughout history have had to adapt to variations or changes in their climate through a variety of strategies and by using knowledge accumulated through experience of past climatic events. In addition, societies have also had to cope with and respond to extreme weather events, such as droughts and floods. For example, the Sahel region has historically frequently faced extreme climatic variability and events such as droughts. Societies in the Sahel have, therefore, had to regularly adapt to unreliable rainfall and drought conditions for example by diversifying their livelihoods and adopting new crop varieties.

A broad range of adaptation measures can be implemented in response to both observed and anticipated climate change. Such measures include altering farming practices and crop varieties, building new water reservoirs, enhancing water use efficiency, changing building codes, investing in air-conditioning, and constructing sea walls. To better understand this diversity, it is possible to classify adaptation measures into the following generic options or categories (IPCC, 2001, based on Burton, 1996):

- *Bear losses.* All adaptation measures may be compared with the baseline response of "doing nothing" except bearing or accepting the losses. In theory, bearing loss occurs when those affected have no capacity to respond in any other ways (for example in extremely poor communities) or where the costs of adaptation measures are considered to be high in relation to the risk or the expected damages.
- *Share losses.* This type of adaptation response involves sharing the losses among a wider community. Such actions take place in traditional societies and in the most complex, high-tech societies. In traditional societies, many mechanisms exist to share losses among a wider community, such as extended families and village-level or similar small-scale communities. At the other end of the spectrum, large-scale societies share losses through public relief, rehabilitation, and reconstruction paid for from public funds. Sharing losses can also be achieved through insurance.
- *Modify the threat.* For some risks, it is possible to exercise a degree of control over the environmental threat itself. When this is a "natural" event such as a flood or a drought, possible measures include flood control works (dams, dikes, levees). For climate change, the major modification possibility is to slow the rate of climate change by reducing GHGs and eventually by stabilising GHG concentrations in the atmosphere (*i.e*. mitigation).

- *Prevent effects.* A frequently used set of adaptation measures involves steps to prevent the effects of climate change and variability. For example, in agriculture such measures include: changes in crop management practices, such as increased irrigation water, additional fertiliser use, and pest and disease control.
- *Change use.* Where the threat of climate change makes the continuation of an economic activity impossible or extremely risky, consideration can be given to changing the use. For example, a farmer may choose to substitute a more drought-tolerant crop or switch to varieties with lower moisture. Similarly, crop land may be returned to pasture or forest or other uses may be found such as recreation, wildlife refuges, or national parks.
- *Change location.* A more extreme response is to change the location of economic activities. There is considerable speculation, for example about relocating major crops and farming regions away from areas of increased aridity and heat to areas that are currently cooler and which may become more attractive for some crops in the future.
- *Research*. The process of adaptation can also be advanced by research into new technologies and new methods of adaptation.
- *Encourage behavioural change through education, information and regulation.* Another type of adaptation is the dissemination of knowledge through education and public information campaigns, leading to behavioural change. Such activities have been little recognised and have received low priority in the past, but are likely to assume increased importance as the need to involve more communities, sectors and regions in adaptation becomes apparent.

Examples of adaptation measures that can be undertaken in each sector are provided in Table 4.1.

4.2. Is past experience with adaptation sufficient for dealing with the impacts of climate change?

Climate change will pose novel risks often outside the range of historical experience. These new risks include: increases in mean temperatures and sea levels; changes in precipitation patterns; melting of glaciers and permafrost; and changes in the intensity and/or frequency of extremes such as droughts, heat waves, floods and hurricanes. Historical experience, therefore, is not sufficient as a guide to adapting to the impacts of climate change. Furthermore, despite a long record of dealing with climate variability, there is considerable evidence that many societies and sectors remain poorly adapted, even to current climate (IPCC, 2007, Chapter 17).

There is therefore a need to enhance resilience to current climate and to be better prepared to respond and adapt to impacts of climate change, which may fall outside of historical experience. Adaptation, however, will be undertaken by a wide range of actors, including individuals, communities, civil society, governments and private actors. Sustainable responses will therefore require all these actors to internalise current and anticipated climate risks in their various decisions, while being mindful of the associated uncertainties.

Table 4.1. **Illustrative examples of possible adaptation measures**

Sector	Type/category of adaptation	Example of adaptation options
Agriculture	*Share the loss*	Crop insurance
	Prevent the loss (structural, technological)	Investment in new capital
	Prevent the loss (market-based)	Removal of market distortions (*e.g.* water pricing); Liberalisation of agricultural trade to buffer regionalised losses
	Change use	Change crops, promote crop diversification Alter planting dates Alter farming practices
	Research	Development of heat- and drought-resistant crops
Coastal zones	*Prevent the loss* (structural, technological)	Coastal defences/sea walls Surge barriers Upgrade drainage systems, salt water intrusion barriers
	Prevent the loss (on-site operations)	Sediment management Beach nourishment Habitat protection (*e.g.* wetlands, mangroves)
	Prevent the loss (institutional, administrative)	Land use planning
	Change location	Relocation Set back areas
Water	*Prevent the loss* (structural, technological)	Loss reduction (leakage control; conservation plumbing) Capacity increase (new reservoirs, desalination facilities)
	Prevent the loss (institutional/administrative)	Water allocation (*e.g.* municipal *vs.* agricultural) Risk management to deal with rainfall variability
	Prevent the loss (market-based)	Water permits Water pricing
	Education/behavioural	Rational water use Rainwater collection
Health	*Prevent the loss* (structural, technological)	Air-conditioning Building standards
	Prevent the loss (institutional, administrative)	Improvements in public health Vector control programmes Disease eradication programmes
	Research	Research & Development (R&D) on vector control Vaccines Disease eradication

While a multitude of actors will need to adapt to climate change, governments and public agencies have a particularly important role to play in this regard. First, governments are the custodians for public assets (such as national parks) and provide services (such as clean water, health care and sanitation) which may be affected by climate change. Second, governments establish rules and regulations that can enhance or constrain the ability of other actors to adapt to the impacts of climate change. These could include, for example, zoning regulations in areas that could be at risk from climate change, policies to promote more efficient water use in areas that might face greater water scarcity, and modified building regulations in areas that may be at enhanced risk of floods, hurricanes, or permafrost-related hazards. Finally, governments are also responsible for investments in "public goods" such as monitoring of weather and climate, provision of weather forecasts, and research and development that could affect the ability of other actors to better adapt to the impacts of climate change.

4.3. How is adaptation different from regular development?

Although adapting to climate change represents a new challenge, overlaps do exist between "business-as-usual" development strategies and adaptation (see Box 4.4). In some cases, activities undertaken to achieve development objectives can automatically lead to adaptation benefits. For instance, decisions taken as part of development activities can have considerable bearing on the vulnerability of societies to the potential impacts of climate change. In principle, a range of development activities oriented towards reduced poverty and improved nutrition, education, infrastructure and health would be synergistic with adaptation to climate change. This is the fundamental principle of adaptive capacity as discussed in the IPCC (2007 and 2001): that better developed societies possess more adaptive capacity than less developed societies and therefore have lower vulnerability to climate change. Furthermore, in situations where vulnerability is primarily contextual, adaptation might simply require emphasis on *baseline* or *business-as-usual* economic development activities – alleviating poverty and improving nutrition, health care, livelihoods and so on – as these activities will also boost the capacity for coping with climate change.

However, while there are overlaps between adaptation and development, activities with an explicit focus on adaptation and climate change will also be required. For example, in cases where vulnerability is significantly exacerbated by the biophysical impact of climate change, adaptation will likely require more explicit consideration of climate risk in development activity. For example, in the Nepal Himalayas, infrastructure and livelihoods could be catastrophically affected by glacial lake outburst floods and glacier retreat resulting from rising temperatures (Agrawala *et al.*, 2004). Thus, adaptation would require more direct measures to reduce exposure to such risks, going beyond baseline poverty reduction and economic development. In addition, business-as-usual development does not include activities that specifically aim to address climate change and reduce its impacts or take advantage of any new opportunities. For such action, explicit adaptation activities need to be developed. For example, in order to respond to the impact of climate change on coral reefs or the increased risk of glacial lake outburst floods, targeted adaptation activities need to be developed.

Further, in many cases (business-as-usual) development that does not take account of climate change is likely to lead to *maladaptation* (see Box 4.3).

Box 4.3. **Definition of maladaptation**

In this Policy Guidance, maladaptation is defined as business-as-usual development which, by overlooking climate change impacts, inadvertently increases exposure and/or vulnerability to climate change. Maladaptation could also include actions undertaken to adapt to climate impacts that do not succeed in reducing vulnerability but increase it instead.

For example, new infrastructure may not be designed to cope with changed weather extremes and thus may either provide inadequate protection from extreme events or may have a shorter useful lifetime than intended. Such outcomes could retard development by allowing climate extremes to result in larger losses of life and destruction of property than would occur if infrastructure were built to withstand risks from climate change. Agricultural investments may not pay off as expected if the climate is becoming

unsuitable for particular crops. Yields could decrease and food would need to be imported, thus limiting economic growth. Activities promoting human settlement or infrastructure development in areas that may become unsuitable because of climate change could even increase a region's vulnerability. Such areas may become vulnerable to rising sea levels, changes in flood and drought frequency, more exposure to infectious diseases or heat stress, and other climate change-related risks.

Box 4.4. **A continuum of adaptation activities: from development to climate change**

Overlaps exist between adaptation and development activities. Adaptation activities can range from virtually pure development activities addressing drivers of vulnerability to actions explicitly targeted on confronting or addressing the impacts of climate change. In practice, many adaptation activities fall somewhere in between those two extremes: they tend to be developed to address a specific type of impact but nevertheless involve activities to reduce vulnerability or increase adaptive capacity. One way of framing this diversity is to classify adaptation along a continuum of activities ranging from "pure" development activities with a vulnerability focus to measures with an explicit focus on climate change impacts. Four categories of adaptation along this continuum can be identified.

The *first* category includes activities that are fundamentally about *increasing human development* and thus address drivers of vulnerability. These activities focus on reducing poverty and addressing factors that make people vulnerable to harm, regardless of whether the stressors that can lead to harm are related to climate change. Although these activities do not consider climate change and its impacts, they can buffer households and communities from the impacts of climate change because they help to buffer them from nearly all stresses. Examples of activities falling under this category are gender initiatives, livelihood diversification efforts and literacy promotion.

The *second* category includes activities that focus on *building response capacity*. These capacity-building efforts lay the foundation for more targeted actions and tend to involve institution-building and technological approaches adapted from development approaches/tools/methods. Activities in this category may lead to more benefits than adaptation to climate change, but they tend to occur in sectors directly affected or sensitive to climate change. Examples of activities include participatory reforestation efforts to combat flood-induced landslides, natural resource management practices and weather monitoring.

The *third* category involves activities aimed at *managing climate risk*. Activities in this category focus more specifically on hazards and impacts and follow the concept of climate risk management. Activities following the climate risk management approach or based on it can be distinguished from typical development efforts through the use of climate information, although successful climate risk management activities may lead to strong development benefits. Disaster response planning activities and technological approaches, such as drought-resistant crops, are examples of activities included in this category. In addition, climate proofing projects most often fall into this category, although many discrete adaptation activities may also focus on managing climate risks.

The *fourth* category involves activities with the objective of *confronting climate change*, and thus focuses almost exclusively on addressing climate change impacts. Activities in this category tend to target climate risks that are clearly outside of historic climate variability and that stem from anthropogenic climate change. Examples of such activities are the relocation of communities in response to sea-level rise and responses to glacial melting. Radical or costly policies and technological approaches that explicitly address unprecedented levels of climate risk also belong to this category.

Source: McGray, H. *et al*. (2007), *Weathering the Storm, Options for Framing Adaptation and Development,* World Resources Institute, Washington.

Chapter 5

Operationalising Adaptation: From Theory to Action

This chapter sets out a four-step generic approach to assessing adaptation actions. These include: (i) *identifying current and future vulnerabilities and climate risks;* (ii) *identifying adaptation measures;* (iii) *evaluating and selecting adaptation options; and* (iv) *evaluating "success" of adaptation. It goes on to discuss implementing and "mainstreaming" adaptation, the approach of this Policy Guidance.*

The preceding discussion makes clear that there are indeed close linkages between regular development activities and adaptation to climate change. In many instances, business-as-usual development may automatically help raise adaptive capacity of societies to cope with climate change. On the other hand, some types of development projects could, however, inadvertently, by failing to consider climate change, contribute to maladaptation and thereby increase the vulnerability of societies to the impacts of climate change. There are also instances where climate change might adversely affect development projects or the achievement of broader development objectives. Integrating adaptation to climate change within development activities will thus be essential if governments wish to achieve the targets set in the MDGs, as well as related national poverty eradication efforts and sustainable development.

5.1. A four-step generic approach to assessing adaptation actions

Adaptation to climate change is a continuous process; it is not expected that adaptation can be dealt with at one time. It is far more likely that it will require regular revisiting of development policies, plans and projects as climate and socio-economic conditions change.

This section briefly describes a generic four-step approach that decision makers can take to address adaptation to climate change. Some of these may already be under way for many governments. Policy processes can vary, and these steps can be modified or adopted in a different order depending on circumstances. Note that this process emphasises policy development and what information and approaches are needed to support it, rather than being based on the science of climate change and models. The latter should be brought in if needed and as necessary. This four-step approach is similar to a climate risk management approach, as it starts with the consideration of both current and future vulnerabilities and climate risks.

Step 1: Identify current and future vulnerabilities and climate risks

When addressing adaptation to climate change, the first step is to identify the vulnerability of the system of interest and the climate risks to that system. Vulnerability assessments should consider baseline changes in socio-economic and environmental conditions, biophysical and socio-economic impacts, and the capacity for systems to react to climate change through autonomous adaptation (Smith, 1996; Smith and Lenhart, 1996). Special attention should be given to how these impacts affect the most vulnerable and disadvantaged populations, including women, children and marginalised groups. These assessments can either be done quantitatively or more qualitatively through expert judgement. A simple rule of thumb is that, if an area or system is affected by climate variability (extreme events, variability in precipitation, extended periods of warm temperatures), it is therefore sensitive to climate change.

In addition to assessing current vulnerability and climate risks, an assessment of future vulnerability and future climate risks needs to be carried out. In order to understand possible future vulnerability, a qualitative understanding of the drivers of vulnerability needs to be developed. This step should also allow an assessment of the opportunities that may arise from climate change and potential ways to take advantage of these. The available literature on climate change impacts may yield important insights into whether and how a system may be affected.

A detailed assessment of risk or vulnerability may not be necessary as part of this step, especially as it may involve significant financial resources and time or delay in addressing adaptation. The key here is not so much to develop perfect information on the system of concern, but to ensure sufficient information to enable thoughtful consideration of policy options. Climate risk analysis should consider other factors that will also change, such as population, migration, income, institutions, and technology. Changes in these factors could substantially affect vulnerability to climate variability and change.

Step 2: Identify adaptation measures

This next step involves the identification of a list of adaptation measures to be considered. These adaptation measures may be justified by considering the risks of climate change, and even without considering these risks. In addition, in the interest of generating as full a catalogue as possible of adaptation options, it makes sense to generate these options initially without regard to their feasibility, cost, or other limiting factors. These will come into the analysis in the next step in which the adaptation measures will be evaluated. It also makes sense to survey a broad group of experts on the system of concern to generate as many creative ideas for adaptation options as possible. There are some general considerations that can be used to identify and develop adaptations.

One general approach to adaptation is to increase the *flexibility* of how climate-sensitive resources are managed. Increasing flexibility means using management approaches that provide benefits under a variety of conditions, including current climate, climate variability, and long-term climate change. Reducing stress on an affected system, such as reducing pollution or demand, can increase flexibility. Use of free market principles can also increase flexibility. Many systems, such as engineering design standards, are inherently less flexible. If such systems were designed to be regularly updated on the basis of observations, to accommodate incremental changes to infrastructure over time, or to incorporate projections of future change, they could be made more flexible.

Measures can be designed to provide net benefits regardless of climate change (these are known as "no regrets" or "low regrets" measures) or can, on the other hand, depend on projections of changes in climate to justify their benefits (known as "climate justified" measures).

No regrets or low regrets adaptations are justified under current (or historical) climate and are even more justified when climate change is taken into account. No regrets adaptations include removing or limiting maladaptation (again, ensuring that climate change is taken into account). Investments in development, particularly those that enhance the capacity of a society to adapt to climate change, are no regrets adaptations. The category also includes other measures, such as reduced pollution and destruction of natural habitats, water conservation and enhanced public health systems. Indeed, promoting development makes sense anyway and will reduce the vulnerability of future societies to climate change. However, as noted above, some development paths can reduce vulnerability more than others. Exact projections of climate change may not be necessary to justify no regrets adaptations. General knowledge that climate is changing may be sufficient.

Climate justified adaptations consist of measures taken specifically to anticipate climate change. Often these are changes made to long-lived investments. For example, a sea wall being built or rehabilitated might be built somewhat higher to account for sea-level rise. Climate justified adaptations can be changes to infrastructure design, but can

also include changing land use (such as limiting development in areas that would be vulnerable to climate change), enhancing emergency response procedures, enabling standards to be updated on the basis of changed conditions, and so on. Here, information on how climate may change may be needed to alter infrastructure design, land-use decisions, or other long-term decisions. In implementing such climate justified actions, however, adequate consideration needs to be placed not only on the projected climatic changes but also on the uncertainties associated with such projections (Box 5.1).

Box 5.1. **Implications of timing and uncertainty in adaptation decision making**

The long-term nature of climate change makes timing an important part of adaptation decisions. The decision about when to act will depend on three factors. The *first* is the difference in adaptation costs over time. The effect of discounting would normally favour a delay in adaptation, and so would the prospect of potentially cheaper and more effective adaptation techniques that might be available in the future. However, there is also a class of adaptations where early action is cheaper. They include adjustments to long-term development plans and long-lived infrastructure investments, such as water and sanitation systems, bridges and ports. In each of these cases, it will be cheaper to make adjustments early, in the design phase of the project, rather than incur the cost and inconvenience of expensive retrofits. The *second* factor is the short-term benefits of adaptation. Early adaptation will be justified if it has immediate benefits, for example by reducing the effects of climate variability. It has been argued that changes in weather extremes will be one of the earliest signs of climate change, making adaptation to climate variability a potentially important early measure. Another example is health investments (such as in the development of a malaria cure), which have poverty-alleviation benefits that are at least as large as the climate change benefits. The *third* component has to do with the long-term effects of early adaptation. Early adaptation is justified if it can lock in lasting benefits, for example by preventing long-term damage to ecosystems. Depending on these three factors, decision makers can decide to act earlier or later. However, they will have to take their decision under considerable uncertainty with regard to the magnitude and timing of the impacts of climate change.

While climate change might clearly pose many novel risks that lie beyond historical experience, adaptation decisions typically require much more precision on the implications of climate change for the locations, time frames and spatial scales that concern them. A key point here is that climate change projections have widely differing degrees of uncertainty associated with them. Large-scale climate projections typically have lower uncertainty than those specific to a particular location. Many adaptation decisions, however, need to be taken at a more local scale, such as a watershed or a city, where credible climate change projections are often lacking. Furthermore, certain climate variables are easier to predict than others. Projections of temperature, for example, tend to be more robust than those for rainfall. Likewise, average conditions are easier to project than changes in extremes.

Uncertainty, however, is not a justification for inaction. What is required of decision makers, however, is to be more aware of its exact nature and to incorporate such information in their decisions accordingly. "Climate change justified actions", might be warranted in cases where there is considerable sensitivity to climate change variables that can be predicted with sufficient reliability. For example, the impacts of glacier retreat and permafrost melt are directly linked to rising temperatures, and might require near-term adaptation actions. Likewise, climate justified actions might also be necessary where near-term decisions might result in a long-term lock-in over which time climate change impacts might become progressively more significant. This, for example, is the case for long-lived infrastructure and land-use policies in coastal zones which might need to account for sea-level rise. In some other instances, however, many climate change projections – while significant– might only warrant "no" or "low" regrets adaptations or enhanced flexibility, in view of the prevailing uncertainties.

Sources: Agrawala, S. and S. Fankhauser (2008), "Putting Climate Change Adaptation in an Economic Context", *Economic Aspects of Adaptation to Climate Change*, OECD, Paris, pp. 19-28.

Agrawala, S. and M. van Aalst (2008), "Adapting Development Cooperation to Adapt Climate Change", *Climate Policy*, Vol. 8, No. 2, pp. 183-193.

In addition, the timing of adaptation measures should be considered (*reactive vs. anticipatory* measures). Reactive adaptations are made in response to observed climate change. Anticipatory adaptations plan for future climate change. Given the uncertainties about future climate change, reactive adaptation may appear preferable. However, long-term decisions, such as those concerning building infrastructure or development plans, and avoiding catastrophic impacts from, for example, more intense extreme events, may justify anticipatory adaptations. One form of anticipation is to enable a system to respond more rapidly by removing impediments to reactive adaptation.

Step 3: Evaluate and select adaptation options

Having identified adaptation options, the next step may be to evaluate and select some for implementation. The following is a list of criteria that *could* be used to evaluate adaptation policy options.

- *Effectiveness* – This criterion addresses the extent to which the adaptation policy reduces vulnerability and provides other benefits. Essentially, it compares vulnerability without adaptation to vulnerability with adaptation. This difference in vulnerability can be thought of as the primary benefit of the adaptation option. Ancillary or co-benefits should explicitly be considered if the adaptation option provides benefits to other sectors or for other policy objectives. This criterion can indicate relative differences in effectiveness between multiple policy alternatives. Effectiveness also includes the concept of flexibility. In other words, a flexible adaptation can be adjusted in response to changing conditions or will be effective under different (plausible) climate scenarios.
- *Cost* – This criterion concerns whether an adaptation is relatively expensive or inexpensive. Typically, it includes the initial costs of implementing an adaptation policy. However, costs over time, such as operation and maintenance, administration and staffing, expected frequency of reconstruction and so forth, should also be considered. An accounting of costs should include non-economic and non-quantifiable costs as well as economic and/or quantifiable costs. For example, costs such as a reduction in viable habitat for significant species or an increased impact on human health should be considered alongside more traditional costs.
- *Feasibility* – This criterion addresses whether the action can be implemented. Do the necessary legal, administrative, financial, technical, and other resources exist, and are they available for use on this policy option? This typically means that adaptations that can be implemented under the current operational framework will be favoured over adaptation options that require new authority, new technology, changes in people's preferences, or other significant changes in the operational context. Feasibility also includes the concept of a "window of opportunity". For example, most planning decisions undergo a periodic review, say every 10 or 20 years. If one of these planning documents is up for reconsideration, then a window of opportunity exists that makes the adaptation option more feasible. Windows of opportunity can also be created when the political landscape is propitious or when response is required following a disaster.

Step 4: Evaluate "success" of adaptation

The final step in the process is to monitor and evaluate the success of the adaptation strategy implemented. Evaluating the success of an adaptation is not a straightforward task and may take a long time because the benefits of some adaptation measures may not be realised until the climate changes significantly. For adaptation measures that were designed to reduce vulnerability to infrequent extreme events, their evaluation can only be carried out if and after those extreme events occur. If such events do not occur, it may be difficult to evaluate the success of the adaptation strategy. In addition, some adaptations may be developed to respond to long-term risks from climate change, in which case it will be even more difficult to evaluate the success of the strategy. For adaptation measures that have benefits if climate does not change (*i.e.* no regrets measures), their evaluation is facilitated as the benefits should be seen in the near term.

Evaluating the success of an adaptation should be based on measuring the benefits against the policy objectives used in the effectiveness analysis. Quantitative measures of success should be used when available (Smith and Lenhart, 1996).

5.2. Implementing and "mainstreaming" adaptation: the approach of this Policy Guidance

Adaptation to climate change will involve both stand-alone adaptation policies and the integration of adaptation measures into existing development processes and activities. The previous section described different steps in a generic approach to adaptation. Such steps can either be implemented as part of a stand-alone adaptation strategy or integrated within development processes in order to make these more resilient or better adapted to climate change.

While in certain situations stand-alone adaptation measures will be needed – for example to partially drain a potentially dangerous glacial lake – in most other cases adaptation measures will need to be implemented as part of a broader suite of measures within existing development processes and decision cycles. This is known as "mainstreaming".

For example, adaptation responses to the risks posed by climate change on agriculture might need to be incorporated as part of existing farming practices, within irrigation and community development plans and projects, as part of sectoral policies in agriculture, and within donor countries' assistance strategies as well as within national development and poverty alleviation strategies.

Clearly the nature of the adaptations required as well as the specific decision-making setting would be very different depending upon whether the context is that of an individual, a community, a region, a sectoral ministry, centralised government agencies, or international donors. Adaptation, at the farm level for example, might be limited to relatively short-term decisions related to the choice of crops and other inputs, as well as to planting dates, purchase of insurance, alternative livelihood choices, and even migration. At the sectoral level, meanwhile, the adaptation decisions and the time horizons might be quite different. They may, for example, relate to long-term strategies for the promotion of certain crops over others, or near-term decisions for financing certain projects rather than others, as well as investments in agricultural extension services and R&D for crop varieties more suited to the changing climate. The adaptation choices within various decision levels might also be linked, and it might also be the case

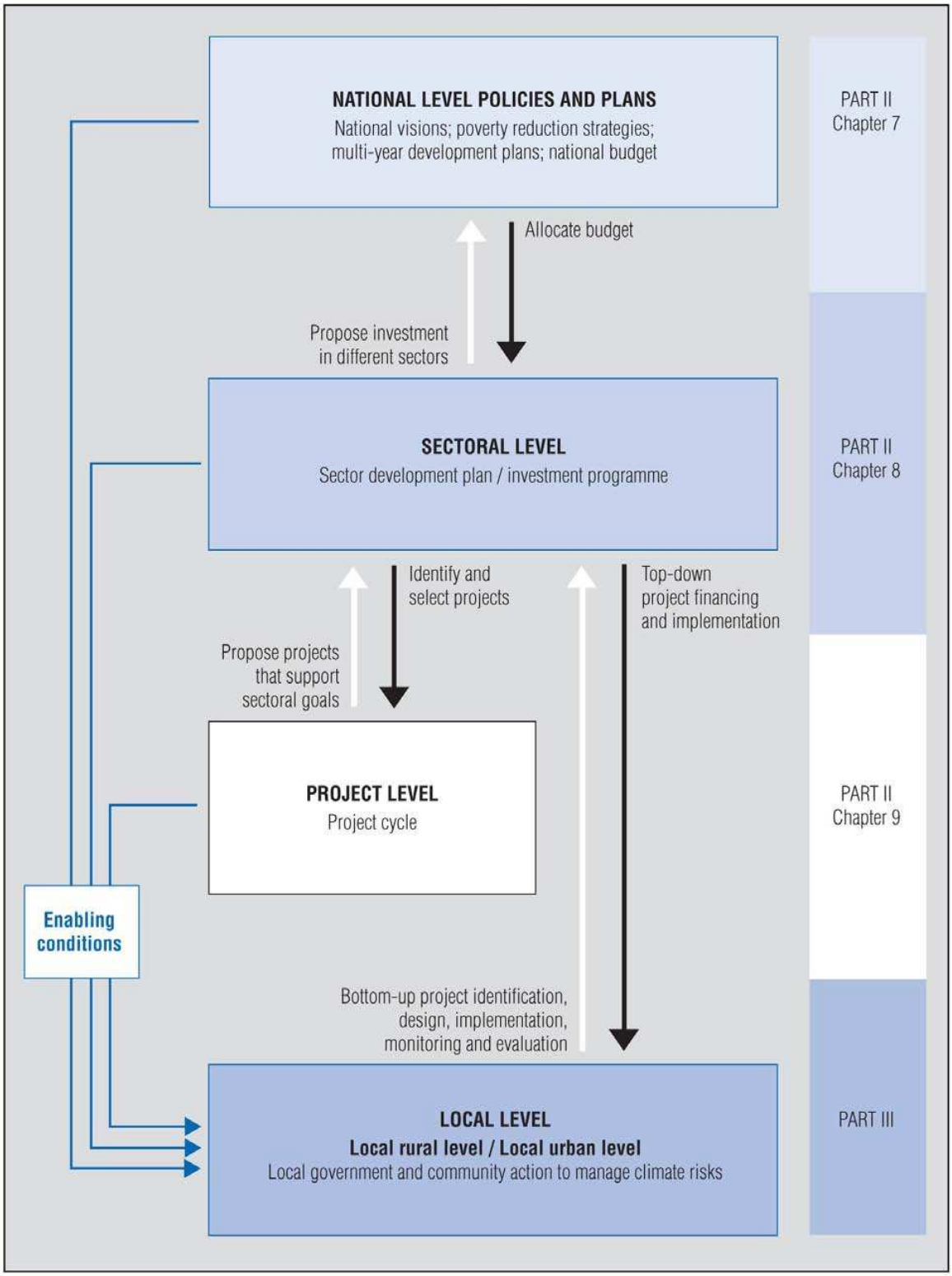
that policy, budgetary and programmatic choices upstream at higher levels of authority might enable or constrain adaptation choices closer to the ground.

For all these reasons, this Policy Guidance takes an integrated or "whole of government" approach to adaptation. Specifically, four levels of governance are examined: centralised national ministries and decision processes at the national level; sectoral ministries; project level; and the local level which includes both urban and rural contexts. Figure 5.1 shows the overall architecture of the Policy Guidance, as well as the interactions between the various levels.

The discussion at each level first highlights its importance within the context of adaptation. Next, key actors as well as core decision processes at that level are identified. This helps identify a number of entry points within existing processes which offer the possibility of factoring in consideration of climate change risks and adaptation measures. Next, specific interventions are identified that can help better incorporate adaptation considerations. Donor processes that can support the integration of adaptation at each of these levels are also examined.

The first three levels are examined sequentially in Part II. Integration of adaptation within national government agencies with a cross-sectoral reach is addressed in Chapter 7. This is followed by policy and planning at the sectoral level in Chapter 8. Finally, integration of adaptation at the project level is examined in Chapter 9. Part III focuses on local level processes which are much closer to implementation, both in urban and rural settings. These levels do not exhaust the range of decision-making contexts, but they do cover key nodes for the incorporation of adaptation considerations both at the strategic level and in on-the-ground actions.

Figure 5.1. **Decision levels examined in this Policy Guidance**



Part II

Integrating Climate Change Adaptation at National, Sectoral and Project Levels

Part II of the Policy Guidance – Integrating Climate Change Adaptation at National, Sectoral and Project Levels – *takes a partner country perspective and discusses in detail how to assess and address climate risks and opportunities and integrate adaptation responses at key decision making levels: national, sectoral and project. The* national *level includes bodies with policy and planning authority and functions at the scale of an entire country and cutting across sectoral boundaries. The* sectoral *level includes bodies with policy and planning authority and functions within a given sector at the level of an entire nation.* Project-*level implies those authorities that are in charged with the execution of a particular activity or set of activities, whose basic objectives and parameters have already been set, typically at the sectoral level. At each of these decision levels, the Guidance first provides an introduction to the level and its relevance to climate change adaptation. Next, the decision-making architecture is outlined, and* entry points *and* interventions *are identified for integrating adaptation considerations within existing processes. The role of donors in this integration process is also discussed and some priorities are outlined to foster greater integration of adaptation considerations within these decision levels.*

Chapter 6

National, Sectoral and Project Levels: Introduction

This chapter introduces Part II of this Policy Guidance which focuses on integrating adaptation within development activities at the national, sectoral and project levels. The chapter defines the scope of the national, sectoral and project levels and outlines the approach that will be taken in subsequent chapters to integrate adaptation at each of these levels.

In line with the trend for development co-operation to be provided through partner countries' own institutions and systems, Part II of this Policy Guidance takes the perspective of a partner government at various levels to identify critical points of *intervention* to enable the consideration of climate change risks and the integration of adaptation to climate change within development activities at the national, sectoral and project levels. Part III addresses the integration of adaptation at the local level – both in urban and in rural contexts.

The national, sectoral and project levels that are examined here are defined as follows:

- **National level**: It concerns agencies at the national level with a cross-sectoral reach. It includes bodies with policy and planning authority and functions at the scale of an entire country and cutting across sectoral boundaries. Policy decisions taken at this level potentially affect all sectors and all parts of a country. Examples include Finance, Planning and Trade Ministries, Office of the Prime Minister, parliaments, scientific research institutions, etc. as well as co-ordinating bodies across various government agencies, for instance on disaster risk management. Policies and legislation with a national reach include, among others, tax policies, fiscal policies, trade policies and regulations governing private-sector investment, protection and use of natural resources and large-scale spatial planning. Cross-sectoral policy co-ordination mechanisms are "central"-level mechanisms.

- **Sectoral level**: Includes bodies with policy and planning authority and functions within a given sector at the level of an entire nation (or, in a decentralised system, within a given sector at the level of an entire state or province). Policy decisions taken at this level directly affect activities within this sector, and potentially other sectors indirectly. Examples include Transport, Agriculture, Energy, Public Works, Health and Education Ministries. Policies with a sector-wide reach include, for example, building and design codes for infrastructure, regulations covering prices of crops and use of various agricultural technologies, and school curricula.

- **Project level**: Project-level authorities are those charged with the execution of a particular activity or set of activities, whose basic objectives and parameters (as well as budget allocations) have already been set at the level above (typically a sectoral programme). Project-level authorities oversee the detailed parameters of a project, within the boundaries set by sectoral policies and guidelines. They may be under the supervision of deconcentrated or decentralised sectoral authorities, or under the responsibility of municipal authorities. In some cases, donor countries have established "project implementation units" with a quasi autonomous status, for the projects they support. However, this is contrary to the principles of the Paris Declaration and is now being recommended against.

This part of the Policy Guidance is structured around the three levels mentioned above. For two of these levels, the governance structure and steps within the policy cycle are described and a diagram illustrating these is provided. Each step corresponds to a generic function ranging from policy making to resource allocation and implementation of projects or activities on the ground. While different institutions may be organised in different ways, these steps and functions are generic enough to cover a wide range of possible arrangements. The objective is to identify particular points along the cycle where consideration of climate change adaptation could be incorporated.

Interventions will occur at different stages of the policy cycle and will generally take a very different form at different points in the cycle, since they apply to very different processes, and at different authority/jurisdiction levels. Enhancing the climate resilience of a long-term policy (sometimes also referred to as "climate proofing") will be very different from enhancing the climate resilience of a set of discrete project proposals for which many key parameters (*e.g.* geographical location, scale, technology choice, etc.) are known. Each intervention will therefore be detailed to identify and elaborate what will be needed to integrate adaptation to climate change at each stage.

The following chapters correspond to the national, sectoral and project levels. Each chapter provides, first, an introduction to the level and its relevance to climate change adaptation; secondly, the governance architecture of the level is described and the interventions identified, with, where possible, a summary diagram giving an overview of the governance structure and interventions; thirdly, the role of donors in this integration process is discussed (for the project level the whole section is equally relevant to both partner countries and donors); and finally, a conclusion discusses some existing moves towards integration of adaptation to climate change within policies and/or plans and potential challenges to this integration.

Chapter 7

Integrating Climate Change Adaptation at the National Level

This chapter addresses why the national level matters for adaptation. It illustrates how to get started on addressing adaptation at the national level by: identifying and engaging key national actors; improving access to national-level climate information; organising government structures to better address adaptation; building upon and reinforcing existing national mechanisms for disaster risk reduction; modifying regulations and standards to reflect current and anticipated climate risks; and enhancing linkages between multilateral/regional commitments and adaptation. It addresses integrating adaptation within the national policy cycle – at the policy formulation stage; at the planning stage (multi-year development plans); at resource allocation stage (medium-term expenditure frameworks and national budgets); and at the programming/implementation stage – (sector-level development plans). It looks at donor support for integration of adaptation at the national level through budgetary support mechanisms and donor country assistance strategies. Finally, it summarises the challenges and priorities for action at the national level.

For the purpose of this Policy Guidance, the "national level" (which could also be termed "central" level) encompasses authorities or organisations with nationwide responsibility. This includes institutions with policy and planning authority and functions with a country-wide remit that cuts across sectoral boundaries. Institutions at this level include governmental bodies such as central ministries or civil society or private-sector organisations with nationwide influence. In centralised countries, national-level authorities have influence down to the municipal or local levels, while in decentralised countries their remit may be confined to a limited number of domains (*e.g.* inter-state commerce), with sub-national authorities (states, provinces) having a wide range of responsibilities. Sectoral line ministries (such as Transport; Agriculture), while having a nationwide (province/state-wide in decentralised systems) remit, are confined to their respective sector. They are addressed in Chapter 8.

7.1. Why the national level matters for adaptation

The national level is where overall political responsibility is located. This level is vital for climate change adaptation efforts for at least five reasons:

- First, the national government sets legislation and regulations, many of which directly or indirectly affect the climate risks facing the country or create the incentives (or disincentives) for exploring climate change adaptation opportunities. Examples include private-sector regulations, land ownership and national-level land-use planning directives; regulations and legislation guiding the management of natural resources. These rules and regulations can enhance or constrain the ability of other actors to adapt to the impacts of climate change.
- Second, the national level provides the overall guiding policy framework within which lower levels (sectoral and local government) operate. National government priorities are defined and implemented through budget allocations and can, therefore, facilitate adaptation across different government levels. The delivery of important prerequisites for adaptation at various levels – such as fundamental climatic and other data, analysis and assessments on climate change impacts, vulnerability and early warning systems – often has to be provided by the national level.
- Third, co-ordination of sectoral policies and branches of government takes place at this level. The national level is the locus of many cross-cutting responsibilities and functions related to the co-ordination of lower-level authorities, notably those responsible for specific sectors. Some of those are embedded in the intersectoral discussions that take place through regular planning and budgeting processes, but others have a separate operational role. A key example is disaster risk management, including both response and risk reduction. Other examples include mechanisms for the co-ordination of policies across key sectors such as agriculture, water management, health, education, transport and others.
- Fourth, international relations with other countries are managed at the national level. These will become increasingly important for shared resources (such as water) and cross-border pollution (such as air pollution) and for the successful implementation and management of international treaties. Multilateral environmental agreements, such as the United Nations Convention to Combat Desertification (UNCCD) and United Nations Convention on Biological Diversity (CBD), are implemented at the national level and have objectives that are

intertwined with those of the United Nations Framework Convention on Climate Change (UNFCCC). The UNCCD and the CBD also have national action programmes (the National Action Programmes for the UNCCD and the National Biodiversity Strategies and Action Plans for the CBD) which may be of relevance to adaptation efforts. Climate change may also lead to increased national and international migration and to conflicts over access to natural resources, and these will have to be addressed by national governments.

- Finally, from the perspective of international donors, the national level is also the principal interface with partner countries. Policy dialogues also occur at the national level, and donors are actively engaged in supporting key national development processes which will have considerable bearing on the adaptive capacity of the partner countries. Budget support, which is an increasingly important modality for donors, also takes place at the national level, and it offers opportunities for fostering adaptation.

This review of core functions illustrates the importance of the national level for setting the right conditions to enable adaptation at all the other levels. In order for adaptation to be effectively integrated at the national level, it needs to be integrated or considered in all of the above functions. The following sections detail how decision makers at the national level can initiate the integration of adaptation considerations, how adaptation can be integrated within the national policy cycle and the resource allocation processes, what role donors can play in fostering such integration, and they conclude by outlining key challenges and priorities for further action.

7.2. Getting started on addressing adaptation at the national level

As a broad development challenge, climate change adaptation needs to be mainstreamed into the *national governance organisation and processes*. Adaptation at the national level will require adjustments to the national governance framework – its structures, policy formulation processes, systems and procedures – to make it responsive to the new challenges created by climate change. It is about putting in place a more flexible and forward-looking process whereby policies are formulated and investment decisions are taken bearing in mind the risks posed and opportunities offered by the changing climate. This also entails a fundamental shift in approach among both partners and donors in order to consider climate change not as an environmental issue but as a broad development issue.

7.2.1. Identifying and engaging key national actors

Integrating adaptation will require the involvement of all key national-level players. The main players at this level of government include prime minister's or president's offices, Ministries of Finance, Planning and Development, Public Administration, as well as central-level bodies responsible for the co-ordination across various government agencies (*e.g.* for disaster risk management, cross-sectoral co-ordination, etc.). Other important players include parliaments, political parties, donor agencies' country offices as well as private-sector organisations, labour unions and non-governmental organisations (NGOs) with a national remit. The key national policy stakeholders and their strategic area of focus are detailed in Table 7.1.

Table 7.1. **Examples of strategic areas of focus by national policy stakeholders**

National policy stakeholders	Strategic areas of focus
Members of parliament	Regulation and standards National policies Public finances Fiscal policy
National government agencies (*e.g.* Ministries of Planning, Finance, Development, and Public Administration)	National policies Public finances Fiscal policy Institutional governance framework Operational capacity of government Management of government assets Disaster preparedness and response
Research community	Research and development Awareness-building and lobbying
Civil society organisations and non-governmental organisations operating at the national level	Awareness-building
Donor agencies	National policies Public finances Research and development

All of the actors detailed in Table 5 will have a role to play to facilitate the integration of adaptation at the national level. *Ministries of Planning and Finance* will be central to the mainstreaming of climate change adaptation into the policy planning process, as well as the management of public finances to support adaptation. An active engagement by *members of parliament* on adaptation policy debates will be essential to the drafting of an appropriate regulatory framework. *Civil society organisation***s** can play a vital role in strengthening public awareness on the need for adaptation and in bridging gaps between scientific research and policy making. *Donor agencies* can contribute by mainstreaming adaptation into their development co-operation programmes (*e.g.* their country assistance strategies), by screening their funded operations for climate risks, by providing access to new adaptation technologies and by channelling new resources to help national governments absorb the additional costs of adaptation.

7.2.2. Improving access to national-level climate information

An important prerequisite for informed decision making on adaptation is that it is based upon the best available information on the implications of both the current and the future climate on the country. This includes information on current climate and extremes, projections of climate change, and assessments of impacts and vulnerabilities. Several sources of information already exist in most national contexts. Weather and historical climate data are typically available from national meteorological services. Assessments of climate change impacts and vulnerabilities have also been conducted in most developing countries, and their results are typically summarised in their national communications to the UNFCCC.

Several least-developed countries (LDCs) have recently developed their *National Adaptation Programme of Action* (NAPA) which identify priority activities that respond to their urgent and immediate needs with regard to adaptation to climate change. The steps for the preparation of the NAPA include (*i)* synthesis of available information, participatory assessment of vulnerability to current climate variability and extreme events, and of areas where risks would increase with climate change; *(ii)* identification of key adaptation measures as well as criteria for prioritising activities; and *(iii)* selection of a short list of priority activities. The NAPA focus on activities addressing urgent and

immediate adaptation needs of the country – those for which further delay could increase vulnerability or lead to increased costs at a later stage. NAPA is intended to be action-oriented and country-driven and be flexible and based on national circumstances. NAPA should establish priorities for action and may therefore be useful for development planners.

There are also a growing number of web-based resources on climate change and adaptation which could be relevant for national-level policy makers. For example, the *Adaptation Learning Mechanism* (ALM)[1] from the United Nations Development Programme (UNDP) provides country adaptation profiles containing climate change adaptation information for over 140 developing countries. This database includes information on key vulnerabilities, historical scientific data on climate risks, climate change and impacts projections and links to related online resources. Another web-based tool/platform of relevance to policy makers is the *climate change explorer* of WeAdapt,[2] which provides climate data relevant to users taking adaptation decisions. Users can download, manage and visualise historical climate data as well as a range of projected changes (currently only for Africa). Finally, the World Bank has developed the *Climate Change Data Portal,*[3] which is an online portal that provides an easy access to global-level climate and climate-related data. It provides historical and projected climate data (low- and high-resolution general circulation models), socio-economic data at the country level, information on natural hazards and "hotspots", as well as agricultural information on current and projected change in crop yields due to climate impacts. The objective of the portal is to help policy makers and development practitioners find relevant information that will help "climate-proof" development plans.

In principle, these information sources represent good starting points for national decision makers. They are, however, of variable quality and depth. For example, weather and climate monitoring information is often not accessible in a form that could be used by non-meteorologist decision makers. Meanwhile, many national impact and vulnerability assessments only catalogue the potential climate change impacts and do not establish clear priorities for adaptation. NAPAs, by virtue of their mandate, only identify immediate priority projects and do not provide an overall perspective on longer-term strategic priorities. Web-based information sources are often multiple and diverse, and many national planners and donors may not be fully aware of them. National planners and donors therefore need co-ordinated and continuous efforts both to improve awareness among key stakeholders of available sources of relevant climate information, and to improve the quality and policy relevance of climate information.

7.2.3. Organising government structures to better address adaptation

For effective integration of adaptation at the national level, it is critical that the co-ordination of adaptation is done from centres of power in the national government. Adaptation has often not been adequately integrated into national economic planning because its importance has not been acknowledged or accepted by key senior figures in government (Box 7.1). In addition, adaptation will require the establishment and management of cross-sectoral co-ordination mechanisms, as many impacts of climate change will cut across ministries. For example, change in water supply and demand will involve ministries such as Water Resources, Power, and Agriculture. The development of adaptations may need to be co-ordinated across ministries to adequately address such cross-cutting issues. Only national-level authorities (*e.g.* the office of the President or Prime Minister) have the power and authority to impose needed cross-sectoral co-ordination.

Box 7.1. **The need to rethink governance structures to adapt to climate change**

A typical arrangement for the co-ordination of adaptation strategies is for the Ministry of Environment to assume overall responsibility for climate change. Experience suggests that this arrangement leads to weak intersectoral co-ordination. A powerful central body, such as the office of the President or Prime Minister, can better co-ordinate implementation by sectoral ministries, review legislation and hold implementation agencies accountable for their results. It is critical that ministries that play a key role in development, such as Ministries of Planning, Finance, Agriculture and Trade, are also engaged in the development of adaptation strategies. In the Pacific region, which is particularly prone to natural hazards, many adaptation responses have been undermined because they are located in junior or weak ministries that have proven ineffective in influencing key ministries such as Public Works, Finance or Health.

7.2.4. Building upon and reinforcing existing national mechanisms for disaster risk reduction

Adaptation to climate change is closely related to disaster risk reduction (DRR) for which there are existing platforms and co-ordination mechanisms at the national level. Adaptation will therefore need to be more closely linked to these existing mechanisms. Existing DRR mechanisms, meanwhile, may also need to better reflect how climate change might affect the frequency and severity of certain types of natural disasters, such as droughts, floods, hurricanes and cyclones, and therefore also affect the adequacy or effectiveness of DRR measures and policies. Governments typically have plans and institutions dedicated to preparing for natural disasters and responding to them when they occur. The effect of projected changes in many extreme climate events on disaster preparedness and response plans and institutions should be assessed and modifications made as appropriate. Many countries have centralised national-level mechanisms for DRR. Typical institutional structures include a co-ordinating national disaster reduction office (within the Department of Civil Defence or the Ministry of the Interior) with responsibilities for both the provision of post-disaster relief and the arrangements for DRR. These agencies often have deconcentrated or decentralised branches or co-operative arrangements with branches of government at lower levels (state, province, district or municipal). At all these levels, arrangements established to respond to potential disasters (*e.g.* contingency plans, risk mapping, *ex ante* assessment of the vulnerabilities of communities and assets) will benefit from taking into account projected changes in the nature, intensity and frequency of hazards.

7.2.5. Modifying regulations and standards to reflect current and anticipated climate risks

At the national level, statutory regulations and standards also represent an important tool to establish the enabling environment and proper incentives for downstream agencies and actors to integrate adaptation considerations within their activities. Such mechanisms can be used to ensure that climate change is considered in development projects *(e.g.* design and building of infrastructure), service delivery (*e.g.* water supply and pollution control) and in the management of government assets. It is critical that regulations and standards do not lock in adaptation to past climate but encourage recognition of changing climate trends and incorporate projections of change in climate.

Regulations and standards may need to be regularly updated to account for observed changes in climate and revised projections of future climate change.

7.2.6. Enhancing linkages between multilateral/regional commitments and adaptation

Finally, adaptation will need to be considered within the context of multilateral and regional agreements which are also co-ordinated at the national level. Regional co-operation or agreements over shared resources, such as river basins, need to include the consideration of climate change risks to ensure the sustainable management of these resources. In addition, the national level is where the various multi-lateral environmental agreements are implemented and where closer links between them can be fostered. Adaptation-related initiatives are not only under way within the UNFCCC, but many activities and programmes undertaken as part of other agreements (including UNCCD, CBD, Ramsar, and others) may also have a bearing on adaptation. Therefore, actions and programmes undertaken to implement these conventions should be better linked or connected. For example, greater links could be encouraged between the national action programmes of the UNCCD, the national biodiversity strategies and action plans of the CBD, and national adaptation programmes (such as NAPA for least-developed countries).

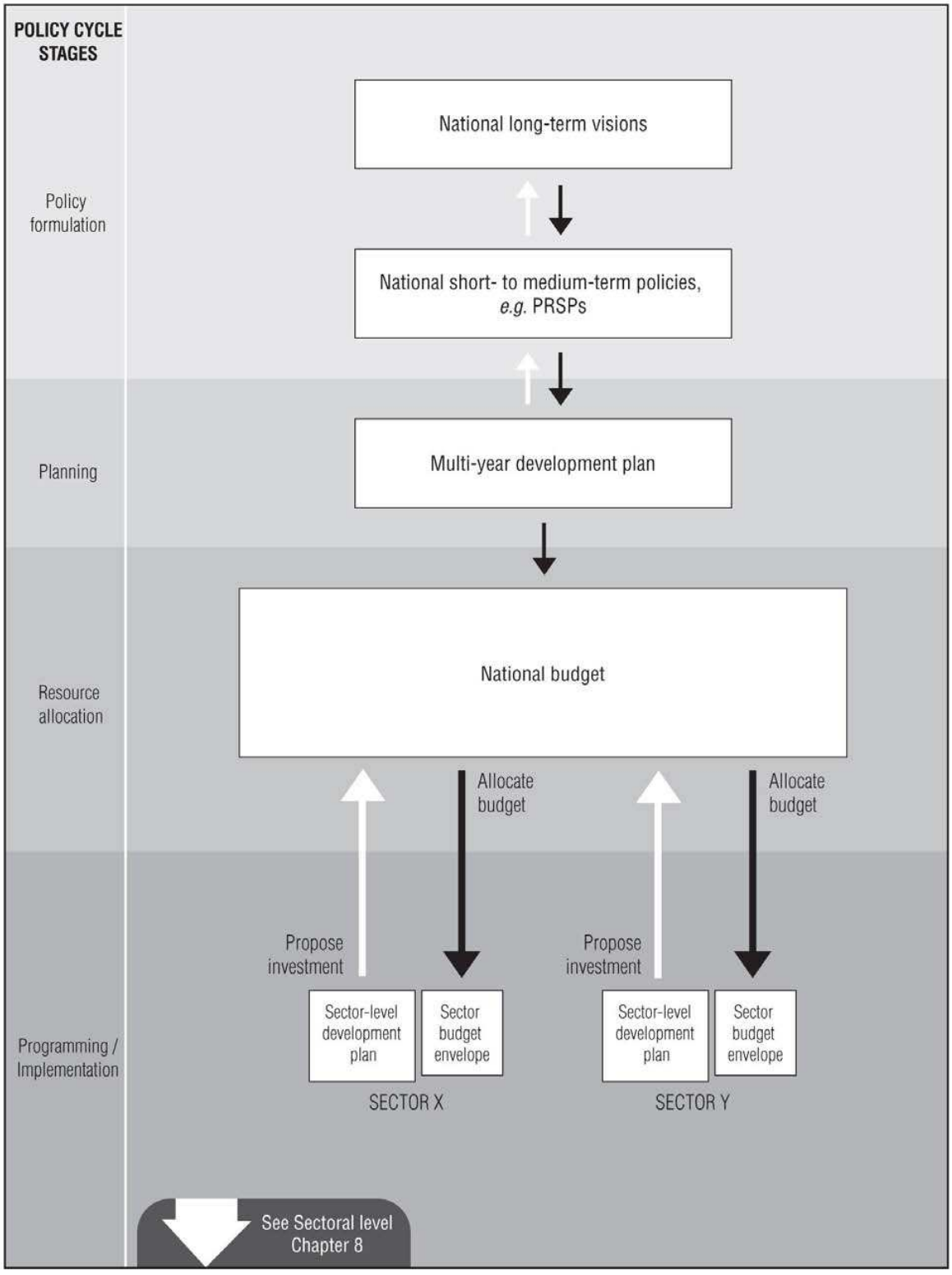
7.3. Integrating adaptation within the national policy cycle

In addition to national co-ordination mechanisms and regulatory processes, there is also a need to integrate considerations of adaptation within various stages of the policy cycle at the national level. This is particularly critical as it affects the way resources are allocated and therefore has significant downstream implications. A stylised model of the policy cycle and governance architecture at the national level is presented in Figure 7.1. This policy cycle includes four stages: policy formulation, planning, resource allocation and programming/implementation.

This stylised model of the policy-making cycle is not intended to suggest that policy making is an organised, linear process. Real-world policy-making processes are subject to intense political pressures from different stakeholders, often with conflicting interests. This often leads to unpredictable decisions and outcomes. The objective of the generic model used here is to distinguish between different policy stages and associated functions, with a view to pinpointing opportunities for integrating climate change adaptation.

The following sub-sections describe in greater detail each of these stages and illustrate where and how adaptation to climate change can be considered.

Figure 7.1. **National-level governance architecture**



7.3.1. Policy formulation stage

Key processes at the *policy formulation stage* include long-term (15 to 20 years) visions and national development strategies as well as shorter-term (3 to 5 years) national policies and poverty reduction strategies (PRS) which provide the overarching framework for the development of operational plans and resource allocation. Such documents highlight the government's intended policy priorities during its term in office and represent an important opportunity to place adaptation issues on the government's agenda. The objectives within the various national visions, strategies and plans should in principle be compatible and mutually reinforcing. For example, there are close linkages between Tanzania's National Poverty Eradication Strategy (adopted in 1998) for the period until 2010 and its "Vision 2025" (adopted in 1999) outlining development goals for the period up to 2025.

Examples of policy formulation processes at the national level include national long-term visions and PRS. *National long-term visions* bring together different groups of society to agree common development objectives. They are usually elaborated for a 15- to 25-year time horizon, guide economic and social development efforts and provide the overarching framework for the development of national policies. National visions may take the form of national sustainable development strategies.[4] The national visions and sustainable development strategies have a long-term horizon that makes them particularly relevant for climate change adaptation, which also has to consider longer-term time-frames.

A *poverty reduction strategy* is a particular type of development plan with a three- to five-year timeframe and a specific focus on poverty reduction, often combined with economic growth objectives. PRSs were initiated in the context of efforts to provide debt relief to heavily indebted poor countries (the HIPC initiative). Over 60 developing countries have started to develop a PRS, with half of these countries in Africa. About 10 countries are well advanced in the process and have finalised the first cycle of PRS implementation, reviewed the strategy and started to implement their second PRS.

PRSs have shorter time horizons (between three to five years), and, in principle it is therefore more difficult to integrate considerations of the longer-term risks posed by climate change. Adaptation to current climate variability, however, has close synergies with what might be required to cope with longer-term climatic changes, and such measures are in fact quite relevant and should be considered within poverty reduction strategies and development plans. In addition, given the impacts that climate change can have on development and poverty reduction efforts (the potential to reverse decades of development efforts) and the potential for development policies to lead to *maladaptation* if climate change is not considered, it is vital that the relation between climate change, growth and poverty be discussed in PRS. Further, while the time horizon of these strategies and plans might be short relative to national visions, their operational relevance is much higher given that they directly influence near-term actions. Poverty Reduction Strategy Papers (PRSPs) also have particular relevance in the context of development co-operation as they provide the basis for most multilateral and bilateral aid.

Interventions for climate change adaptation

The specific interventions that are required at the policy formulation stage within the national policy cycle would consist of:

- clear recognition of climate risks and the need for adaptation within relevant national policies;
- applying a *climate lens* in the formulation of national policies and strategies.

i) Clear recognition of climate risks and the need for adaptation within relevant national policies

Climate change risks and the need for adaptation to climate change should be clearly recognised within national policies. Currently the majority of national visions, strategies and policies do not mention climate change and the risks arising from it. Incorporating climate change and adaptation keywords may help increase the importance of recognising climate change and its impacts and the need to adapt to them. It would hopefully lead to a trickle-down effect to the downstream levels of decision making and to a systematic consideration of climate risks and need for adaptation at all levels of decision-making. As these policies provide the overall framework within which the lower levels operate, the inclusion of adaptation considerations within them can shape downstream priorities and help provide the framework to facilitate adaptation at the lower levels (sectoral and project levels). Sectoral plans and policies have to conform with national policies, strategies and visions. If these national policies, strategies and visions mention climate change and adaptation as key national considerations, then sectoral plans and policies will have to integrate those concerns. In addition, the inclusion of adaptation within these national policies could then influence the way the national budget is allocated by highlighting adaptation as a key element to be considered in investment decisions. Furthermore, the explicit consideration of climate change risks and adaptation within national policies may enable interested stakeholders operating at lower levels to hold subsequently governments accountable for their actions and policies relating to climate change.

ii) Applying a *climate lens* in the formulation of national policies and strategies

A climate lens needs to be applied in the formulation of national visions, strategies and policies (Box 7.2). The result of applying a climate lens should be a better strategy or policy, more effective at reaching its original objectives in the face of a changing climate, including variability and extremes. This would contribute to the identification of the potential risks that climate change might pose for longer-term development goals, and lead to the modification of the orientation of the strategy in a situation where it may lead to maladaptation if climate change risks are ignored. For example, planned development of certain geographical zones (for example coastal areas vulnerable to sea-level rise and storm surges) or sectors (*e.g.* hydropower) may be viewed in a different light when the medium- to long-term risks posed by climate change are taken into consideration.

Box 7.2. **Applying a climate lens**

A climate lens is an analytical process/step/tool to examine a policy, plan or programme. The application of a climate lens at the national or sectoral level involves examining:

i) the extent to which the policy, strategy, regulation or plan under consideration could be vulnerable to risks arising from climate variability and change;

ii) the extent to which climate change risks have been taken into consideration in the course of programme formulation;

iii) the extent to which the policy, strategy, regulation or plan could lead to increased vulnerability, leading to maladaptation or, conversely, miss important opportunities arising from climate change; and

iv) for pre-existing policies, strategies, regulations or plans which are being revised, what amendments might be warranted in order to address climate risks and opportunities (sometimes referred to as "climate-proofing").

A first quick application of the climate lens should enable a policy maker to decide whether a policy, plan or programme is at risk from climate change. For a policy, plan or programme that is not at risk, no further work needs to be done. However, for a policy, plan or programme that is at risk, further work is required to identify the extent of the risk, assess climate change impacts and adaptation responses in more detail, and identify possible recommendations and "downstream" actions.

Applying a climate lens to a national policy will require inputs from research assessing climate risks for the entire country and for the relevant time-frame. This research may already be available from national communications to the UNFCCC or from NAPAs (for LDCs). However, if this research is not available or not sufficient, new research may have to be commissioned.

One possible way to apply the climate lens is by using the framework provided by Strategic Environmental Assessments (SEAs) and tailoring it to the purpose of climate change adaptation (Box 7.3). Annex B provides a set of possible questions to consider at each of the main stages of an SEA process, as outlined in the *OECD/DAC Good Practice Guidance on Strategic Environmental Assessment.*

Countries which have developed NAPAs could use these as a basis for developing their short to medium-term priorities within their national policies and strategies, and integrate or link the recommendations arising from the NAPA to their PRSP (Box 7.4).

For countries that have not yet developed national visions, sustainable development policies or PRS, these two steps or interventions could be carried out at the initial stages of policy formulation. For countries that have already developed such policies, these two steps or interventions can be carried out during the evaluation or revision phases of the policy. In the case of PRSP, the poverty diagnosis may represent a key stage for the consideration of climate risks.

Box 7.3. **Mainstreaming climate change adaptation at the national level through Strategic Environmental Assessment**

Strategic Environmental Assessment (SEA) refers to a range of "analytical and participatory approaches that aim to integrate environmental considerations into policies, plans and programmes and evaluate the inter-linkages with economic and social considerations." (OECD, 2006c). SEA provides a methodology not only for evaluating the impact of policies, plans and programmes on the environment, but also for addressing the impact of environmental change on policies, plans and programmes. It may thus offer a useful framework for effectively mainstreaming climate change adaptation into policy-making processes at the national level. This may be particularly relevant in countries with legal requirements for SEA.

The *Guidance on Applying SEA* (OECD, 2006c) suggests four generic steps for the SEA process: *(i)* establish the context; *(ii)* implement the SEA; *(iii)* inform/influence decision making; and *(iv)* monitor and evaluate. Each of these steps can be tailored as needed to include the consideration of climate change concerns and facilitate the integration of adaptation measures into national-level policies, plans and programmes.

The initial step "establishing the context" could be used to assess whether and how the policies, plans and programmes under consideration will be affected by climate change. Examples of questions that could be asked are: "What are the main climate risks facing the country, region or sectors?",: "Which key national development priorities, geographical areas, and/or sectors are likely to be particularly affected by climate change?"; "Has climate change been considered in the national policies, plans and programmes of interest?"; and "Is there a national climate change strategy in place that the policies, plans and programmes would need to be fully aligned to and consistent with?'

This first step would help to identify whether a climate lens will have to be applied in more detail, or whether no further climate change analysis will be needed.

Participatory approaches are an important element of SEA. Accordingly, a potential key result of an SEA may be the identification of groups that are particularly vulnerable to climate change risks. The SEA process may facilitate giving the most vulnerable a voice. This will in turn help policy makers understand the synergies between climate change adaptation, economic growth and poverty reduction.

The standard SEA approach focuses on potential interrelations between concrete policies, plans and programmes and environmental changes by looking at the projected future evolution of key variables, like trade patterns, commodity prices, population growth, migration flows, but also climatic factors. There are, however, large uncertainties as regards the evolution of these variables over the time-span and geographic scales covered by national strategies and policies. Therefore, an institutions-centred SEA approach may be best suited for mainstreaming climate change adaptation into national-level policy making. This approach focuses not so much on projected future developments but rather on the capability of the institutional and policy framework to respond to uncertain or unexpected environmental risks. It offers a tool to adjust the national policy formulation processes, systems and procedures to be responsive to the challenges and risks related to climate change.

As regards the analytical work to be undertaken as part of the SEA, the institutions-centred approach suggests to include an in-depth analysis of the institutions involved in the design and implementation of possible adaptation measures. This should include a political economy analysis, in order to better understand the goals, values, behaviours, and incentives of associated stakeholders. It should also examine the horizontal (intersectoral) and vertical (across federal, state, and municipal levels) co-ordination mechanisms within a government to identify, at the earliest possible stage, potential hurdles to mainstreaming climate change adaptation.

Another key objective of institutions-centred SEAs is to enhance social learning and continuous improvement of policy design and implementation. To this end, it suggests to establish monitoring and evaluation frameworks that continuously re-examine the policy direction and priorities. Such a social learning process will enable attention to be directed to emerging new risks such as those resulting from climate change. It will allow for the timely recognition of adaptation needs in the policy formulation process.

A pilot programme has been launched by the World Bank in 2008 where institutions-centered SEAs are applied to reform processes in a variety of different sectors (forestry, mining, transport and urban development) and countries (Kenya, Sierra Leone, Guinea, Liberia, Malawi, Bangladesh, Pakistan, and China). Evaluation of this pilot programme in the coming years will show how this approach can contribute to the mainstreaming of climate change adaptation into national policies.

Box 7.4. **Examples of countries linking their NAPAs and national policies**

Although little integration of adaptation to climate change has yet occurred at the national level, there are some examples of countries integrating climate change concerns in their national policies or development strategies and poverty reduction strategies.

For example, Rwanda and Bangladesh have created clear links between their National Adaptation Programme of Action (NAPAs) and Poverty Reduction Strategy Papers (PRSPs) in order to facilitate the mainstreaming of adaptation to climate change. In the Rwanda NAPA, the process of selecting priority adaptation activities was closely linked to the various national and sectoral policies of Rwanda as it took into account the urgent and immediate needs established in its PRSP, its economic development and poverty reduction strategy (EDPRS) and other development programmes. In addition, one of the criteria of the multi-criteria analysis (MCA) used to select and prioritise between the different adaptation options was the criterion on the contribution of that option to sustainable development. Furthermore, for each high-priority project identified or selected, links between the objectives of these projects and key development strategies of Rwanda (including the Rwanda Vision 2020, the Rwanda PRSP and other relevant national and sectoral policies) are provided. Such explicit links should help facilitate the integration of the identified high-priority adaptation projects into overarching development frameworks. In addition to these links, the Rwanda NAPA was actually used to inform the second national poverty reduction strategy (PRS), the EDPRS. The review of the first PRSP in February 2006 – as part of the development of the EDPRS – helped to integrate environment and other aspects of climate change into the EDPRS as an essential element of economic development (Republic of Rwanda, 2006). The EDPRS itself includes a clear recognition of the importance of providing the required framework to facilitate adaptation and mitigation activities (Republic of Rwanda, 2007). The EDPRS specifically states that "an incentive framework will be put in place to implement the National Adaptation Programme of Action on Climate Change" (Republic of Rwanda, 2007).

The Bangladesh PRSP highlights how a national policy framework can provide the basis for mainstreaming climate change adaptation programmes, such as the NAPA and the comprehensive disaster management programme. The PRSP recognises climate change as a cause of "grave concern" to the country, highlighting the challenges posed by sea-level rise. The poverty diagnosis discusses extensively the relation between natural disasters, growth and poverty. Climate change is considered as one of the challenges for water resource management and environmental protection. The PRSP has 19 policy matrices that were developed to operationalise the strategy, one of which focuses exclusively on comprehensive disaster management. One of this matrix's key targets is to "factor vulnerability impacts, and adaptation to climate change into disaster management and risk reduction plans, programmes, policies and projects". This, together with an acknowledgement of the NAPA as a national implementation programme, helps to ensure policy coherence for adaptation activities. The Bangladesh NAPA also took the PRSP into account as the priority adaptation strategies identified were specifically prepared to complement the PRSP. The NAPA refers to PRSP policy matrices on "comprehensive disaster management" and "environment and sustainable development" in devising strategies to address climate change issues and raise awareness.

The Republic of Kiribati is another country making efforts to mainstream adaptation into its national development policies. It has implemented two national adaptation processes: the NAPA and the Kiribati adaptation programme (KAP). While the NAPA gives attention to urgent and immediate adaptation needs, the KAP focuses on long-term planning for climate change adaptation. Lessons learnt from both of these initiatives will be used to plan the national response to climate change from 2008/09 onwards. A framework to integrate the NAPA and the KAP into the overall national policy development process is provided by the national development strategy (NDS) 2004-07, which is supplemented by the climate change adaptation policy and strategies and the government budget. The NDS notes that "climate change is posing costly risks to economic growth, and calls for the development of participatory and cost-effective ways of minimizing and managing risk of loss from climate change related events". It thus provides an opening for integrating climate change adaptation planning into the national policy process.

7.3.2. Planning stage – multi-year development plans

The *planning stage* involves the formulation and costing of multi-year development plans[5] based on top-down input from national policies and bottom-up input from sector-level development plans. Higher-level policy objectives are translated into operational action plans and budgets. Examples of planning processes at the national level include the *multi-year national development plans*. These plans often cover a five-year period, set out development objectives and targets, and detail multi-sectoral plans for achieving them. These plans are generally linked to the annual budget or to the medium-term expenditure framework (MTEF). This stage has very concrete impacts on shaping downstream plans and programmes at the sectoral and other levels.

Unlike the national visions and sustainable development strategies for which integration primarily involved the inclusion of keywords and the use of a climate lens, the planning stage provides an opportunity for more concrete actions and changes. Integrating adaptation to climate change at the planning stage allows for both reactive and proactive inclusion or consideration of adaptation and consists of two steps or actions. Multi-year development plans are based on both top-down input from national policies and bottom-up input from sector-level development plans. If climate change adaptation concerns have been effectively integrated in national policies, the top-down input from these should have already been assessed through the climate lens and should therefore be "climate-proof". If this is the case, no further action should be required on these top-down inputs. However, the bottom-up sectoral plans may not have been screened against climate risks and will therefore need to be assessed in the light of climate change projections and impacts. This represents the first action required for the integration of adaptation at this stage. The second action involves more proactive consideration of adaptation, as new specific adaptation projects or programmes can be included in the development plan.

Interventions for climate change adaptation

The specific interventions that are required at the planning stage within the national policy cycle therefore consist of:

- applying a climate lens to proposed sectoral plans;
- proactive action on programmes or projects specifically aimed at enabling adaptation to climate change.

i) Applying a climate lens to proposed sectoral plans

A climate lens should be applied to the proposed sectoral plans to assess climate risks and/or opportunities and potential responses. An important measure may be to adapt existing guidelines and criteria used to assess plans proposed by sectoral ministries, with a view to adding climate change concerns. The application of a climate lens to proposed sectoral plans should lead to better ("climate-proofed") plans or proposals and suggest modifications if required.

ii) Proactive action on programmes or projects specifically aimed at enabling adaptation to climate change

Climate change will lead to new challenges that will also require the development and implementation of plans specifically aimed at enabling adaptation. The application of the climate lens at the policy formulation stage should have revealed some of the key needs and responses that will be required to adapt to the impacts of climate change. The adaptation plans may have a cross-sectoral nature as many impacts of climate change cut across sectors. Some progress has been made in this direction, for example through the development of NAPAs by LDCs, although such documents typically identify only a limited number of priority projects.

7.3.3. Resource allocation – medium-term expenditure frameworks and national budgets

The *resource allocation stage* corresponds to the translation of operational action plans into budgets. National budgets and, in some countries, MTEFs, constitute the main instruments at this level. The national budget is spread across the different sectors[6] and thus determines the budget envelope that each sector has to implement in its sector-level development plans. In addition, the national budget also funds other non-sectoral/cross-sectoral investments/actions that have to be provided/funded at the national level/by the national (or central) government.

The *national budget* is the main instrument for operationalising a government's policy. It is allocated by the Ministry of Finance across different sectoral areas, as well as for cross-cutting priorities and investments. It provides the sectors with a resource envelope with which they can implement their development plans. Once the budget is allocated, each sectoral ministry has to revise its development plan to fit with the budget envelope it has been provided with. This may involve prioritising certain programmes and activities over others according to a set of predefined criteria.

Medium-term expenditure frameworks are a budget programming tool for planning actions and programming spending over a three- to five-year period, thereby translating policies into budgets. MTEFs reconcile systematically the achievement of strategic objectives with respect to aggregate resource limits. An MTEF consists of a "top-down" resource envelope consistent with macroeconomic stability, a "bottom-up" estimate of the current and medium-term cost of existing national priorities, and a framework which matches these costs with available resources through an iterative decision-making process. In some countries, the whole budget process is already managed through an MTEF system. In others, the MTEF is limited to specific sectors and acts only as a broad guidance for spending decisions.

Interventions for climate change adaptation

The specific interventions that are required at the resource allocation stage within the national policy cycle would consist of:

- reallocating funding to more vulnerable sectors or regions;
- funding for adaptation specific plans or activities.

i) Reallocating funding to more vulnerable sectors or regions

Climate change will affect certain sectors and regions more than others. In order to adapt to climate change, national governments will or may have to reallocate some of the national budget to more vulnerable sectors or regions, or increase the budget for these sectors or regions. Sectors will need financial support to assess their policies and programmes against climate change risks (application of the climate lens) but also to develop new adaptation-specific programmes or projects enabling proactive adaptation.

The Ministry of Finance will normally be intimately involved in decisions on the national budget through its annual budget discussions with spending ministries. The climate lens should reveal key sectors and regions that will be vulnerable to climate change and which may require further funding to "climate proof" their policies/programmes and also develop specific adaptation responses/measures/programmes/ projects. The results from this climate lens can therefore serve to reorient to a certain extent some of the funding to more vulnerable sectors or regions, or lead to an increase in budget for some sectors and regions.

ii) Funding for adaptation specific plans or activities

Funding adaptation may entail: *(i)* funding nation-wide plans specifically aimed at enabling adaptation (*e.g.* investment in new agricultural technologies such as more drought-resistant varieties); *(ii)* establishing a *horizontal fund for adaptation* which sectoral ministries could tap on to meet the additional costs of integrating identified climate risks in their planned activities or investments.

The MTEF process can be used to incorporate adaptation priorities into resource allocation processes. The MTEF may need to be reviewed to determine if climate change adaptation priorities have been appropriately integrated into medium-term spending plans.

Figure 7.2 provides an overview of the main interventions for climate change adaptation in the national policy cycle.

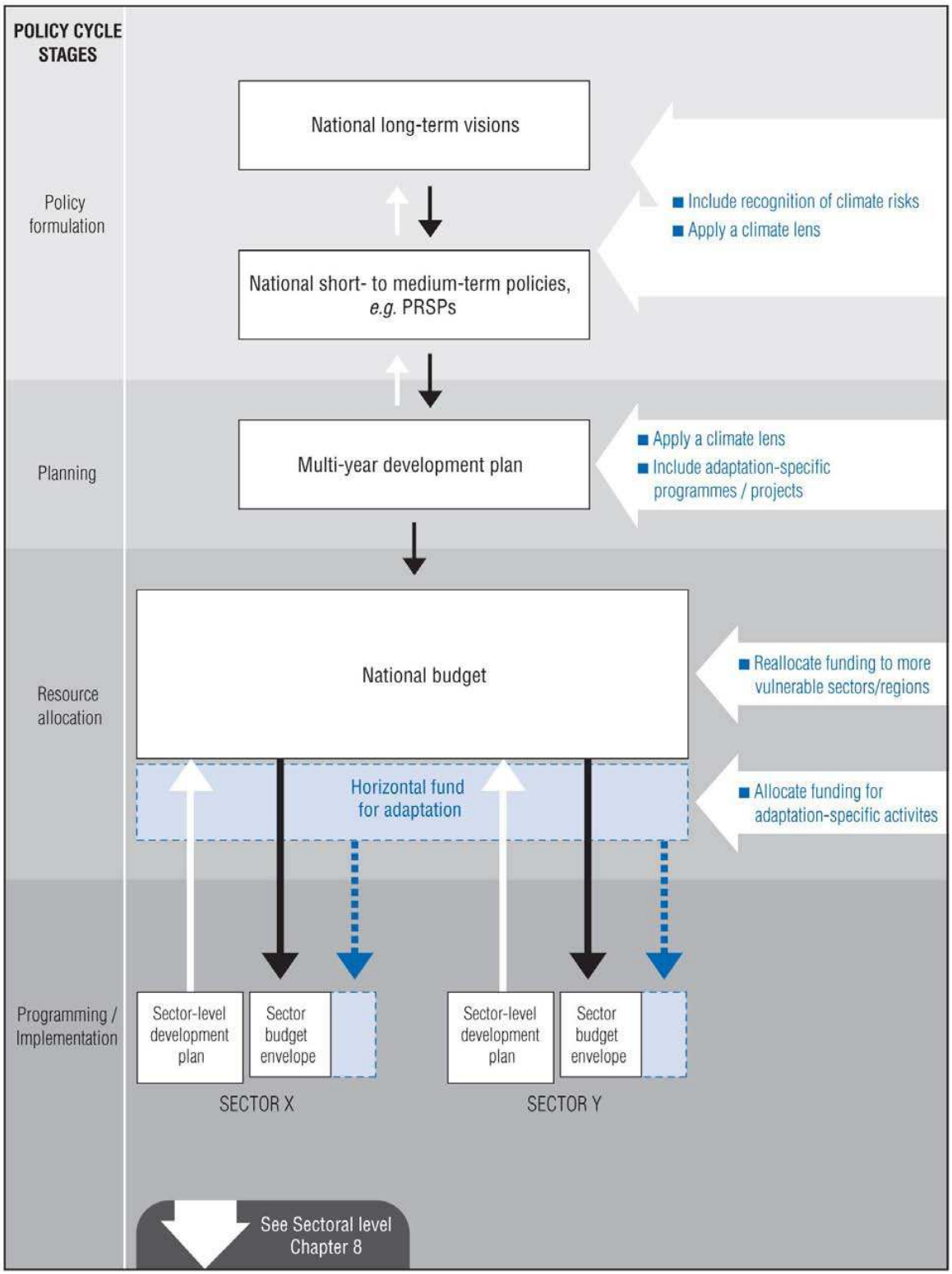
7.3.4. Programming/implementation stage – sector-level development plans

The *programming/implementation stage*, from the national-level perspective, corresponds to the translation of national-level priorities and budgetary allocations into sectoral and local government-level plans and budgets. This stage and potential *entry points* for adaptation are analysed in detail in subsequent chapters.

7.4. Donor support for integration of adaptation at the national level

A significant influence at the national level in aid-receiving countries is the presence of international donor agencies. Since the 2005 *Paris Declaration on Aid Effectiveness*, there has been considerable attention given to the harmonisation of different donor programmes. Aid delivery has shifted from project interventions to more programmatic forms, including General Budget Support. In line with the objectives and principles of the Paris Declaration, the role of donors will mainly be to provide support to partner countries' own priorities and national processes and through partners' own systems.

Figure 7.2. **National-level governance architecture with key interventions for adaptation**



7.4.1. Through budgetary support mechanisms

Budget support[7] constitutes an increasingly important platform for policy dialogue between donors and partner countries' national governments. This aid instrument, which until the late 1990s was predominantly used by multilateral agencies, is now being used by a growing number of bilateral donors, including agencies with small bilateral programmes. The modality normally includes a performance assessment framework (PAF) for monitoring government progress on pre-established priority areas, often corresponding to the priority areas of the country's PRSP (Box 7.5).

Box 7.5. **Performance assessment frameworks for budget support**

Performance assessment frameworks (PAFs) were established to monitor and review budget support programmes. They provide opportunities for policy dialogue on key strategic issues for the development of the country. Evidence suggests that PAFs have been useful as a signalling device to identify important reforms within the government programme and to support their efficient implementation. If there is already some degree of commitment to adaptation in the government, specific goals and indicators for adaptation and disaster risk management could in principle be integrated into PAFs in order to set and keep adaptation on the political agenda.

But it is important to avoid falling into the trap of overloading the PAF with an excessive number of indicators. Evidence on the use of PAFs suggests that long and complex matrices tend to undermine the overall focus of the policy dialogue, generate inconsistencies and make the process more transaction cost-intensive than necessary (Lawson *et al,.* 2005). An overloaded PAF can also represent a threat to domestic ownership and counteract donor alignment with national processes (including domestic monitoring frameworks).

Furthermore, although the PAF must identify the areas where progress needs to be made, it is not necessary for the PAF to be the sole means of assessment *(ibid.*). The PAF should be conceived as one element within a range of formal and informal processes of performance review, policy dialogue and knowledge sharing. Thematic and sectoral working groups, also established as part of budget support arrangements, can be highly effective settings for the type of detailed dialogue necessary to explore policy positions under different climate change scenarios.

Source: Lawson, A. *et al*. (2005), *Learning from Experience with Performance Assessment Frameworks for General Budget Support*, report commissioned by the Swiss State Secretariat for Economic Affairs in the framework of the General Budget Support Evaluation undertaken by the OECD/DAC.

Budget support offers both direct and indirect opportunities for fostering adaptation to climate change. It provides opportunities for high-level policy dialogue with senior government officials in key ministries, such as Planning and Finance, and helps build bridges to environment ministries. This provides an avenue for donors to raise central government's attention to findings from climate risk assessments, threats to national development and poverty reduction objectives arising from climate change and the need for strategic interventions or precautionary measures in various sectors. This may contribute directly to raising the profile of adaptation in the context of national development plans. Table 7.2 breaks down the different stages and steps in the preparation of the budget support agreement and how adaptation can be integrated into each of these stages and steps.

Table 7.2. **Integrating adaptation within donors' budget support processes**

Stages in preparation of budget support agreement	Steps to ensure integration of climate change adaptation	Typical actions required (and possible sources of information)
Concept stage • Budget support operation confirmed in annual programme	Documentation review	Consider relevance of climate change in this operation: • Identify available information on climate change impacts for the country and how these will affect the proposed operation/policy/programme: • Is there any existing analysis of climate change impacts on the policy/programme or review of how programme activities will be affected by climate change? • Do country documents such as Poverty Reduction Strategy Papers or donor countries strategies take into account climate change, its impacts and the potential adaptation responses required?
Early donor dialogue	Climate change assessment	Discuss need for formal analysis of climate change risks/application of a climate lens and review of the operation: • Determine if other donors are intending to undertake formal review • Obtain information on what relevant activities (if any) other donors or agencies are carrying out in terms of adaptation to climate change • Obtain any relevant recent reports/studies. • Agree which donor will take the lead on addressing climate change impacts to this programme and on what specific documents/outputs are to be produced or action to be taken. Decide if formal climate change analysis is required and what if any inputs from a climate change specialist are needed.
Donor / government discussion	Climate change analysis	
• Initial government meetings		Put on agenda a discussion of climate change impacts and adaptation Request relevant information and inputs from responsible government agencies. Agree on counterparts and on co-ordination mechanisms.
• Ongoing processing by country office		Ensure that agreed work on climate change/adaptation is carried out, provide inputs if requested. Identify issues to be raised with government.
• Donor project review meetings		Discuss and agree on critical climate change issues to be raised as part of budget operation finalisation, including specific inputs for the programme matrix. Identify any technical assistance or other complementary actions *(e.g.* capacity building) that may be proposed and how these would be funded/managed.
Finalisation	Climate change policy actions	Discuss outputs of agreed climate change review and agree with government if and how specific climate change/adaptation priorities are to be addressed. Ensure that agreed and appropriate actions – including monitoring indicators – are included in the project documentation including the programme matrix. Discuss and agree complementary measures such as technical assistance if needed.
Implementation	Joint donor supervision	Ensure that progress against adaptation objectives is monitored and reported, generally through a mechanism of joint supervision missions. Identify shortfalls or issues that need to be further addressed in future operations.

Source: Hanrahan, D. and K. Green (2007), "Environmental Review of Budget Support Programmes: Guidance for Non Specialists", report for the UK Department for International Development and Irish Aid.

Further, by providing support directly to the budget, donors increase the overall amount of discretionary resources that governments can use for development purposes. This can directly alleviate financial constraints which may have been an important reason for deferring the implementation of activities identified by the government as necessary for climate change adaptation purposes but which had received a lower priority relative to more urgent needs. Thus, budget support can also indirectly contribute to covering adaptation-related expenditures. Also, by promoting governance capacities (through its

emphasis on policy reforms and management systems), budget support contributes to strengthening adaptive capacity.

7.4.2. Donor country assistance strategies

Country assistance strategies (CAS)[8] are the strategic planning instruments used by donor agencies to guide their programme of assistance at country level. A CAS defines the agencies' development co-operation objectives, areas of intervention, volume of resources committed and, often, the modalities for providing assistance. CAS are usually prepared by each agency in close consultation with national government and other stakeholders, including NGOs. They are guided by the national objectives of the partner country and national and international obligations or objectives of the donor agency. CAS constitute, therefore, an important vehicle for getting adaptation objectives into the national policy agenda (Box 7.6).

Box 7.6. **World Bank Country Assistance Strategy for the Republic of Maldives**

The World Bank country assistance strategy (CAS) for the Republic of Maldives provides an example of donor support to national adaptation strategies. The World Bank CAS for the Republic of Maldives (2008-2012) aligns a joint International Development Association /International Finance Corporation assistance programme behind the government of Maldives' development strategy for the next five years. The CAS aims at providing specific support to help the country adapt to the impacts of climate change, in part by co-ordinating efforts with other implementing agencies (such as the United Nations Environment Programme (UNEP) and the United Nations Development Programme (UNDP)). The government of the Republic of Maldives has developed the Maldives Seventh National Development Plan (7NDP) which highlights the need to improve environmental practices to ensure sustainable growth and secure effective adaptation to global climate change. The World Bank CAS has three "pillars", the third of which focuses on "environmental protection and climate adaptation". In response to Goal 5 of the 7NDP, the objective of pillar III is to "improve environmental management practices and build greater climate resilience to protect the pristine environment". During the CAS period, the World Bank Group will support the government's priorities by strengthening government capacity to implement a national strategy that builds climate resilience and adaptation to the impending risks of climate change. As part of this country assistance strategy, the Bank is committed to forging a closer partnership with the UNEP and the UNDP.

Increasingly, donors aim to increase the harmonisation of their effort though a *Joint Assistance Strategy* (JAS).[9] JASs specify the modalities and arrangements of development support and replace individual and multilateral country assistance strategies. The objective is to minimise multiple donor processes and requirements and allow for more efficient and effective use of development assistance. While often led and co-ordinated by the partner country, JASs also reflect the common concerns of participating donors and provide the opportunity to raise issues, such as climate change adaptation, which may have a low profile on the national development agenda. In many cases, JASs provide for the establishment of sector-specific working groups which can examine these issues in the context of specific sectors. In Tanzania, for example, a sector working group on the environment has played a significant role in ensuring attention to environmental issues in the PRSP.

Both CAS and JAS provide opportunities for donors to address issues which may not have a high domestic profile within the partner country. They can therefore constitute important vehicles for raising the profile of climate change adaptation objectives through the identification of those investments or activities that will be sensitive to climate change (*e.g.* the development of coastal or water resources). They should be compared with NAPAs and other national priority-setting exercises to determine if climate change adaptation has been integrated into such planning. The provision of financial or technical support specifically aimed at addressing such policy themes can be raised within the CAS or JAS.

7.5. Challenges and priorities for action

This chapter has outlined a number of avenues for integrating the consideration of adaptation within the national-level governance structures, policy and resource allocation cycle, as well as within donor processes. It also highlights some illustrative examples where such integration is beginning to occur at the national level, both within partner and donor processes. However, such examples are still relatively few, and progress at the national level has so far been more at the level of improved climate assessments and formulation of adaptation planning, than in the actual integration of adaptation considerations within a broad range of partner and donor processes.

Table 7.3 synthesises the principal action items discussed in this chapter for better integrating adaptation considerations within national-level partner and donor processes. The table also highlights key challenges and obstacles facing the implementation of such measures, and also identifies a number of priority actions by both partner governments and donors to address these challenges.

One key challenge is clearly the inadequate availability of, or access to, relevant climate information that is critical to integrating adaptation. At the national level, this information includes historical climate data, current vulnerabilities to weather and climate, projections of climate change and their associated impacts, as well as information on possible adaptation responses and techniques for evaluating and prioritising them. An initial step, therefore, might be for national authorities to assess what information is currently available and disseminate it via user-friendly and tailored products to key stakeholders. This can also result in a needs assessment in terms of what additional information might be required, which can then establish priorities for action.

At the same time, however, it must be recognised that climate information will always remain imperfect, with considerable uncertainties. Therefore, decision making on other fronts to better integrate adaptation should not be put on hold pending the availability of significantly improved climate information. There is also the need for a parallel effort to take decisions to the extent they are warranted, while simultaneously making the requisite investments in improved information to better inform future decisions on adaptation. Institutional changes, such as moving the co-ordination of adaptation efforts closer to centres of national authority, need not be put on hold pending the availability of improved climate information. Likewise there are a number of "no regrets" actions that provide a host of development benefits in addition to fostering climate change adaptation and that can be implemented even in the presence of remaining uncertainties about future climatic conditions. Policies to integrate adaptation need not and should not be on hold pending the availability of all desired information. These could, for example, include forging

better linkages between efforts to implement adaptation and existing mechanisms to implement DRR.

Table 7.3. **Strategic priorities, challenges and specific actions for integrating adaptation at the national level**

Strategic priorities	Challenges	Specific actions
I. Improve availability and quality of climate information		
• Improve coverage and quality control of climate monitoring data.	• Inadequate infrastructure for weather and climate monitoring.	• Invest in infrastructure for weather and climate monitoring.
• Improve quality and resolution of national climate change scenarios and impact projections.	• Limited technical and computing capacity for climate change and impacts modelling.	• Improve research and computing capacity for climate change and impact modelling.
• Identify key vulnerabilities to climate change.	• Lack of adequate methodologies and data for assessing vulnerability to climate change.	• Harmonise methodologies and improve availability of both biophysical and socio-economic data for assessing vulnerability to climate change.
• Make a strong economic case for investing in adaptation.	• Little or no information on costs and benefits of adaptation measures.	• Commission analyses of the costs and benefits of adaptation measures.
II. Incorporate adaptation considerations within national development policies		
• Include considerations of climate change risks within long-term visions, poverty reduction and sustainable development strategies.	• Climate change adaptation is still not viewed as a development issue and consequently is not a high priority.	• Awareness-raising of the specific consequences of climate change on development priorities.
	• Mismatch in terms of time-scales over which many climate change impacts might manifest themselves and the much shorter time horizons of many development policies.	• Conduct assessments of how the achievement of specific policies, plans and programmes could be impacted by climate change, and whether they might in turn affect vulnerability to climate change.
	• Disconnect between the stakeholders engaged in the formulation of development policies and the climate change community.	• Forging closer links between the development and adaptation communities.
	• Lack of financial resources to undertake the required additional analyses.	• Commit requisite additional financial and technical resources for such assessments, *i.e.* through a *horizontal fund for adaptation* which various departments could have access to.
III. Government-wide approach		
• Mobilise key stakeholders to improve co-ordination with existing mechanisms for disaster risk reduction and implementation of relevant multilateral and regional environmental agreements.	• Climate change still pigeon-holed as the remit of the Environment Ministry. • Lack of incentives to change existing structures and practices.	• Move co-ordination for adaptation within powerful central bodies such as the office of President or Prime Minister or planning agencies. • Commit financial incentives, through a *horizontal fund for adaptation.*
• Review and adjust regulations and standards to reflect climate change impacts.	• Lack of specific information on how climate changes would impact core government functions and regulations.	• Commission tailored analysis on how current regulation might need to be adjusted to enhance adaptive capacity.
	• Rigidities and inertia in regulatory frameworks.	• Enhance the flexibility of relevant standards and regulations to facilitate the eventual consideration of climate change impacts as they become available.

Table 7.3. **Strategic priorities, challenges and specific actions for integrating adaptation at the national level** (continued)

IV. Incorporate adaptation considerations within donor policies and processes		
• Encourage action on adaptation through budgetary support mechanisms, country and joint assistance strategies.	• Adaptation is still a low priority within donor agencies themselves and is usually compartmentalised within small teams dealing with environmental issues. • Further, donor processes are intended to support partner priorities. Therefore, to the extent adaptation is a low priority for partner governments, the role of donors in raising its profile is somewhat limited.	• Raise awareness within donor agencies – both in capitals and within country offices – of the consequences of climate change on development priorities. • Use high-level policy dialogues with officials in key ministries such as Planning and Finance to raise the attention of partner governments to the risks posed by climate change and the need for strategic interventions.
• Support capacity-building efforts to better monitor climate, assess future climatic changes and impacts, identify and evaluate adaptation actions, and incorporate adaptation considerations within development processes.	• Multiplicity of donor-supported capacity-building efforts on screening for climate risks and implementing adaptation.	• Better harmonisation of donor actions on adaptation within specific countries. • Harmonisation is also needed for tools and methodological approaches (such as for screening of climate risks).

International donors also have a key role to play in facilitating the implementation of stand-alone adaptation measures, as well as the integration of adaptation with core development priorities and projects. They can support capacity building efforts to better monitor climate, as well as to assess future climate change impacts and adaptation priorities at the national level. In this context, there is a need for greater awareness-raising about the risks posed by climate change within donor agencies. Donors can also use high-level policy dialogues as a vehicle to raise the profile of adaptation with senior officials in key mnistries like Finance and Planning in partner countries. Finally, there is also a need for donors to better co-ordinate and harmonise their efforts on adaptation within specific countries.

Certain adaptation initiatives require co-ordination at the regional level and co-operation between national governments (Box 7.7).

Box 7.7. **Climate change adaptation responses at the supra-national/regional level**

Climate change adaptation has implications beyond national boundaries. Adaptation needs to integrate a regional dimension to tackle transboundary climate change impacts to shared ecosystems, water resources and potential regional security threats, such as a higher migration pressure coming from environmental crises. There are several instances where climate change adaptation initiatives are best undertaken through regional-level co-operation. Examples include:

- **Regional-level meteorological and climate observation institutions**

Regional institutions encourage research and monitoring capacity beyond the scope of national programmes and help to advance on the science and the information needs to address the implementation of regional adaptation activities. They also reinforce the essential climate change monitoring capacity and reduce costs The scientific expertise and hardware needed for climate monitoring is very costly. Pooling of resources among countries in a region with similar climatic conditions and ecosystems can alleviate resource constraints.

- **Regional-level agricultural research and development institutions**

Research and development on crops, cultivars or agricultural techniques suited to specific climatic conditions (*e.g.* drought-resistant crops) often have a "public good" character at the regional level and can be shared among countries with similar climatic conditions, ecosystems as well as agricultural traditions.

- **Co-operative management of shared river systems among riparian states**

Shared river basins, such as the Mekong and the Nile, are often managed collaboratively by riparian states. This provides a ready entry point for integrating climate change adaptation concerns in the context of planning and management of water resources at the level of the entire river basin. For example, the Mekong River Commission, an intergovernmental organisation created in 1995 by an agreement between the governments of Cambodia, Lao PDR, Thailand and Viet Nam, is collaborating with the Global Change System for Analysis, Research and Training to address the potential impacts of climate change on the Mekong river basin.

Under the Bali Action Plan, several ideas are being discussed to support the identification and/or development of regional adaptation centres on the globe to support disaster risk reduction, climate resilience, climate-resilient development and to undertake research and development in appropriate modalities for North–South and South–South co-operation.

Donors can provide significant financial and technical support to many of these institutions and are in a position to draw the attention of participating countries to climate change adaptation issues.

Notes

1. See the website: *www.adaptationlearning.net.*
2. See the website: *www.weadapt.org.*
3. See the website: *http://sdwebx.worldbank.org/climateportal.*
4. National sustainable development strategies are based on several key principles, including the integration of economic, social and environmental objectives, with the recognition that the possible needs of future generations must be factored into this process.
5. A *policy* provides a set of general approaches to reach a set of given objectives. The corresponding *plan* outlines a set of practical actions that have to be undertaken in order to implement the policy. A plan is generally time-bound and is also regularly updated in the light of experience and changing circumstances.
6. Or regions, depending on national circumstances.
7. Budget support is an aid modality whereby donors pool their funds in support of the government's development programme. Un-earmarked resources are channelled to the state budget and are managed according to national public finance management procedures. The focus is on working through government's own systems and supporting those systems through strengthening planning and financial management capacity.
8. Also called country assistance partnerships or country assistance plans.
9. *Joint Assistance Strategies* are in place or being established in Tanzania, Uganda and Zambia.

Chapter 8

Integrating Climate Change Adaptation at the Sector Level

This chapter addresses why the sector level matters for adaptation and identifies the priority sectors and key players at the sector level. It examines integrating adaptation within the sectoral policy cycle - at the policy formulation stage; the planning stage; the resource allocation and sector programming stage; and the monitoring and evaluation stage. It looks at donor support for integration of adaptation at the sectoral level and concludes with a discussion of the challenges and priorities for action.

This chapter describes the integration of climate change adaptation at the sector level. For the purposes of this Policy Guidance, the "sector level" includes bodies with policy and planning authority and functions within a given sector at the level of an entire nation (or, in a decentralised system, within a given sector at the level of an entire state or province). Section 8.1 establishes the context, describing sector-level entry points and processes that can advance climate change adaptation. As in Chapter 7 on adaptation at the national level, this chapter on the sector level uses the generic governance architecture to describe the various stages of the policy cycle. Section 8.2 provides guidance on the types of interventions required to incorporate adaptation across the sector policy cycle. This is followed by a discussion of how donors can support integration of adaptation at the sectoral level in section 8.3. The chapter concludes with section 8.4 that identifies key challenges as well as priorities for action to foster better integration of adaptation considerations at the sectoral level.

8.1. Why the sector level matters for adaptation

Policy decisions taken at the sector level directly affect activities within this sector, and potentially other sectors indirectly. Examples include Transport, Agriculture, Energy, Public Works, Health and Education Ministries. Policies with a sector-wide reach include, for example, building and design codes for infrastructure, regulations covering prices of crops and use of various agricultural technologies, and school curricula. While national level (Chapter 7) and project-level (Chapter 9) interventions are crucial for integrating adaptation into development planning and into specific development activities, vulnerability and response options are highly sector-specific. Adaptation tools and methods therefore vary significantly between sectors and so important steps and decisions on adaptation have to be taken at this level.

8.1.1. Priority sectors for adaptation

Certain sectors are particularly sensitive to climate variability and therefore need to factor climate change into sector policy and planning as a matter of priority. Some of these sectors are directly affected by climate, such as agriculture, while others incur mainly indirect impacts. For example, industrial production can be affected if climate change reduces (or enhances) hydropower production for electricity as has happened recently in Ghana, where drought conditions have limited hydropower production, cutting economic growth by 2% (New York Times, 2007). Key climate-sensitive sectors include agriculture, forestry, fisheries, water resource management, human health, nature conservation, energy, and infrastructure. A summary of the impacts of climate change on some of the key sectors for development was provided in Part I.

For these sectors, taking into account climate change information at the policy-making stage can allow identification of adaptation actions, avoidance of maladaptation risks and identification of new opportunities resulting from climate change. For example, in relation to the agricultural sector, a given region may face the risk of increased temperature, making it unsuitable for certain crops and more suitable for others. Identifying this long-term prospect can help guide the sectoral policy and, subsequently, the rural development options to be pursued for the region. Similarly, for the energy sector, factoring the risk of changes in precipitation could point to significant changes in a country's long-term potential for hydropower development options and even influence the choice of energy mix. For long-lived infrastructure facilities, climate change concerns

may also lead to the revision of sector-wide planning, construction and design standards and criteria, as well as site selection rules.

8.1.2. Key players at the sector level

The main players at this level of government include line ministries, sector-specific commissions, parliamentary committees focused on sectoral issues, donor agencies and NGOs with a sectoral focus. Table 8.1 provides an indicative list of these sector players, using the water sector as an example. The range of sector players described highlights the emphasis that needs to be given to the co-ordination of adaptation actions, so that they are applied in a consistent manner within any given sector.

Table 8.1. **Identifying the key players for climate change adaptation in the water sector**

Key players	Functions	Examples
The Water Ministry	• Overall planning, policy formulation, co-ordination and guidance in the water resources sector. • To develop policy, planning and regulatory frameworks for the national or sub-national level on various issues such as irrigation, environment, equitable access, etc. • To allocate sustainable financing for national and sub-national water management; and • Technical guidance, scrutiny, clearance and monitoring of projects.	In Zimbabwe, the Ministry of Water Development is responsible for policy formulation and standards for planning, water pricing, management and development. In India, though water is a state subject, the central government provides the finance to undertake construction of irrigation projects of national importance and to implement schemes to enhance productivity.
Water management and planning boards	• To provide technical inputs into planning processes; • To facilitate monitoring; and • To oversee implementation of national policies/regulations.	The Indian Central Ground Water Board was responsible for circulating the model bill developed by the central government to regulate and control development of groundwater to state governments for enactment.
National water authorities/councils	To facilitate inter-sector/state and level (national to sub-national) co-ordination, conflict-resolution and exchange of information.	The National Water Commission (CNA) in Mexico was established to modernise and decentralise the nation's water resources using a river basin management approach.
Water commissions	To facilitate trans-boundary exchange of information and co-operation on treaties.	The Permanent Indus Commission created under the Indus Water Treaty between India and Pakistan The International Boundary and Water Commission established to manage boundary and water treaties between the United States and Mexico.
National association of water users	To enhance negotiating power of water user associations at the national level.	In Mexico, a federation of water users associations (WUA) called the National Association of Water Users represents WUAs in negotiations with the CNA and the Secretariat of Agriculture.
Donor agencies	To provide financial and technical assistance to develop capacity, formulate policy and planning frameworks, dissemination and education.	

Source: Levina, E. (2006), *Domestic Policy Frameworks for Adaptation to Climate Change in the Water Sector. Part II: Non-Annex I Countries, Lessons Learned from Mexico, India, Argentina and Zimbabwe.* OECD, Paris.

8.2. Integrating adaptation within the sectoral policy cycle

Sectoral policy making, planning and programming are key steps in the implementation of investments and activities for health, transport, water supply,

agriculture, energy, and so on. Although the policy cycle takes different forms in different sectors and in different countries according to the political and institutional context, one can generally distinguish between the *policy formulation*, the *planning,* the *resource allocation* and *programming* stages (Figure 8.1).

8.2.1. Policy formulation stage

The *policy formulation stage* sets out the broad objectives to be pursued in a given sector (*e.g.* development of irrigated agriculture in a given portion of the country for the production of commercial crops for export) over a given time-span; the main approaches to be employed *(e.g.* a mix of smallholder and commercial-scale operations); and the associated policies to be implemented to facilitate the reaching of these objectives. This is the stage where national policy directions are translated into sector-specific policy options, which then provide the basis for designing operational plans and the mobilisation of resources to implement them. Some of these policies may be within the authority of the sectoral ministry concerned *(e.g.* Ministry of Agriculture regulations concerning the approval, certification and commercialisation of certain seeds and phytosanitary inputs) while others may lie beyond its control *(e.g.* implementation of transport or irrigation infrastructure programmes, fiscal treatment of key inputs, land tenure taxation) requiring cross-sectoral co-ordination.

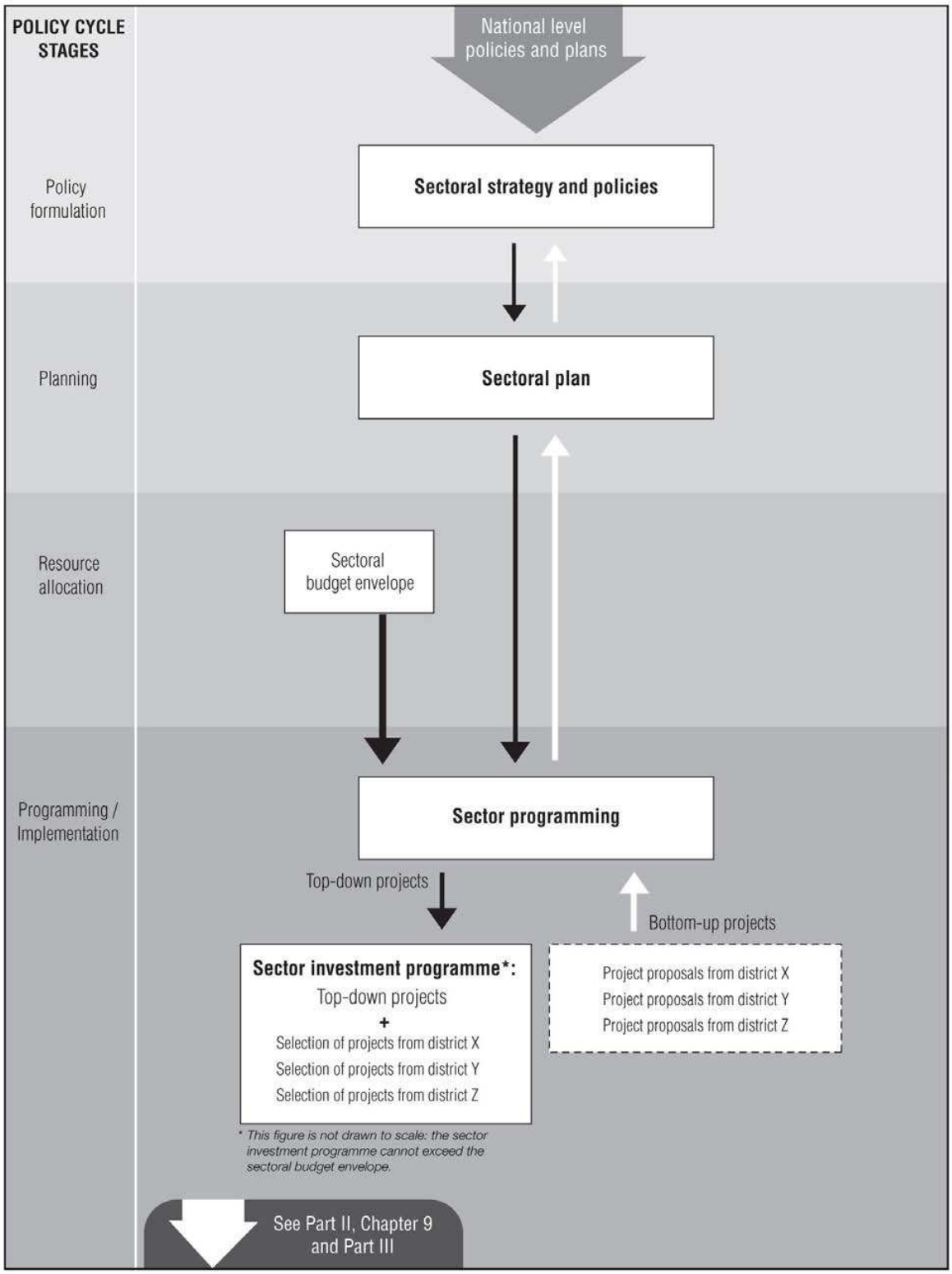
The *sectoral strategy*[1] is normally guided by broader national development policies, such as national visions, sustainable development strategies and PRS. It outlines a broad statement of intent that reflects and focuses the political agenda of a government and provides guidance for all public agencies working in the sector and for institutions that are related to the sector. It also outlines key long-term objectives and development plans for different parts of the country and provides the framework for decisions which may be very costly to reverse. It is therefore critical to consider the direct and indirect impacts of climate change and other environmental factors in the formulation of such strategies. An example of a particular sectoral strategy is the country water resource assistance strategies.

Interventions for climate change adaptation

Policy formulation at sector level provides a key entry point for adaptation. Government agencies, donors and other relevant stakeholders operating at the sector level will need to take action to ensure not only that climate change adaptation priorities established at the national level are operationalised, but also that the setting of such priorities is informed by sector-specific information and experiences. This Policy Guidance suggests the following priority interventions at the sectoral policy formulation stage:

- reflect upon and further deepen action on climate change priorities that may have been established at the national level;
- clearly recognise climate change and the need for adaptation within sectoral policies and strategies;
- apply a climate lens in the formulation of sectoral policies and strategies, and make the necessary adjustments.

Figure 8.1. **Sectoral level governance architecture**



i) Reflect upon and further deepen action on climate change priorities that may have been established at the national level

These priorities established at the national level should provide information on the key sectors and regions vulnerable to climate change and some possible actions that need to be undertaken both reactively and proactively. For example, the analysis of the PRSP using a climate lens may have revealed key sectors vulnerable to climate change and provided new directions for the development of that sector. These new directions would then have to be taken into account in sectoral policies.

ii) Clearly recognise climate change and the need for adaptation within sectoral policies and strategies

Incorporating the keywords climate change and adaptation in sectoral policies could in principle lead to systematic consideration of climate change risks and adaptation responses in the sectoral planning stage, which may help promote proactive adaptation plans and activities. In addition, the explicit consideration of climate change and adaptation to climate change in sectoral policies may enable, at a later stage, stakeholders operating at lower levels to hold sectoral ministries accountable for their actions and policies relating to climate change.

iii) Apply a climate lens in the formulation of sectoral policies and strategies, and make the necessary adjustments

The term "climate lens" is used here in the same way as in Chapter 7 on the national level. Applying a climate lens should result in a better strategy or policy, more effective at reaching its original objectives. This would contribute to the identification of the potential risks that climate change might pose for longer-term development and sectoral goals, and lead to a reorientation of the strategy in a situation where it may lead to maladaptation if climate change risks are ignored. Applying a climate lens to sectoral policies should provide the basis for making the necessary adjustments to the policy framework and therefore reduce the risks to future development for the entire sector.

Certain sectors are inherently vulnerable to climate risks. They include agriculture, transport, energy, urban development, water and others. For these sectors, factoring climate change information at the policy-making stage could allow identification of adaptation actions, avoidance of maladaptation risks and identification of new opportunities resulting from climate change.

SEA can provide a useful tool to facilitate the application of a climate lens in the formulation of sectoral policies and strategies. Particularly in countries with legal provisions for SEA, it may provide a ready entry point for climate change considerations in strategic decision making (Box 8.1).

Box 8.1. **Applying a climate lens to sectoral policies, plans and programmes through Strategic Environmental Assessment**

Strategic Environmental Assessment (SEA) may provide a useful tool for applying a climate lens in the formulation of sectoral policies, strategies and plans, as well as for integrating climate change considerations into the formulation of sectoral programmes. Although the primary focus of SEA so far has been to evaluate the impact of policies, plans and programmes *on the environment* rather than the impact of *environmental change on policies*, *plans and programmes*, it provides a generic framework and sound methodology for integrating environmental considerations into policies, plans and programmes. It may therefore also facilitate systematic reflection of climate change risks in the formulation of policies, plans and programmes. Legal requirements for SEA are being adopted in a growing number of developing countries and organisations, thus often providing a ready entry point for climate change considerations in strategic decision making at the sector level.

Building climate change considerations into an SEA can help to identify whether sectoral strategies are viable and sustainable under different climate change scenarios. For example, in areas facing increasing water stress, SEA can help to assess different strategies for reform of the agricultural sector with different water requirements to identify which strategy is most sustainable under different climate change scenarios. In addition, SEA can help to analyse whether a sectoral strategy might lead to increased vulnerability of the sector where natural and human systems are affected by climate change, and thus prevent maladaptation. Finally, SEA provides a tool for identifying which adaptation interventions can enhance the resilience of the sector in the face of climate change. Box 8.2 presents an example of how SEA has helped to account for climate change impacts in a hydropower plan for a river basin in the Quang Nam province in Viet Nam.

A few typical features of SEA are highlighted in the following to show that SEA offers useful tools for integrating climate change adaptation into the formulation of policies, plans and programmes at the sectoral level. First of all, SEA seeks to identify and alert decision makers to unsustainable development options at a very early stage in the decision-making process. By identifying options that are not sustainable under a certain climate change scenario, costly mistakes can be prevented. Second, broad consultation processes and the involvement of a wide range of different stakeholders are an integral part of an SEA process. Such participatory processes are inevitable for a sound analysis of how climate change might affect economic and social systems. They also provide a basis for developing measures to be built into sectoral strategies and plans so as to enhance the resilience of these systems. In addition, SEA helps to unveil capacity gaps and to highlight capacity development priorities. This may become particularly relevant as new capacities will have to be developed in the light of climate change for assessing the implications of climate change for a sector, and for identifying adaptation priorities. Last but not least, SEA offers a good framework to focus on linkages between the sector in question and other sectors (*e.g.* between health, agriculture and water). Given the cross-sectoral nature of climate change impacts, opportunities for co-ordinating or integrating programmes with other sectors will be important elements of climate change adaptation measures at this level.

Annex B shows how climate change adaptation issues can be factored in at the main stages of an SEA process for sectoral policies, plans and programmes, as outlined in the OECD/DAC Good Practice Guidance document on *Strategic Environmental Assessment* (OECD, 2006c). It suggests some key climate change adaptation-related questions to consider at each stage.

8.2.2. Planning stage

The sectoral plan translates the sectoral strategy into a set of concrete actions by specifying in more detail the various investments and activities to be implemented over a given time period in order to reach the objectives of the sector-wide policy. This often includes specification of the number, type and location of facilities to be implemented (*e.g.* a specific geographical zone to be developed for certain crops and associated infrastructure requirements, such as an irrigation network). In many cases, the national-level plan will be translated into more detailed plans for different parts of the country. The sectoral plan provides an opportunity to develop more concrete actions with regard to adaptation to climate change for any one sector.

Interventions for climate change adaptation

Sectoral plans (long-, medium- and short-term plans) provide an opportunity to define more concrete climate change adaptation actions. Government agencies at sectoral level need to apply a climate lens in the formulation of sectoral plans and build proactive adaptation interventions into the planning process. Planning needs to be prioritised carefully as the demands are great at the sector level. Sector agencies in the public administration may need support from donor agencies to help them realign their missions to allow for more effective medium- to long-term planning. This lengthening of the planning horizon has the potential to create tension with shorter-term political imperatives, such as poverty reduction.

This Policy Guidance suggests the following priority interventions to incorporate adaptation into sectoral planning:

- applying a climate lens in the formulation of the sectoral plan;
- build in sector-level top-down proactive adaptation activities and projects;
- build in cross-sectoral adaptation activities and projects identified at the national level.

i) Applying a climate lens in the formulation of the sectoral plan

This may lead to the reorientation and modification of the sectoral plan and/or to the development of new activities. In sectors which are inherently vulnerable to climate change, specific examination of current climate-related risks may inform sectoral activities. Examination of the potential impacts of climate changes may also help guide sectoral or cross-sectoral decisions concerning projects with an anticipated useful life within the horizon envisaged by climate change projections. Plans to develop irrigated agriculture will, for example, need to examine the impact of climate change on water resources.

In sectors not inherently vulnerable to climate change, the focus of attention may be on geographical areas expected to be significantly affected by climate change. This analysis may best be conducted at the regional or sub-regional level. Regional development authorities may, for example, be encouraged or required by national policies to identify the likely risks of climate change on the development plans in various sectors and, in turn, encourage responsible sectoral authorities to factor these risks in the context of a regional-level sector planning exercise. For example, factoring the risk of sea-level rise in a given region may lead to a reconsideration of zoning rules, thereby influencing

future investments in a large variety of activities and sectors in that region and, as the case may be, significantly modifying land-use planning.

More generally, a climate vulnerability analysis of a sectoral plan may point to the need for detailed analysis of certain issues and lead to the allocation of specific funding and capacity for this purpose.

Box 8.2 shows two examples of how SEA has provided a tool to apply a climate lens to sectoral plans in Viet Nam.

Box 8.2. **Strategic Environmental Assessment as a tool to integrate climate change adaptation in Viet Nam**

Viet Nam is one of the developing countries that have legal provisions for Strategic Environmental Assessment (SEA) of regional and sectoral plans. Article 14 of the Law on Environmental Protection (LEP) of 2005 requires SEA for various categories of strategies and action plans related to socio-economic development at different levels of government, including for land use, forest protection and development, development of natural resources and of river basins. The law requires that SEAs cover environmental, social and economic impacts. The legal frameworks and implementation guidance for SEA in Viet Nam is generally consistent with the OECD/DAC Good Practice Guidance document on *Strategic Environmental Assessment* (OECD, 2006c). They provide a sound potential framework for integrating climate change considerations into sectoral and spatial development planning. While the SEA law does not entail detailed provisions for how to take climate change into account, the draft guidelines for general SEA application prepared by Viet Nam propose the consideration of climate change impacts and risks at different steps throughout the SEA procedure.

Viet Nam is rapidly accumulating experience in SEA, applied across a range of administrative levels and spatial scales. The following two cases demonstrate how SEA has helped to integrate climate change adaptation into a regional land-use plan and a sub-national sectoral plan.

SEA of land-use planning for the Nhon Trach district

An SEA was conducted in 2007/08 to integrate environmental issues into the land-use planning for the Nhon Trach district near Ho Chi Minh City. An assessment of the possible consequences of climate change for Nhon Trach district was made as part of the SEA. Accordingly, the SEA report proposes not only environmental protection solutions, but also measures for adapting to the expected climate change impacts, including estimated costs and implementation arrangements. The assessment of climate change impacts included analyses of possible temperature increase, precipitation changes, sea-level rise, and salt water intrusion. Proposed recommendations and measures for adapting to climate change included:

- Dike systems to prevent the invasion of seawater in the district should continue to be maintained and further developed.
- New varieties and species of crops should be identified, and an adaptation of cropping systems is needed in order to reduce the vulnerability of the agricultural system to climate change impacts.
- Tree coverage for the agricultural land converted to other uses, such as dwelling or construction land, should be at least 15% in order to contain soil erosion.

Box 8.2. **Strategic Environmental Assessment as a tool to integrate climate change adaptation in Viet Nam** (continued)

- The drainage system should be better maintained and extended in pace with urban development and environmental management of urban and industrial parks should be enhanced, including regular dredging, in order to avoid local flooding in the rainy season.
- Existing mangrove forests should continue to be preserved in the district in order to mitigate increasing hazards from high tides.

SEA of the Quang Nam province hydropower plan covering the Vu Gia-Thu Bon river basin

An SEA was conducted, with support from the Asian Development Bank (ADB), on the hydropower development plan for the Vu Gia-Thu Bon river basin (2006-2010). Climate change was considered as one of 15 key issues to be addressed by the SEA. However, some of the climate change concerns were not quantifiable as predictive, or spatial models for the study area, particularly for the time-frame of the study (20 years), were not available. The analysis of climate change impacts was therefore largely qualitative, based on extrapolation from available literature (mainly IPCC, 2007). However, a range of important climate change impacts on the hydrology of the basin were identified: increased rainfall intensity and variability; increases in size of extreme flood flows, resulting in large sediment transport and sand excavation; sea-level rise affecting flooding in the seaward parts of the delta; increases in temperature and higher evapotranspiration leading to lower dry season minimal flows with effects on salinity intrusion.

The SEA concluded that the pace and scale of the proposed hydropower development was at an unsustainable level and recommended a number of fundamental principles to enhance the sustainability and equity of the hydro sector in the basin. One of these principles highlights "safe operations", recommending the implementation of operational regimes and institutional arrangements to reduce droughts and floods and prepare for disasters; the need to incorporate climate change parameters in design and management is explicitly mentioned. In addition, the results from the climate change analysis gave support to some strategic recommendations regarding the need for *(i)* integrated river basin management; *(ii)* co-ordinated management and water release programmes for the 60 dams considered; (*iii)* needs for improved data collection on climate-related issues.

Sources:

ADB (2008), "Strategic Environmental Assessment of the Quang Nam Province Hydropower Plan for the Vu Gia-Thu Bon River Basin", prepared for the Vietnam Ministry of Natural Resources and Environment, the Ministry of Industry and Trade and Electricity Vietnam, Asian Development Bank, Hanoi.

ADB (2009), "Strategic Environmental Assessment as a Tool to Improve Climate Change Adaptation in the Greater Mekong Subregion", Asian Development Bank, Manila.

SEMLA (2008), "Evaluation of SEMLA SEA Projects", Vietnam-Sweden Cooperation Programme on Strengthening Environmental Management and Land Administration in Vietnam, Hanoi.

ii) Build in sector-level top-down proactive adaptation activities and projects

A climate change analysis of a sectoral strategy may identify the need for additional activities or investments at a national or regional scale. Examples include centralised climate monitoring systems or research and development of particular technologies (such as drought-resistant crops). Such regional or national public goods would generally not arise from the bottom-up project submission process but would be identified by sectoral authorities.

iii) Build in cross-sectoral adaptation activities and projects identified at the national level

Applying a climate lens to national level policies and strategies may also have revealed the need for responses to the impacts of climate change that cut across sectors (see section 7.3.2). Key examples are measures in relation to disaster risk management. Such cross-sectoral climate change responses will then have to be translated into programmes and projects at the sectoral level and built into the sectoral plan.

8.2.3. Resource allocation and sector programming stage

The *sector programming stage* involves the precise identification and costing of a specific set of *investments*, activities or "projects" (which may have varying scales) to be implemented within a given time horizon (say 5 years) as well as implementation arrangements and responsibilities, time-lines and estimated costs. The formulation of the nationwide sector programme, which compiles all the region-specific plans, generally results from a mixture of top-down (national objectives*, e.g.* poverty reduction) and bottom-up processes (specific proposals developed by the regional-level sectoral authorities). Projects selected for implementation as part of the sector programmes have to conform to sector-wide guidelines and/or procedures. Bottom-up proposals from lower-level authorities are assessed against "top-down" sector-wide criteria (*e.g.* cost-benefit analysis, poverty reduction impact and technical soundness) as well as overall sectoral objectives.

Sector-level budget envelopes are derived from and influence the national budget cycle. The overall size of the sector investment plan will depend on the availability of resources made available to the sector from the national budget. This in turn depends on the potential role of the given sector in achieving priority national objectives and the capacity of sectoral authorities to present strong investment proposals, as well as other factors. Given a budget envelope, a sectoral ministry will have to make choices and allocate it across different geographical regions. This allocation will normally be guided by national and sector-wide policies and objectives. For example, poverty reduction objectives may imply that the poorest parts of the country have priority access to the limited resources in the sector-level budget envelope.

Compared to sectoral polices and plans, the sectoral investment programme is subject to more frequent revisions and adjustments. This stage defines the selection and outline of concrete activities and projects that can either increase adaptive capacity or lead to maladaptation, such as construction of transport infrastructure in hazardous zones. It is important, therefore, that relevant information on climate risks inform key parameters of sectoral programmes and projects, including choice of technologies and location of infrastructure.

Interventions for climate change adaptation

This Policy Guidance suggests the following priority interventions to incorporate adaptation into sectoral programming and resource allocation:

- add climate change considerations to the range of criteria used to screen project proposals;
- incorporate top-down adaptation activities and projects identified during the sectoral planning stage;
- make "room" in the budget for climate change responses identified in the context of cross-sectoral plans, or claim resources from a horizontal fund for adaptation.

i) Add climate change considerations to the range of criteria used to screen project proposals

Projects are routinely subjected by sectoral ministries to a range of screening criteria before their inclusion into the sectoral investment programme. These include, for example, social impact analysis, environmental impact assessment and cost-benefit analysis. A climate lens may be added to these existing criteria. This can help to identify whether a project proposal *(a)* may be sensitive to climate change or *(b)* could lead to increased vulnerability and therefore to maladaptation. The inclusion of climate change considerations to screen sectoral programme provides the opportunity to *(i)* avoid excessively risky projects (*i.e.* exclude them from the programme); *(ii)* build in appropriate climate-proofing measures and financing for vulnerable projects that are selected for implementation; and *(iii)* include in the sectoral programme activities that can contribute actively to reducing climate vulnerability (adaptation programmes). In addition, adding a climate screen to the other "top-down" criteria provides a ready way to require or encourage project proponents or the appropriate authorities within districts or regions to examine this aspect as part of their project analysis. This may lead to the identification of ancillary or additional investments, and influence the costing of projects.

In general, the vulnerability of a project to climate risks is a function of the type of infrastructure it establishes (*e.g.* irrigation facilities) or the activities it supports (like farming) as well as its geographical location (whether it is located in an area where climatic conditions are susceptible to significant changes).

In addition, the expected lifetime of project activities is likely to be a critical factor determining the need to assess climate change vulnerability. Investment in infrastructure that has a long expected lifetime, for example lasting more than several decades (such as a dam or an irrigation network), could consider the effect of future climate conditions on the viability of the project, since climate change impacts will most likely become relevant during the planned life of the project.

Box 8.3 suggests a generic approach for a climate risk and vulnerability impacts screening of a sectoral investment programme.

Box 8.3. An approach to screen for climate change risk

This approach is designed to assess whether projects will be affected by climate change. Projects are assigned to one of three categories (high-risk, partial- or moderate-risk, no/low-risk) on the basis of the nature, magnitude and sensitivity to climate risks.

The high-risk category (Category 1) contains projects that may have diverse and significant relationships to climate and includes projects in sensitive sectors (agriculture, water), in hazard zones (coastal zones, flood plains), related to livelihoods close to the margin of tolerance (coping range) and/or close to the economic margins of production, and with long physical and economic lives.

Category 2 includes projects which may have some specific climate vulnerabilities and those which potentially increase vulnerabilities external to the project.

Category 3 includes projects that are not affected in any significant way by climate and do not affect external vulnerability.

The screening is based on an evaluation of the following three elements:

- Climate risks facing the country or region;
- Climate risks to the project, *i.e.* the extent to which the project contains components that may be vulnerable to climate risks; and
- External climate risks affected by the project, *i.e.* the extent to which the project may have consequences for the vulnerability of external natural and human systems.

The classification of projects into the three categories can be based on the following considerations.

Category	Direct risk	Effect on external risk	Effect on indirect or secondary risk
Category 1	Large components of the project are subject to the climate risks facing the country or region (*e.g.* infrastructure and agriculture projects located in flood- or drought-prone areas).	The project could have a strong effect on the climate risks to which the country or region is exposed (*e.g.* infrastructure projects that trigger development in dangerous areas).	
Category 2	Some elements of the project are subject to direct risks, but the risk to the project as a whole is limited or only indirect.		The project may have indirect effects on the vulnerability of the country.
Category 3	The project is not sensitive to climate risks at all.	The project does not (negatively) affect external vulnerability.	

Placing a project in one of the three categories will have implications on whether the project is proposed and on the modifications required to reduce the climate risks facing the project. In addition, it will have implications on the amount of climate risk assessment needed downstream (at the project level). High-risk projects would require a full climate risk assessment, partial/moderate-risk projects a selective climate risk assessment, and no/low-risk projects no further assessments.

Source: Burton, I. and M. van Aalst (2004), "Look Before You Leap: A Risk Management Approach for Incorporating Climate Change Adaptation into World Bank Operations", World Bank, Washington.

ii) Incorporate top-down adaptation activities and projects identified during the sectoral planning stage

The body responsible for allocating the sectoral budget to different regions or districts may consider not only the project proposals provided by these regions or districts but also the inclusion of top-down project proposals identified during the sectoral planning stage. In addition, the increased costs of adding climate change to the criteria used for screening project proposals may have to be taken into account in the sectoral budget.

A top-down sector-level perspective may also lead to the identification of additional measures cutting across the jurisdictional boundaries of regional authorities. For example, effective integration of climate change risks in the agriculture sector may require national-scale investments in infrastructure to transfer water from one river basin to another. Given that the sector-level budget envelope is finite, "room" would therefore have to be made for such investments by reducing the scale of regional programmes.

The MTEF can be a useful tool to identify in advance financing gaps at the sector level and serve as the basis for well-costed budget proposals to be submitted by the sector to the annual budget. The MTEF can also be instrumental in securing funding commitments (from Ministries of Finance and from donors) over the medium term. Other potential financial mechanisms to explore are the international funds dedicated to adaptation to climate change and climate change resilience.

iii) Make "room" in the budget for climate change responses identified in the context of cross-sectoral plans, or claim resources from a horizontal fund for adaptation

Applying a climate lens at the level of national policies and plans may have identified the need for cross-sectoral responses to the impacts of climate change (*e.g.* in relation to disaster risk management). Concrete adaptation measures and priorities may then have been further defined in the context of cross-sectoral plans such as national climate change adaptation plans. The resulting activities and projects to be undertaken accordingly at the sectoral level may either have to be covered by the sectoral budget envelope or by resources from a *horizontal fund for adaptation* (see section 7.3.3).

8.2.4. Monitoring and evaluation stage

The *monitoring and evaluation stage* consists of the assessment of progress against set targets and objectives. Monitoring and evaluation instruments include an array of reporting tools, including budget execution reports as well as gender-based budgeting. An increasingly important monitoring and evaluation tool is the PAF used to assess governance performance under sector budget support (discussed below).

As noted in Part I of this Policy Guidance, it is important to routinely monitor and evaluate implementation of adaptations to identify successes and failures, and, as appropriate, to make changes to the adaptations. There may be an important distinction between monitoring and evaluating "no regrets" or "low regrets" adaptations versus "climate justified" adaptations (see Part I, Chapter 5). No regrets or low regrets adaptations are already justified on the basis of current climate conditions. Thus, benefits could be seen very soon after implementation. Adaptations designed to address infrequent events may not have sufficient data upon which to fully evaluate them. Climate-justified adaptations may be designed to account for long-term climate change. Until the climate changes, it may be difficult to fully evaluate the effectiveness of such adaptations.

Considerable investment is needed at the sector level to support monitoring and evaluation of climate change adaptation. Monitoring programmes will require the careful selection of criteria and indicators to ensure they are both effective and efficient. Early investment is required so that trend data can be obtained in the near future. This suggests building on existing systems and methods so that historic data can be incorporated. Resources are also required to allow for the evaluation of these data sets. Such evaluation will depend, to a large extent, on strengthening the existing research and development community.

Interventions for climate change adaptation

This Policy Guidance suggests two priority interventions to incorporate adaptation into monitoring and evaluation at sector level:

- mobilise the necessary resources to strengthen monitoring and evaluation systems and capacities;
- produce indicators to track performance against adaptation.

i) Mobilise the necessary resources to strengthen monitoring and evaluation systems and capacities

Financial and specialised human resources are required to establish any effective monitoring and evaluation system. Such systems have become a common feature of many government reform programmes, as they are often considered an integral component of the switch between "input" administrative processes to ones that focus on public service delivery. Earmarked allocations need to be set within the annual budget of each sector agency. As monitoring and evaluation is a medium- to long-term endeavour, such programmes should also feature within any multi-year budgetary frameworks (such as MTEFs) where they have been created. By securing recognition within the MTEF, there is a certain level of assurance concerning the continuity of funding.

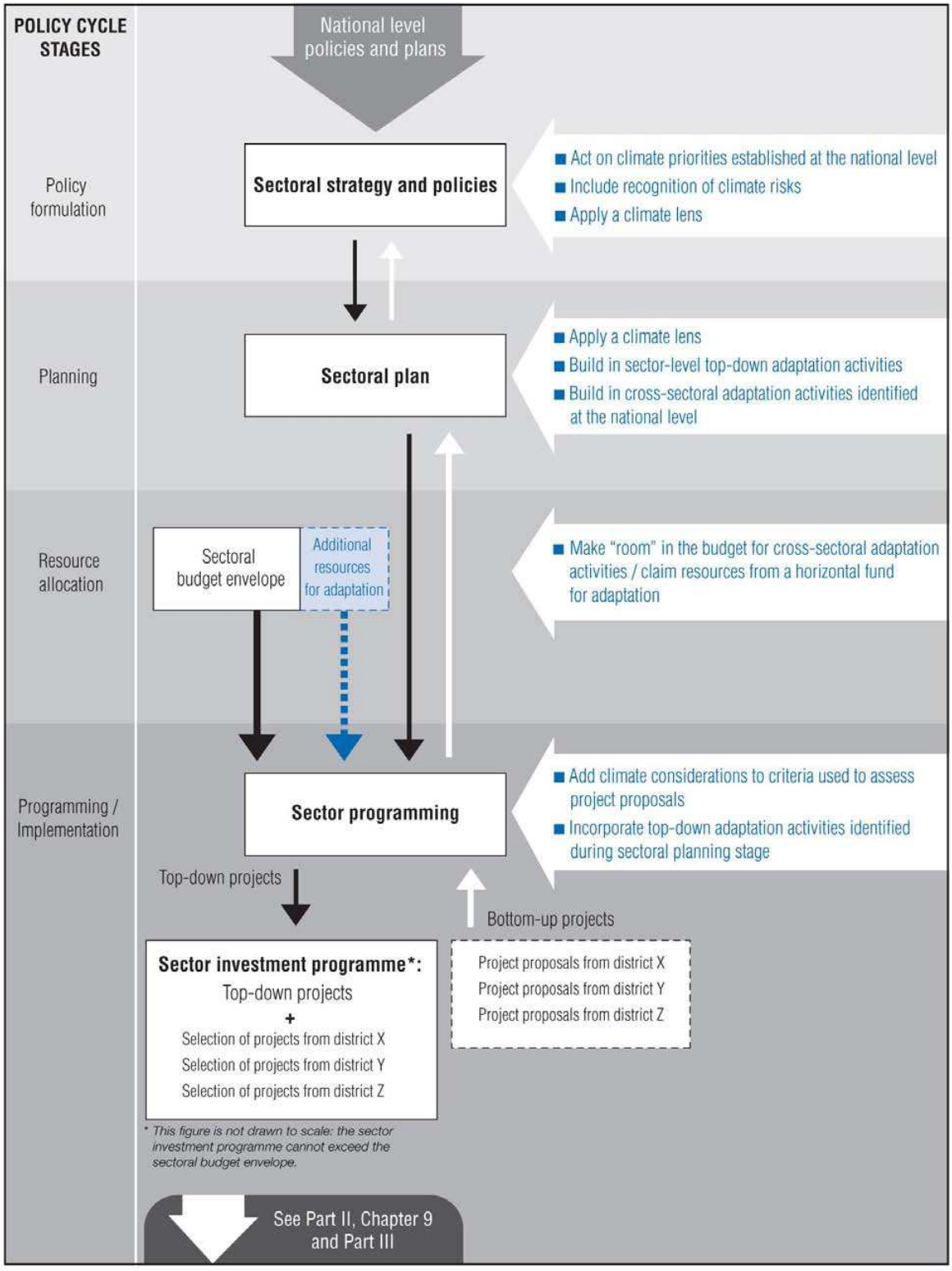
ii) Produce indicators to track performance against adaptation

Considerable experience has been built up in recent years with the use of performance indicators. It is now understood that for medium-term policy goals such as poverty reduction, measuring policy impact is quite problematic as the causal chain between inputs, outputs, outcomes and impacts is not a simple one. As new areas of policy are developed (such as climate change adaptation), early emphasis in monitoring can be given to input and process indicators to measure the uptake of policy measures in a comprehensive way. Over time, these indicators can change and more outcome-related measures can be assessed.

At the national level, Ministries of Planning or Economic Development may contain monitoring and evaluation units that liaise with the national statistical service over the collection and analysis of performance-related indicators across a range of sectors. Sector-based agencies need to tap into this expertise to ensure that any monitoring system is well designed and is capable of being integrated with broader national efforts.

Figure 8.2 provides an overview of the main interventions for climate change adaptation in the sectoral-level policy cycle.

Figure 8.2. **Sectoral level governance architecture with key interventions for adaptation**



8.3. Donor support for integration of adaptation at the sectoral level

Development co-operation is often earmarked for specific sectors. Donors' country assistance strategies typically specify the sectoral domains benefiting from development assistance. Assistance to the selected sectors is planned and implemented on the basis of a donor's own sector-specific policies or programmes that set the objectives and overall guidance for co-operation. Aid to the beneficiary sectors can be channelled through a variety of modalities, including sector budget support,[2] sector-wide approaches (SWAps), basket funding, project funding (see one example in Box 8.4) and technical assistance.

Box 8.4. **Mainstreaming climate change adaptation in China's agricultural sector**

This case study shows how mainstreaming at sector level can be assisted by strategic interventions to help identify, prioritise, demonstrate and implement adaptation measures through pilot activities. The "Mainstreaming Climate Change Adaptation in Irrigated Agriculture" is a new project funded by the Global Environmental Facility (GEF) that is being implemented by the World Bank to ensure that adaptation to climate change is mainstreamed into the Comprehensive Agricultural Development programme in China. The project uses the World Bank implemented Irrigated Agricultural Intensification III Project as an entry point and focuses on identifying and implementing adaptation strategies and mainstreaming strategies through institutional building and policy development.

- *Policy*: The policy framework for mainstreaming climate change adaptation into the agricultural sector includes China's initial national communication (2004) to the United Nations Framework Convention on Climate Change and the Comprehensive Agricultural Development. China's national communication highlights that climate change will have a negative impact on agriculture leading to higher costs of production, which will in turn require a greater focus on management techniques. The Comprehensive Agricultural Development is China's policy on macro-agricultural adjustment and the promotion of sustainable agricultural development. However, the Comprehensive Agricultural Development has not addressed climate change issues so far.
- *Type of engagement*: The project will mainstream adaptation in the national Comprehensive Agricultural Development programme through capacity building; implementation of a monitoring and evaluation system and a management information system focusing on adaptation measures; and the preparation of a national climate change adaptation plan for the Comprehensive Agricultural Development.
- *Actors involved*: Actors responsible for driving the GEF project include the government of China whose priority is to use the Bank to help develop and explore adaptation measures to address agricultural vulnerabilities to climate change; the GEF, which is funding the project, and the World Bank responsible for developing the project. Implementation is guided by the State Office for Comprehensive Agricultural Development, with the close co-operation of the National Development and Reform Commission, and the Ministry of Finance's national climate change adaptation offices. Because of this institutional location, the project has significant influence in all the provinces and has close working arrangements with central-sector agencies concerned with adaptation to climate change, including the Ministries of Water Resources and Agriculture.

Sources: Initial National Communication on Climate Change (2004), "The People's Republic of China", *http://unfccc.int/resource/docs/natc/chnnc1e.pdf*;

World Bank (2008), "Mainstreaming Climate Change Adaptation in Irrigated Agriculture Project", *http://web.worldbank.org/external/projects/main?Projectid=P105229&Type=Overview&theSitePK=40941&pagePK=64283627&menuPK=64282134&piPK=64290415.*

Sector budget support is a modality for funding, through the state budget, government policy in a specific sector. By using this modality, donors provide untied funds that are earmarked for the respective sector, and include a dialogue between donors and partner governments on sector policies and performance.

PAFs are often developed as part of budget support arrangements and as a mechanism to monitor and review government progress. In the case of sector budget support, PAFs are sector-specific and include sector policy indicators and targets.

Sector budget support provides an important platform for high-level policy dialogue with senior government officials from the sectoral ministries as well as the Ministry of Finance. This provides an opportunity for donors to raise government attention to climate risks in sector development. Adaptation strategies can in principle be integrated into sector budget support PAFs to help keep adaptation high on the policy agenda. Furthermore, additional discretionary donor funds for sectoral development can ease financial constraints in the sector so that adaptation-related expenditures can be covered and activities with increased priority because of climate risks can be implemented.

Financial assistance to specific sectors is also provided through *basket funding* (also called pooled funding) whereby a group of donors pools together funding in support of specific sub-sectoral areas (*e.g.* basket fund for the procurement of essential drugs in the health sector; basket fund for government capacity building). The difference between basket funding and sector budget support is that the former usually targets a sub-sectoral area within the sector and is often managed through parallel mechanisms to those of the national government. The use of basket funding is not recommended in countries where budget support is already in use (Box 8.5 explains why). In countries where budget support is not an option (for example because of high fiduciary risk), basket funding could be a useful instrument to bring aid resources together in support of adaptation in a particular sectoral or cross-sectoral area.

Sector-wide approaches are another important entry point in development co-operation at the sector level. A SWAp is not an aid instrument as such but rather an approach for co-operation in a sector, which is defined by the emphasis on the principles of ownership, alignment and harmonisation. A SWAp ideally consists of the following elements (OECD, 2006d):

- a nationally owned sector policy and strategy;
- a medium-term expenditure programme that reflects the sector strategy;
- systematic arrangements for programming the resources that support the sector;
- a performance-monitoring system that measures progress and strengthens accountability;
- broad consultation mechanisms that involve all significant stakeholders;
- a formalised government-led process for aid co-ordination and dialogue at the sector level; and
- an agreed process for moving towards harmonised systems for reporting, budgeting, financial management and procurement.

Box 8.5. **Basket funding: Opportunities and risks**

Basket funding, or common pool funding, is an aid modality used when donors limit aid to specific expenditure categories within a sector. Basket funds are usually managed outside the national public financial management (PFM) system and have their own rules and procedures. When they are managed through the national PFM system, they become forms of budgetary support.

Basket funding may be appropriate where it is seen as a transitional arrangement from discrete projects to the use of budget support. The underlying rationale is that so long as there are doubts over the quality of the PFM system, a basket fund can permit tighter financial supervision by donors, while offering advantages over discrete projects. This argument would seem to be valid in a weak PFM environment where General Budget Support is not being provided, or being provided only on a small scale.

Basket funding offers therefore the following **opportunities:**

- It offers advantages in relation to project support both in terms of donor co-ordination and alignment with government policies and expenditure programming systems.
- It reduces transaction costs (in relation to project modalities) by introducing common reporting, disbursement, accounting and procurement procedures for activities which would otherwise be funded through a number of discrete projects.
- It may provide a useful "learning ground" for building confidence between government and donors and hence facilitate the move towards budget support and the use of government procedures.

But basket funding has to be handled with care as it poses a number of **risks**:

- Although being a transitional arrangement, it might become a permanent one.
- It may undermine the potential effects of general budget support on budget coverage, transparency and allocative and technical efficiency.
- Experience shows that the establishment of pooled funds is highly demanding in government time and very costly in terms of technical assistance and preparatory costs.

Source: ODI (2006), "Addressing Environmental Objectives in the Context of Budget Support", report produced for DFID, Overseas Development Institute, London, *www.odi.org.uk/ccef/resources/ reports/EnvObj&BudgSupport.pdf*.

While donors can support SWAps through several aid instruments, the harmonisation and alignment principles indicate a preference for common funding arrangements (*i.e.* basket funding or sector budget support). SWAps are prominent in sectors that are important for adaptation, including health, water, agriculture and forestry (Box 8.6).

Box 8.6. **Cameroon: The Forest and Environment Sector Programme**

The Forest and Environment Sector Programme in Cameroon provides a framework for donor harmonisation within the forest sector and ensures the effectiveness of interventions aimed at poverty reduction and sustainable management. The Forest and Environment Sector Programme has led to the development of a sector-wide approach (SWAp) in the forest and environment sector and to the implementation of budget support. Though the activities under the Forest and Environment Sector Programme are not designed specifically as climate change adaptation strategies, they will build the coping capacities of communities and institutions to respond to the threats and opportunities posed by climate change scenarios. In addition, the development of a SWAp will facilitate effective and efficient donor support targeted on the sector.

- *Policy*: The Forest and Environment Sector Programme, a ten-year programme developed by the government of Cameroon and the donors engaged in the sector, was adopted in June 2004. The objectives are derived from the two existing laws in the forest and the environment sectors, namely, the Forest, Fauna and Fisheries Act (1994) and the Environment Management Framework Act (1996). Both laws are based on principles of sustainable management, growth and poverty reduction, conservation and good governance.

- *Type of interventions:* The Forest and Environment Sector Programme provides a framework for donor harmonisation and alignment. For example, in January 2006, 13 donors signed a Code of Conduct in support of the country's first SWAp in the forest and environment sectors. It has also facilitated budget support and has ensured that technical assistance provided for its implementation is channelled through a basket fund. Ongoing donor interventions aimed at developing the Forest and Environment Sector Programme include the establishment of the Forest Governance Facility. Though not designed with the objective of climate change adaptation, this Facility could play an important role in raising awareness and ensuring local participation in sector decision-making processes. Other activities, including the development of spatial planning designed to harmonise the economic and ecological interests in a given region, are not specifically aimed at facilitating adaptation to climate change, but they are strengthening the capacity of sectoral institutions to plan and implement robust adaptation strategies.

- *Actors*: The Forest and Environment Sector Programme has been developed by the government of Cameroon and led by the Ministries of Forests and Environment. Donors include the World Bank, the European Union, UK, Germany, Netherlands, France, Canada, the United Nations Development Programme and the Food and Agriculture Organization.

Sources:

"Aid Harmonisation and Alignment: Initiatives for Cameroon", *www.aidharmonization.org/ah-cla/ah-browser/index-abridged?area_list=H-TBD&master=master&advanced_view_p=f&page_no=2*;

OECD (2007), "Workshop on Development Effectiveness in Practice: Applying the Paris Declaration to Advancing Gender Equality, Environmental Sustainability and Human Rights, Session A, Cameroon Forest and Environment Sector Programme", *www.oecd.org/dataoecd/24/10/38556752.pdf.*

Experience to date with SWAps has been mixed. They have no doubt contributed to strengthened government leadership and a more streamlined dialogue between donors and government, and among donors. But this has often been at the cost of centralisation of policy making with limited inter-sectoral (or sector-wide) co-ordination or participation from local and non-governmental stakeholders in policy formulation and debate.

Evidence also shows that there has been an excessive focus put on the SWAp process itself (for example, creating common funding mechanisms and policy dialogue forums between the donor community and government) rather than on sector policy objectives and outcomes.

Notwithstanding these limitations, where they exist SWAps can provide opportunities for addressing important aspects of the adaptation agenda at the sector level, particularly those requiring government leadership and donor co-ordination, dialogue and sharing of information. The medium- to long-term horizon of a SWAp might also suit better the longer-term nature of some adaptation provisions compared to often shorter-term disbursement and aspirations for success of stand-alone projects.

8.4. Challenges and priorities for action

This chapter has outlined a number of avenues for integrating the consideration of adaptation within partner and donor countries' processes at the sectoral level. It has also highlighted some illustrative examples where such integration is beginning to occur at the sectoral level. Meaningful integration of adaptation considerations, however, is still at a very early stage. This is on account of a number of key challenges:

- First, unlike the national level where assessments of climate change impacts and vulnerabilities are generally available for most countries, there is a general lack of detailed information on climate change impacts, vulnerabilities, and adaptation priorities at the sectoral level. Furthermore, there is also a need for assessments on how climate change impacts might interplay with other drivers of change within the context of specific sectors. For example, in the case of the agricultural sector, the implications of climate change might need to be viewed not in isolation from but in conjunction with other pressures such as demographic trends, scenarios of water availability, and trends in trade and commodity prices – all of which might influence sectoral policies. Such integrated information would often be key to both partner governments and donors to facilitate more meaningful integration of adaptation at the sectoral level.
- Second, adaptation to climate change is still not high enough on the agenda of most sectoral ministries and donor agencies. Even in cases where consideration of climate variability is part of established practice (as in water resource management), the established regulations and procedures frequently rely upon historical climate as a baseline and do not adequately reflect how the baseline itself might change as a result of the changing climate.
- Third, there is a general lack of capacity in terms of analysing the implications of climate change in many sectoral ministries. There is also limited access to centralised sources of climate expertise such as in the Ministries of Environment or the Department of Meteorology. Consequently, decision makers may not have adequate information on the specific implications of climate change on their specific sectors.
- Fourth, successful implementation of adaptation would require factoring such actions within resource allocations such as sectoral investment plans. However, even when there is information available on specific adaptation actions that could be undertaken at the sectoral level, there is typically little or no information on how much such measures might cost.

Addressing these challenges would necessitate a number of priority actions at the sectoral level. These include:

- A "needs assessment" of sector-specific information on climate change impacts, vulnerabilities and adaptation priorities for key climate-sensitive sectors in a particular country. To the extent such information is unavailable or lacking in specifics, there may be a need to commission such targeted studies that can better inform policy making at the sectoral level.
- Second, there is a need for greater awareness-raising, both among sectoral planners and their counterparts within donor agencies of the implications of climate change on their specific areas of activity. Such efforts can also highlight potential adaptation strategies, as well as entry points for their implementation.
- Third, in cases where sectoral regulations and other decision-making processes are based entirely on historical climate, there might be a need to introduce greater flexibility – such as more frequent updating of the climatic baseline (in case of water resource management) or hazard maps to be better equipped to take evolving climate risks into account.
- Fourth, there is a need to boost in-house capacity within sectoral ministries and donor agencies to better evaluate the implications of climate change for specific sectors. There is also a need for better cross-sectoral co-ordination mechanisms that can facilitate access to relevant information from other ministries (such as Environment) and also the conduct of linked assessments of the implications of climate change (*e.g.* water and agriculture).
- Finally, better information on the costs and benefits of adaptation actions is needed so that decision makers at various levels (including at the sectoral level) can factor such information in taking decisions on how to implement adaptation-related actions.

Notes

1. It is recognised that some countries will have sectoral strategies and others will have sectoral policies. The word "strategy" is used here in a generic way and includes the two terms of strategy and policy.
2. Sector budget support differs from General Budget Support in that aid is earmarked for a specific sector. Sector budget support often contains no further earmarking and is distributed across sub-sectoral areas on the basis of government priorities for the sector, according to sectoral development programmes or strategy documents.

Chapter 9

Integrating Climate Change Adaptation at the Project Level

This chapter addresses why the project level matters for adaptation. It sets out the project cycle, from identification to appraisal and detailed design to implementation to monitoring and evaluation. It goes on to discuss integrating adaptation within the project cycle and the role of donors in enabling integration of adaptation at the project level. The chapter closes with a discussion of challenges and priorities for action at the project level.

9.1. Introduction

The term "project" can have different meanings. In this Policy Guidance it is used to refer to a discrete activity in a predetermined location. Projects come in a wide variety of types and scales, ranging from, for example, a rural school or a large hydroelectric dam to the resettlement of a given population.

In spite of their enormous diversity in terms of size, aim, focus and method, projects share a number of features: they normally have a specific purpose, objectives, a target population, detailed activities, a clearly defined budget, monitoring indicators and targets to be reached within a defined time-frame. While it may be part of a large set or series of activities with similar objectives (*e.g.* an investment programme comprising of many similar projects in different parts of a country or region), a project is normally placed under the responsibility of a dedicated authority (*e.g.* the Project Implementation Unit within the relevant public administration) with a significant degree of discretion concerning its detailed design and implementation. In most cases, however, the broad parameters governing project design are determined by higher-level sector-wide criteria or guidelines which apply to all similar activities in the sector or geographical location concerned.

"Project support" is also one modality of development co-operation. It involves providing a specific amount of financial and/or technical assistance for a clearly defined and time-bound activity or set of activities. In general, authorities responsible for project implementation are not involved in securing its funding. The climate change considerations outlined in this chapter are applicable to any project, regardless of whether it is funded by a government's own resources or by project support from one or several donors.

Adaptation-specific projects, *i.e.* projects that are developed with the specific intent of addressing climate change impacts (the construction of a sea wall, for example) are not the focus of this chapter that focuses primarily on "normal" development projects that may need to be "climate-proofed".

9.1.1. Why the project level matters for adaptation

There are two ways in which climate change is relevant to projects (and vice versa). First of all, projects may be vulnerable to the impacts of climate change (*e.g.* floods or sea-level rise damaging infrastructure). Second, projects may increase or decrease the vulnerability of natural and human systems to climate change. Both of these aspects need to be considered.

The vulnerability of a project activity to the impacts of climate change may be direct (*e.g.* irrigation facilities are affected by changes in runoff as well as changes in demand for irrigation) or indirect if the area in which a project is established undergoes significant socio-economic modifications as a result of climate change.

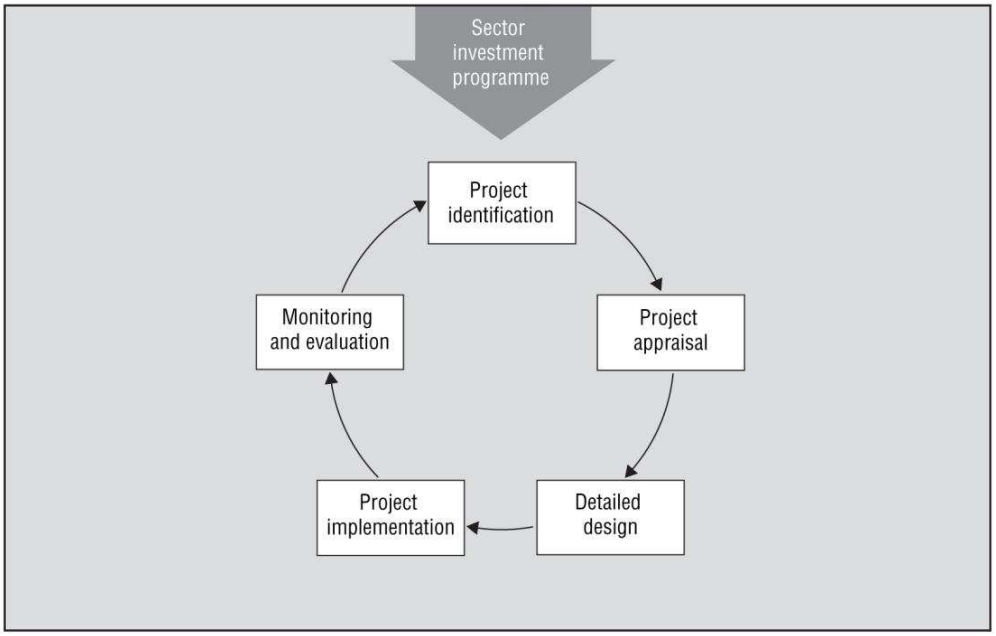
A project may also affect the vulnerability of natural and human systems to climate change and could therefore lead to maladaptation. For instance, new roads might be weather-proofed from an engineering standpoint, even taking future climate into account, but they might trigger new human settlement in areas at high risk for particular impacts of climate change, such as coastal zones vulnerable to sea-level rise. These considerations need to be taken into account to avoid maladaptation.

However, not all projects are equally relevant for climate change considerations. For some "soft"/non-structural projects, such as institution building for the rule of law, climate change may be largely irrelevant or so peripheral as not to be in need of any special attention. Others, such as infrastructure projects in climate hazard areas, or hydropower and irrigation projects that depend upon the reliability of future water supply, may be very vulnerable to climate change. In between these examples is a wide array of potential project activities where climate change may be relevant but in ways that are not so immediately self-evident. The assessment of climate risks will enable the identification of those projects that are vulnerable and those that are not. In addition, there may be possibilities to modify certain projects to take advantage of potential opportunities that may arise from climate change.

9.2. The project cycle

The "project cycle" is a way of viewing the main steps in the development of a project, and how they relate to each other in sequence (Figure 9.1). The precise formulation of the cycle and its phases varies from one sector, administration or agency to another, but some basic components are similar. The steps apply, in principle, to projects regardless of whether they are funded by a government's own resources or by donor project support.

Figure 9.1. **The project cycle**



9.2.1. Project identification

The project identification stage defines the point of departure for the project cycle. It comprises the establishment of indicative objectives, general guidelines and principles for the project, according to policies and strategies set at the sectoral, national or even

international levels. This type of exercise is often best done by involving those stakeholders on whom the project will have an impact. The key output of this stage is normally a programme framework (or logical framework) that outlines a set of interventions to be implemented within a specific time-frame and within an allocated budget. Project implementation agencies and management rules and procedures are also indicated. The implementing agencies can comprise public authorities, parastatal entities, or private-sector actors that execute the projects under the supervision and on behalf of sectoral authorities at national or sub-national level, or on behalf of the funding agency.

9.2.2. Project appraisal and detailed design

Project appraisal is the stage when each discrete project proposal selected is formulated and analysed in more detail and when the viability of the project is evaluated against multiple criteria. Detailed design is the stage when the findings of the appraisal stage can be implemented and the bulk of the project parameters is finalised before implementation. A factor which provides the baseline for project appraisals throughout the life of the project is the investment appraisal. Project viability is usually defined in largely economic or financial terms. However, it is normally extended to include issues such as environmental appraisal, health and safety, and certainty of performance. Economic, social, environmental and other aspects will be examined at this stage, with a view to taking a decision regarding the specific form under which the project should be pursued.

9.2.3. Project implementation

Following the completion of the project appraisal, detailed design and requisite resource allocation, the project can then move to the implementation stage.

9.2.4. Monitoring and evaluation

Monitoring is a core project management responsibility. It serves *(i)* to identify successes and problems during project implementation; *(ii)* to enable informed and timely decision making by project managers to support implementation; and *(iii*) to assess the accountability for the resources and results achieved. It involves the collection, analysis, communication and use of information about the project's progress.

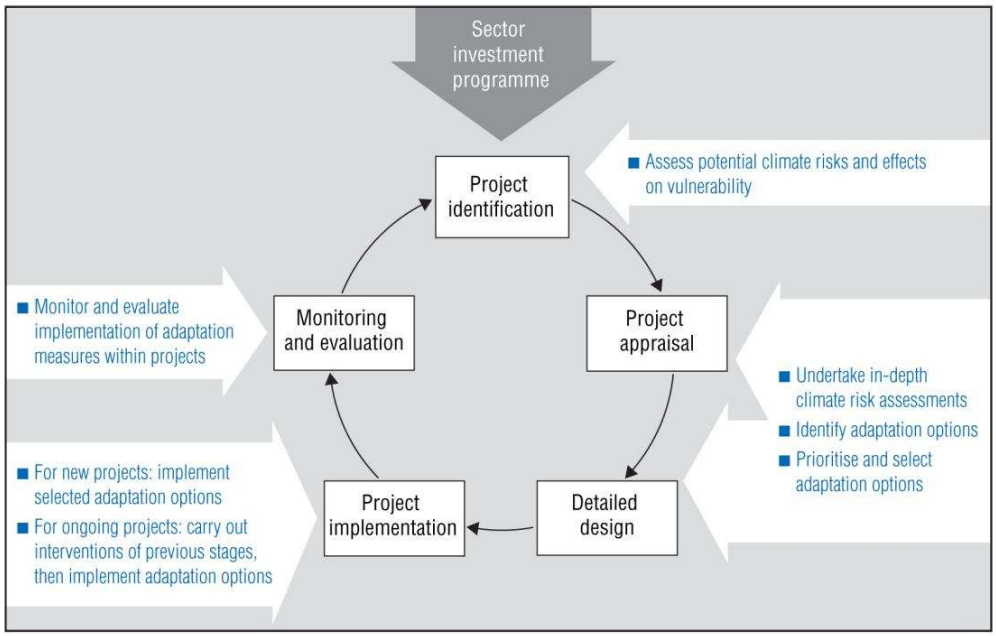
Project evaluation can be distinguished from monitoring by *(i)* its broader scope – being concerned with whether or not the right objectives and strategies were chosen; *(ii)* its timing – being less frequent, usually at completion or *ex post*; *(iii)* the persons who undertake evaluations – it will usually involve external or independent personnel to provide objectivity; and *(iv)* the users of the results – including project planners concerned with strategic programming issues, rather than just managers responsible for implementing the project.

9.3. Integrating adaptation within the project cycle

The project cycle is used as the framework to integrate the assessment of climate risks and the identification, analysis and prioritisation of adaptation options. The following sections outline opportunities for such integration along the typical steps of the project

cycle. These opportunities for integration are relevant to both partner countries and donor agencies. Figure 9.2 highlights the potential interventions along the project cycle.

Figure 9.2. **The project cycle with key interventions for adaptation**



9.3.1. Project identification

In general, the vulnerability of any project to climate change impacts is assessed as a function of the type of infrastructure it develops, the activities it supports, and its geographical location. In addition, the expected lifetime of a project determines whether climate change concerns are likely to become relevant, for example long-lived infrastructure may be particularly vulnerable. Vulnerability may be direct (*e.g.* irrigation facilities are affected by changes in runoff as well as in demand for irrigation) or indirect if the area in which a project is established undergoes significant socio-economic modifications as a result of climate change. For example, a facility designed to process certain crops may no longer be economical if the crop mix in its service area changes as a response to climate change.

If sectoral authorities have an effective mechanism to screen for climate risk as outlined in section 8.2.3 in the previous chapter, projects may have already been screened at the sector programming stage. In the interim, as long as climate change impacts are not considered into the risk and the screening procedures at the sectoral level, any project can be evaluated at the identification stage to assess whether it is in principle climate-sensitive or whether it may affect the vulnerability of a human or natural system.

Interventions for climate change adaptation: assessment of potential climate risks and effects on vulnerability

For projects that have not undergone a thorough screening for climate change relevance at the sector programming stage (as described in Chapter 8), the main intervention for integrating climate change adaptation at this stage consists of an assessment of *(i)* the vulnerability of the project to climate change impacts and *(ii)* the potential of the project to increase vulnerability of natural and human systems to climate change. Projects identified as sensitive to climate change or likely to lead to increased vulnerability may require more detailed assessment at the project appraisal stage.

For some projects, sector-level screening for climate change needs to be complemented with an assessment of climate change risks and vulnerability effects after the implementing agency has defined the project parameters in more detail at the project identification stage.

When assessing the vulnerability of a project, timing and certainty of climate change impacts are two important considerations that need to be taken into account:

- *Timing:* A decision should be taken on how far into the future the analysis will consider climate change impacts. Some projects may be quite sensitive to climate changes that could happen within a few decades. Others may have low or no sensitivity to climate change in a few decades but be sensitive to impacts many decades away. Decision makers may wish to focus on projects with relatively near-term sensitivity.
- *Certainty of climate change impacts:* Impacts that are the result of increased temperature or higher sea level are virtually certain to happen at some point in the future (as long as the potential magnitude of change is sufficiently high to affect the system). Impacts that are the result of drought or flood may be less certain.

Screening for climate change risk at this stage of the process provides the opportunity *(i)* to avoid excessively risky projects (to be excluded from the programme); *(ii)* to build in appropriate climate risk management measures and financing for vulnerable projects that are selected for implementation; and *(iii)* to prioritise projects which will contribute actively to reducing climate vulnerability (adaptation programmes).

9.3.2. Project appraisal and detailed design

This step represents a natural point at which climate change risks to the project can be assessed in detail. It provides the opportunity to reduce the climate change risks facing a project and to take advantage of any opportunities that may arise from climate change. Projects that are directly sensitive to climate should be examined with regard to their degree of sensitivity and vulnerability and whether different project designs or functioning would reduce sensitivity or vulnerability. In addition, projects can also be examined to determine whether they can be modified in order to take advantage of opportunities arising from climate change.

Interventions for climate change adaptation

Interventions for integrating adaptation at this stage can be structured along the following steps:

- undertaking in-depth climate risk assessments;
- identifying adaptation options;
- prioritising and selecting adaptation options.

In addition, project appraisal is the stage where an Environmental Impact Assessment (EIA) is carried out. An EIA may represent a potential entry point for integrating climate change adaptation (Box 9.1).

Box 9.1. **Is EIA a potential entry point for integrating adaptation at the project level?**

In many cases, an Environmental Impact Assessment (EIA) of projects is carried out at the stage of project appraisal. The objective of an EIA is to identify the impacts of a project on the environment with a view to "building in" mitigation measures or, in extreme cases, recommending that the project be significantly reformulated or even dropped out of consideration altogether. EIA of investment proposals is mandatory in most countries, even if weakly implemented, and may therefore provide a frame for establishing routine climate change considerations at the project level.

One critical limitation of EIAs when it comes to building in climate change adaptation concerns is the fact that they are designed to identify the impact of projects on the environment, but not the impact of environmental change on the projects. The first step of an EIA is to identify activities likely to have significant environmental impacts in order to examine them further. "Environmentally benign" activities are therefore not considered even though they may be vulnerable to the impacts of climate change. Coupling climate risk analysis and climate change adaptation with EIA procedures would require that the project screening process be extended to include climate change sensitivity and for the project's potential to increase climate change vulnerability (maladaptation). Another limitation concerns the fact that an EIA is conducted once a project has been selected for implementation, and most parameters have been set. Further, in many cases EIA procedures are codified in legal obligations, thus making them difficult to modify to take into account climate risks. Nevertheless, many of the underlying practices and tools for EIA may be relevant and useful in the context of climate change adaptation.

i) Undertaking in-depth climate risk assessments

After a project has been identified during the programming stage, and its key parameters (location, type of approach or technology, budget envelope, etc.) determined, its potential vulnerability to climate change and its potential to increase vulnerability and lead to maladaptation can be assessed in detail. Embedding such in-depth assessments into the project appraisal phase is important as it allows its findings to be considered during the final project design. However, the scope for building in adaptation provisions will be narrower than at the programming stage, because many of the parameters relevant

for climate change adaptation (type of infrastructure, geographical location, among others) will largely have been set already.

Climate risk assessment may, in some cases, be undertaken with standard risk analysis tools, but, in other cases, may require new approaches. A variety of manuals and handbooks detailing possible methods and tools are available, including: the *Compendium on Methods and Tools to Evaluate Impacts of, Vulnerability and Adaptation to Climate Change* from UNFCCC; and the *Handbook on Methods for Climate Change Impact Assessment and Adaptation Strategies* from United Nations Environment Programme (Feenstra *et al.,* 1998).

The World Bank is designing a computer-based tool to assist with the analysis of climate risks for projects. The "assessment and design for adaptation to climate change: a prototype tool" (ADAPT) is designed to assist project developers in: *(i)* identifying the level of climate risk in a project through a simple description of the project and its location, and *(ii)* finding sources of information on how to minimise this risk (Box 9.2).

Box 9.2. **Assessment and design for adaptation to climate change (ADAPT): a prototype tool**

ADAPT is a computer-based tool that undertakes a sensitivity analysis for specific projects and flags activities that are sensitive to climate change. It has a dual function – screening and designing – that is intended for adapting projects to climate change. It provides advice on adaptation activities. It utilises project location and activity information which are screened through a project activity sensitivity matrix based on data from a general circulation model.

The tool carries out the risk analysis process by identifying the level of risk in a project through a simple five-level classification. The design process is carried out by providing a guide of options to minimise risk where necessary; it is based on past experience within World Bank and other relevant agencies (national and multinational), as well as on recent research.

The aim of the tool is to provide a first, quick check of potential climate-related issues by sector and by region. It uses a system of flags to categorise the climate-related risks associated with the project.

Flag classification system:

- Red flag: Adaptation issues are important and must be taken into account.
- Yellow flag: Some concerns, which should be checked.
- Orange flag: Not enough known to assess.
- Green flag: No adaptation issues foreseen.
- Blue flag: Positive action for adaptation.

The screening tool ADAPT is now a component of the World Bank Climate Change Data Portal. The tool can be accessed at *http://sdwebx.worldbank.org/climateportal*.

Source: Noble, I. (2005b), "A Screening and Design Tool for Adapting Projects to Climate Change", presentation, World Bank, Washington, *http://siteresources.worldbank.org/INTDISMGMT/ Resources/noble.pdf.*

ii) Identifying adaptation options

This involves compiling a list of adaptation options, which will reduce the vulnerability of the project to climate variability and mitigate the negative impacts of the project on the recipient population's or system's vulnerability to climate variability and change. The emphasis will be on identifying measures that are needed for climate change, but that still make sense under current climatic conditions, therefore providing a "win-win" or "no regrets" solution (see Chapter 5 in Part I).

This intervention point involves reviewing and extracting information on climate impacts and project vulnerabilities, or possible impacts of the project on natural or human systems that might increase their vulnerability, identified during the first two stages of the project cycle. In addition, it will involve consultations with a range of stakeholders (*e.g.* from government officials to local community groups) and experts in such fields as climate change, climate change adaptation and environmental science and policy.

In order for the intervention point to be undertaken effectively, the following information about the adaptation options should, if possible, be provided (Lim and Spanger-Siegfried, 2005):

- *Description of the measure*: Objective, location, timing and responsibilities for implementation, and financing should be indicated.
- *Estimated costs of the measure*: Cost is a prerequisite for ranking a measure and including it in the budget, or in a wider adaptation programme. Costs could be a one-off expenditure for capital investments or recurrent costs, including operational costs for project-type measures. Apart from direct costs there are often indirect and external costs. Costs should, to the extent possible, be expressed in monetary terms.
- *Estimated benefits of the measure*: The impacts of the measures on the environment and on society can be determined by comparing the "with" and "without" case. These impacts need to be described in terms of their contribution to the objectives or criteria, again preferably in monetary terms. The evaluation of options should include equity considerations and identify positive or negative impacts outside the project.
- *Feasibility of the measure*: How easy or difficult will it be to implement the adaptation measure? Is the measure technically feasible? Is there any lack of capacity to implement and sustain the measure? Are there institutional (legal restrictions), cultural, social or other barriers that must be overcome to be able to successfully implement the measure?

iii) Prioritising and selecting adaptation options

Once a list of adaptation options has been compiled, they can be prioritised using various methods and, subsequently, rejected, postponed or selected for implementation. Four main methods can be used for this process: cost-benefit analysis (CBA), cost-effectiveness analysis (CEA), multi-criteria analysis (MCA) and expert judgement (Box 9.3). When judging the costs of options, the costs of non-action may also be considered.

Box 9.3. **Four main methods for prioritising and selecting adaptation options**

The four major methods used for prioritising and selecting adaptation options – cost-benefit analysis (CBA), multi-criteria analysis (MCA), cost-effectiveness analysis (CEA), and expert judgement – vary in a number of ways. Some of these are outlined here:

1) CBA can handle optimisation and prioritisation; it also provides an absolute measure of desirability, albeit judged by only one criterion: economic efficiency. CBA has comparatively heavy data requirements.

2) MCA is suitable when more criteria are thought to be relevant, and when quantification and valuation in monetary terms is not possible. MCA is normally used for the ranking of options. But if the "do-nothing" case is included as an alternative, it can also help to clarify whether the measure is better than simply "bearing with the situation". Subjective judgement plays an important role in this method, making outcomes more arbitrary than with CBA.

3) CEA is a method that falls somewhere between CBA and MCA. As is the case with MCA, CEA only produces a ranking.

4) Expert judgement is a qualitative method which can support the prioritisation of adaptation options at project level.

Given that CBA is the more objective method and can handle optimisation, it may be the most desirable option. However, this depends on the purpose and stage of the analysis. In cases where important criteria cannot be accommodated in CBA (such as sociological or cultural barriers), or when benefits cannot be quantified and valued (such as the benefits of preserving biodiversity), MCA is preferred. If desired, the outcomes of CBA can be incorporated into MCA, making the overall analysis a hybrid one

Source: Lim, B. and E. Spanger-Siegfried (2005), *Adaptation Policy Framework for Climate Change: Developing Strategies, Policies and Measures*, UNDP and GEF, Cambridge University Press, Cambridge.

A popular prioritisation method is the adaptation decision matrix, which is a form of MCA. This method is advocated by United States Agency for International Development (USAID) in "Adapting to Climate Variability and Change: A Guidance Manual for Development Planning (USAID, 2007). This Manual suggests using consultations with decision makers and stakeholders to select the final set of factors and assign "weights" or levels of importance to each of them. Examples of factors or criteria that can be used to prioritise adaptation options include: cost, effectiveness, ease of implementation, acceptability to local stakeholders, endorsement by experts, time-frame, institutional capacity, adequacy for current climate and size of beneficiaries group. An example of an adaptation decision matrix used by USAID in its case study on water resource planning in South Africa is provided in Table 9.1.

Table 9.1. **Sample matrix for evaluating adaptation options used in USAID's Pilot Study on Water Resource Planning in Polokwane, South Africa**

Adaptation option	Effectiveness	Cost	Technical feasibility	Social and cultural feasibility	Speed of implementation
Recycling of urban water	Medium	High	High	Medium	High
Reallocation of dam yield	Medium	High	High	Medium	High
Water conservation and demand management (existing)	High	Low	High	High	High
Building of new dam	High	High	High	Medium	Low
Reuse of mining water	Low	High	High	High	Medium
Expansion of well fields	Low	Low	High	High	High
Rainwater harvesting	Low	Low	High	High	High
Level of service (future)	High	Low	High	Low	Medium
Conjunctive use	Low	Low	High	High	Medium

Note: Evaluation options were assessed on the basis of their effectiveness in increasing water supply or reducing demand; cost; technical, social and cultural feasibility; and speed of implementation. A high score is better than medium which is better than low; with this, however, not being the case for costs, where a low score is most preferable.

Source: Adapted from USAID (2007), "Adapting to Climate Variability and Change: A Guidance Manual for Development Planning", USAID and Stratus Consulting, Washington.

In order to increase acceptance and facilitate implementation, all key stakeholders that are concerned with the identified options should participate in the decision-making process. Stakeholders can be brought together, for example by means of meetings or workshops where all options are clearly outlined along with their advantages and disadvantages resulting from previous analyses.

9.3.3. Project implementation

While the planning stages of the project cycle provide the key entry points for integration of climate risk assessment and identification and selection of adaptation options, it is important not to lose sight of adaptation during the project implementation. Once adaptation options have been selected, the next stage is their integration and implementation within the project and this represents further intervention points.

Interventions for climate change adaptation

The interventions at this stage of the project cycle depend on whether the projects are new or already in the course of implementation:

- for new projects: implementing selected adaptation options;
- for ongoing projects: carrying out steps at the intervention points in the three previous stages and then implement adaptation options selected or modifications required.

i) For new projects: implementing selected adaptation options

If the options were selected to modify a project that was already planned, implementation of the options will become a part of the implementation of that "parent"

project. The optimal response strategy for a climate-vulnerable project can go beyond the scope of the initially planned project. This may require interventions and/or measures beyond the scope of project authorities.

ii) For ongoing projects: carrying out steps at the intervention points in the three previous stages and then implement adaptation options selected or modifications required

The implementation stage represents a key stage in which adaptation concerns can be integrated for projects that are already in the course of implementation. For these projects, project managers should still carry out climate risk assessments and the identification, prioritisation and selection of adaptation options where projects are in the "high-risk" category. These steps will then help the project managers select modifications to incorporate into the project and then add the activities related to the modifications to the project implementation or work plan.

Many projects comprise change processes, *e.g.* of organisations or legislation, which require ongoing negotiation and planning processes for implementation. Some sort of progress monitoring of the project, including its adaptation-relevant components, can help project managers and stakeholders ensure that adaptation is not overlooked amid the competing pressures from other issues and interest groups. For details on project monitoring, see the following section.

9.3.4. Monitoring and evaluation

The monitoring and evaluation phase of the project provides a natural entry point for monitoring and evaluating the built-in climate change adaptation elements. Monitoring and evaluation are indispensable to correct past mistakes and improve current practices. In addition, evaluation provides an opportunity to test the accuracy of *ex ante* projections of climate vulnerabilities, or of the project's impacts on the recipient system's vulnerabilities. Monitoring and evaluation for climate change adaptation is a "doing-by-learning" and participatory process. A dynamic process may allow an effective and active monitoring and evaluation of the performance of an adaptation project with respect to its objectives, so as to establish a solid background for scaling up pilot activities. The process can allow for lessons learned to be actively incorporated in a monitoring and evaluation framework as a new step for the adoption and mainstreaming of effective adaptation interventions.

Given the limited experience with the integration of adaptation into projects, neglecting monitoring and evaluation would be a missed opportunity for building knowledge through learning-by-doing. The engagement of relevant stakeholders is critical in this stage, including in the selection of indicators, so as to ensure a broad consensus over any assessments.

Monitoring and evaluating the integration of adaptation into projects will require several actions. First, the implementation of the options identified for adaptation will need to be specifically monitored. This will involve assessing whether the identified adaptation options were actually put in place, what unexpected problems arose in the implementation process, whether the adaptation options had any adverse or positive impacts on other sectors or regions, and whether costs of adaptation exceeded those anticipated.

Secondly, the progress and success of the adaptation options that were implemented will have to be monitored and evaluated. Such an evaluation should assess whether the project delivered the intended benefits and whether it caused adverse outcomes that were not anticipated, *e.g.* in the form of negative environmental externalities. This last intervention can also contribute to providing suggestions for improving future adaptation planning and design. The conclusions of the evaluation process can be taken into account when planning and implementing similar projects. As experience with the integration of adaptation is limited, evaluations provide good opportunities to build knowledge on adaptation from past experience and feed it back into future projects.

Finally, the evolution of the baseline climate conditions will need to be monitored over the lifetime of the project to ensure the effectiveness and long-term sustainability of the project under evolving climate conditions.

Any evaluation of the effectiveness of adaptation activities integrated within projects, however, also faces several constraints. There may be an important distinction between monitoring and evaluating "no regrets" adaptations which would have been sensible to implement even in the absence of climate change *versus* climate-justified adaptations which were undertaken explicitly by taking into account projected climatic changes. No regrets adaptations are already justified on the basis of current climate conditions. Thus, benefits of such measures could be seen very soon after implementation. By contrast, climate-justified adaptations may have been designed to address infrequent or long-term events (such as low-probability extreme events), which will create constraints when trying to monitor and evaluate the success of the adaptation measure. A measure designed to reduce vulnerability to infrequent extreme events can be evaluated if an extreme event occurs. However, if such an event does not occur, it may be difficult to determine whether the measure was properly implemented. Nevertheless, even if the event does not happen following implementation, this does not mean the investment was unjustified. When a measure is designed to incorporate long-term risks from climate change, it will be even more difficult to evaluate. Long-term changes in climate may not be evident when the time comes to evaluate the project and the built-in adaptation elements. However, this lack of an immediate pay-off should not be a factor in the decision analysis. In such cases, other ways to evaluate may be made by considering the ease of implementation and costs (USAID, 2007).

The performance and achievements of adaptation-specific projects can be measured through the use of indicators (see Table 9.2 for an example of the type of indicators that are used). However, the constraints identified above for the evaluation of the success of adaptation activities make it more difficult to identify the appropriate indicators for monitoring and evaluation. For projects whose adaptation benefits and impacts may not be directly measurable (for example those designed to reduce vulnerability to low-frequency events), appropriate indicators may be those which provide some sign of progress towards the achievement of project objectives *(e.g.* number of schools constructed to withstand floods). A similar kind of indicator may also be required in situations where the full benefits of a project will only become apparent after its completion (*e.g.* by measuring the progress of a mangrove planting scheme intended to provide protection against sea surges in terms of growth rates and survival of the trees).

Table 9.2. **The Asian Development Bank's Hunan Flood Management Sector Project, China**

Project impact	Sustainable and inclusive socio-economic growth in flood-prone areas of Hunan province. **Indicators**: • Number of newly established industrial and commercial enterprises in the project areas, increases compared with base year 2006. • Land values for commercial and industrial purposes in project areas increases by at least 20% over 2005 levels by 2012. • Urban poverty incidence in the project areas is reduced compared with 2003 incidence of 6.7%.
Outcome	Flood protection for strategic and priority flood-prone areas in the upper reaches of the four main river basins in Hunan province is improved. **Indicators**: • Annualised flood damage and disaster relief costs reduced in participating cities as a result of increased standards for flood protection works and improved flood emergency preparedness. • Direct economic losses from floods and water logging reduced compared with current average losses.
Outputs	1. Non-structural flood management systems: operational flood warning and management systems for up to 35 municipalities and counties linked to the provincial flood warning and management system. **Indicators**: • Increased warning time against potential floods in project area (current warning time is a few hours to one day). • Forecasting and warning data more frequently accurate. 2. Structural flood protection, resettlement, and environment management: flood protection works are completed in priority locations as part of Hunan's River Basin Flood Control Plan and the 11th Hunan Provincial Five-Year Plan and in compliance with the People's Republic of China's ---regulations and the Asian Development Bank 's safeguard policies. **Indicators**: • Flood control level of county-level cities improved to 1 in 20-year return flood from below 1 in 5-year return flood recurrence by end of project. • Flood control level of municipal cities improved to 1 in 50- or 100-year return flood by end of project. • Satisfaction level of the 20 133 relocated persons restored to pre-resettlement levels in terms of income and livelihood. • Percentage of environment management plan monitoring targets achieved. 3. Project management and capacity building: operational and strengthened project management and monitoring systems. **Indicators**: • Timely and informative reporting of local project management offices that reflect accurate and on-time project implementation in line with agreed assurances. • Domestic systems-based project management and monitoring system, including project performance management system operationalised. 4. Flood management sector planning: selected sector assessments and planning to support development of integrated flood management plans (grant financed through the advisory technical assistance). **Indicator**: • Basin-wide flood warning system development needs assessed; flood insurance appraised with support from advisory technical assistance; next actions for inclusion in future flood management plan agreed upon by key provincial authorities by year 2008.

Source: Excerpt from ADB (Asian Development Bank) (2006), "Proposed Loan and Technical Assistance Grant: People's Republic of China: Hunan Flood Management Sector Project", Report and Recommendation of the President to the Board of Directors. Project No. 37641, Asian Development Bank, Manila.

Use of proxies and alternative indicators may also assist measurement. For instance, in a project aimed at strengthening the drought-resilience of poor households, fluctuations in livestock sales or school enrolment will be easier and cheaper to monitor than movements in household income. Considerable care is required in thinking through the implications of the achievement of possible indicators and ensuring that appropriate, and collectively fully informative, indicators are selected.

The consequences of reliance on particular indicators also require careful thought. For instance, a rise in flood-plain land prices may help capture the benefits of a flood control project. However, rising land prices could also imply that poorer households are forced into other marginal areas and thus a second indicator measuring population movements by income group or occupation in and out of the project area might also be required. In cases where it proves difficult to identify a relevant risk reduction indicator, it may be because the related intermediate objective or output has been defined too broadly or ambitiously and needs to be more closely defined. The magnitude of the hazard event itself may need careful definition to support identification of appropriate indicators, *e.g.* protection against a 1 in 25-year flood event rather than protection against flooding.

9.4. Role of donors in enabling integration of adaptation at the project level

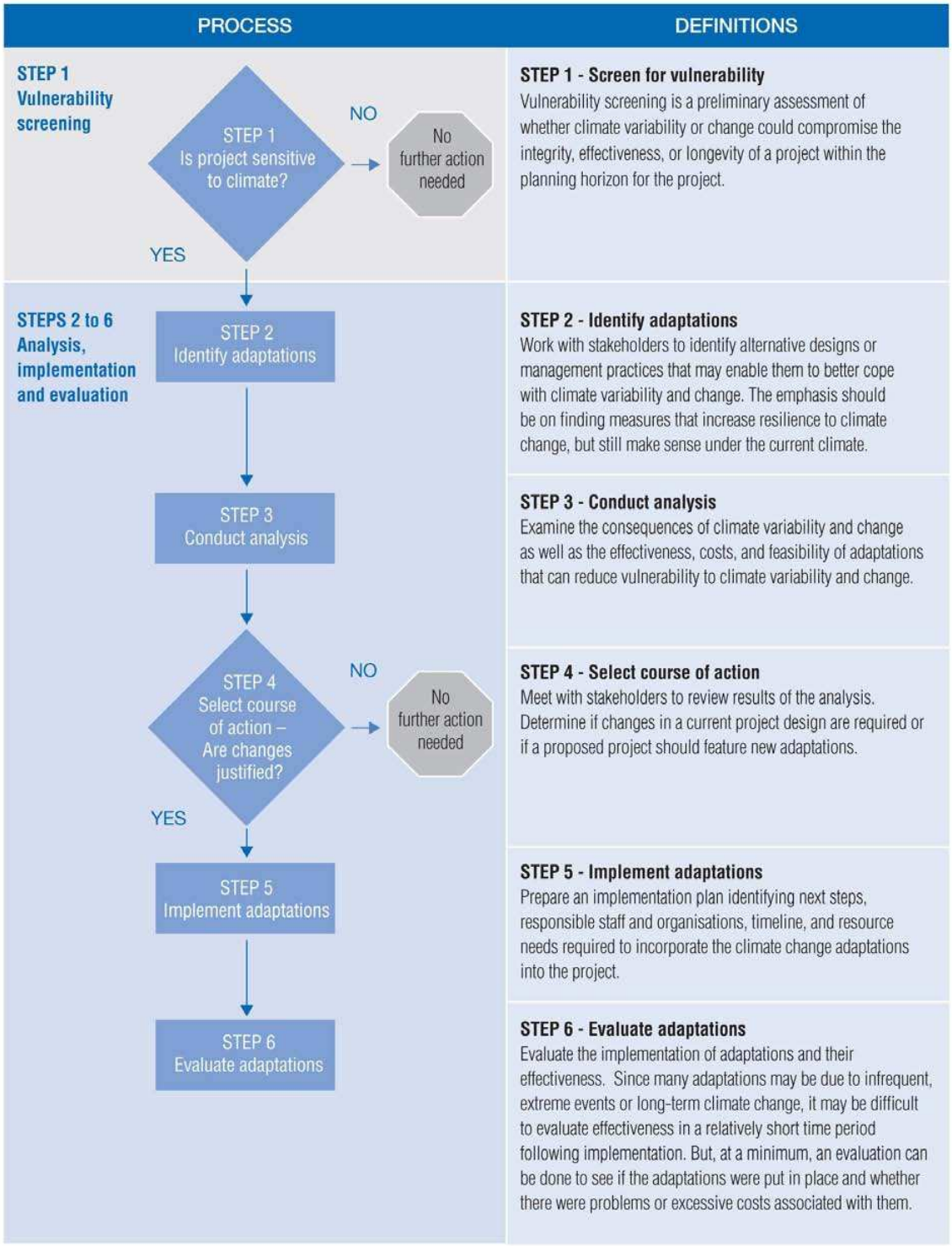
Donor agencies can play two roles to enable the integration of climate change adaptation at the project level. First, if they provide development co-operation through project support, they can integrate adaptation within the projects in which they are involved. Second, donors can also contribute to adaptation efforts at the project level by other partners through the development and sharing of relevant assessments, frameworks, and tools that could also be of use to other partners.

Various donors have developed tools and instruments for screening their project portfolios for climate risk, and for selecting and implementing adaptation measures into projects. Some examples of such tools are given below. More work will be needed to harmonise these methodologies across donors, as has been achieved in the case of environmental impact assessments of development projects.

The USAID, for example, has prepared generic guidance on how to incorporate climate change into project development.[1] It suggests using a six-step process to examine whether proposed projects should be modified to account for climate change (Figure 9.3). USAID also commissioned a pilot study of the city of La Ceiba, located on the north coast of Honduras, to develop and test a process by which adaptation to climate change can be factored into project planning (Box 9.3 provides details).

The World Bank has designed a computer-based tool for the Assessment and Design for Adaptation to Climate Change (ADAPT)[2] (Box 9.2 and section 9.3.2). The Swiss Agency for Development Cooperation (SDC), in collaboration with the International Institute for Sustainable Development (IISD), the International Union for Conservation of Nature (IUCN) and the Stockholm Environment Institute (SEI), have developed the "Community-based Risk Screening Tool – Adaptation and Livelihoods" (CRiSTAL), which helps users to account for possible negative effects of community-level projects on the recipients' climate resilience, and to help the adjustment of projects to enhance the local adaptive capacity.[3] The German Technical Cooperation (GTZ) has also developed a so called "climate check" that contains two main elements: a "climate proofing" tool aiming to reduce climate change risks in development programmes and an "emission saving" tool aiming at optimising contributions to GHG reductions of development programmes.

Figure 9.3. **USAID's guidance on incorporating climate change into project development**



Source: USAID (2007), "Adapting to Climate Variability and Change: A Guidance Manual for Development Planning", USAID and Stratus Consulting, Washington.

Box 9.3. **Honduras pilot study: climate change, coastal resources and flood planning in La Ceiba**

A pilot study of the city of La Ceiba, located on the north coast of Honduras, was carried out to develop and test a process by which adaptation to climate change can be factored into project planning. The study examined the types of interventions required to ensure that climate change is mainstreamed into project-level activities and identified the wide range of actors that make such mainstreaming possible. The city of La Ceiba is vulnerable to flooding, coastal erosion, and coastal storms. The pilot study aimed at addressing risks from current climate and climate change to coastal development, urban drainage and upstream land management. On the basis of the study findings, building an enhanced urban drainage system that could cope with the increased risks of climate change were identified as a priority adaptation action.

Types of interventions: The process of incorporating climate change into project planning involved six stages:

Stage I: Screening. A preliminary assessment examined whether climate change/variability would compromise the integrity, effectiveness or longevity of the city's infrastructure.

Stage II: Identifying adaptations. Interventions included involving local stakeholders to identify potential adaptation topics.

Stage III: Analysis. This stage involved evaluating the effectiveness, costs, and feasibility of adaptations for reducing climate-related vulnerabilities. International and national researchers carried out a variety of analyses of the identified adaptation topics.

Stage IV: Identifying course of action. Interventions at this stage included presenting study findings to technical experts to review the feasibility of the identified adaptation options, and consultations with the planning authority to select adaptation strategies.

Stage V: Developing an implementation plan. Interventions at this stage involved presenting options for implementation to the United States Agency for International Development (USAID) that were consistent with the agency's mission and categorising the rest as options that could be implemented by other agencies.

Stage VI: Evaluating adaptation. Interventions at this stage will follow after the strategies are implemented.

Actors involved: Various stakeholders played a key role in assessing the impacts of climate change and in the development of feasible adaptation options. Stakeholders involved in the various stages of assessment and project development included:

Initial consultation stage: Stakeholders included project staff, federal and municipal government representatives, the business and consulting community and representatives from non-governmental organisations;

Identifying adaptations and analysis stages: Stakeholders included the individuals consulted during the initial consultations and subject experts/researchers;

Selecting course of action stage: Actors involved in this stage included technical experts, the Mayor and the municipal corporation responsible for selecting identified adaptation options.

Implementation plan stage: USAID responsible for selecting options that it can implement.

Source: Stratus Consulting (2006), "Honduras Pilot Study Report: Climate Change and Coastal Resources and Flood Planning in La Ceiba", final report prepared for US Agency for International Development.

9.5. Challenges and priorities for action

The project level is clearly critical for the integration of adaptation considerations, and indeed much of the recent progress in this direction has been made at the project level. This chapter has highlighted a number of priority actions to further deepen this integration at the project level. These recommendations include:

- incorporating consideration of climate risks and adaptation throughout the project cycle;
- developing, pilot testing, and implementing climate risk assessment tools that might be relevant for different categories of projects;
- developing appropriate metrics and indicators to assess whether any efforts at better integrating climate risks and adaptation considerations have proved effective;
- engaging a variety of stakeholders *(e.g.* scientists, local communities, project managers, economists, livelihood specialists, local government officials, NGO staff) to identify adaptation options and indicators to monitor progress and success.

While clearly much progress is being made, there are nevertheless a number of outstanding challenges:

- While many climate risk assessment tools are currently being piloted (primarily by various donors), they are yet to be tested or implemented in a wide range of contexts.
- As climate risk assessment is still relatively new, there is currently a diversity of approaches, and harmonisation is lacking.
- There are also significant limitations in terms of the availability and reliability of projections of future climate which could serve as a guide for the integration of adaptation considerations. These limitations include:
  - lack of reliable climate projections scaled down at the spatial scale, relevant for most projects;
  - significant uncertainties associated with many climate variables, important in project design, particularly with regard to extreme events.
- From an administrative point of view, meanwhile, project managers may not have sufficient flexibility to implement many adaptation measures. This is because once a project has been selected at the sectoral programming level, project managers are constrained in terms of the changes they can make.
- Any modifications to established practice and guidelines might also incur resistance, as well as additional costs.

Some key recommendations, therefore, for the better integration of both short- and long-term risks at the project level include:

- Greater emphasis on comparing and reconciling the diverse attempts at climate risk assessment, more systematic testing of climate risk screening tools, followed by wider implementation of the tools or approaches that are found to be most reliable and useful. This recommendation is, of course, broader than at the project

level. However, it is particularly important here, given that it is the project level which is a key focus of climate risk assessment efforts.

- There is also a need to improve the availability and reliability of downscaled climate change projections (preferably drawing upon multiple climate models), and to ensure that the uncertainties associated with various projections are transparently communicated to the project managers.
- More analytical work on methodologies for prioritising and costing of adaptation measures.
- More systematic evaluation of the effects and effectiveness of any implemented adaptations.
- More efforts at capacity development and piloting of initiatives that can help project managers as well as other relevant decision makers better understand the implications of climate change on their projects and be better equipped to incorporate adaptation considerations within their decision frameworks. Such capacity development efforts might need to be tailored for specific types of projects (*e.g.* infrastructure, livelihood, etc.), given their diverse needs.
- Finally, tools and methods for integrating climate change adaptation at the project level should as much as possible build on existing tools and methods, *e.g.* for risk and impact assessment, prioritisation and costing of measures, and monitoring and evaluation.

Notes

1. See the website: *www.usaid.gov/our_work/environment/climate/docs/reports/cc_vamanual.pdf.*
2. See the website: *http://sdwebx.worldbank.org/climateportal.*
3. CRiSTAL is described further in Part III of this Policy Guidance.

Part III

Integrating Climate Change Adaptation at the Local Level

The local level is important for mainstreaming climate change adaptation for three reasons. First, climate change impacts are manifested locally, affecting local livelihood activities. Second, vulnerability and adaptive capacity are determined by local conditions. Third, adaptation activities are often best observed at the local level. Decisions about livelihood strategies and investments can represent real-life demonstrations of adaptation. Part III of the Policy Guidance – Integrating Climate Change Adaptation at the Local Level – *discusses in detail how to assess climate risks and incorporate adaptation considerations within government and community level processes at the local level – within both urban and rural contexts. Specifically, four* "entry points" *have been identified to facilitate the integration of climate change adaptation into local development planning processes:* (1) *consideration of the implications of climate change in development planning processes of local governments;* (2) *adjustment of local regulatory and service provision frameworks, including provision of information bases on likely local impacts of climate change;* (3) *adjustment of local government accountability mechanisms; and* (4) *engagement of private sector and civil society organisations and processes. The role of donors in this integration process is also discussed and some priorities are outlined to foster greater integration of adaptation considerations at the local level.*

Chapter 10

Introduction to the Local Level

This chapter addresses why the local level matters for adaptation. It then discusses linking local adaptation to the national, sectoral and project levels. It closes with a discussion of the roles donors play at the local level.

Part II of this Policy Guidance has highlighted the main *entry points* for integrating climate change adaptation into development activities at key decision levels. While the sector- and project-level entry points are relevant at a number of geographic scales and contexts, their treatment was somewhat generic in order to render them as broadly applicable as possible.

Part III will contextualise the process of integrating adaptation into development decision making by highlighting some of the unique circumstances present at the local level, in both urban and rural settings. "Local" refers generally to the sub-national geographic scale, but can mean something as specific as a particular area or place. It is the scale of administration and analysis closest to people and their everyday activities. Local decision-making levels can range from individuals to municipal governments, while local administrative levels can range from communes and villages to municipalities and districts. Local administrative entities manage the resources and affairs of people living in a defined geographic unit or territory through their own local governments. Individuals, households and other collectivities residing in these areas are affected by local government decisions. This part of the Policy Guidance will highlight the roles of local governments, communities and civil society, as well as the private sector in integrating climate change adaptation into development activities.

10.1. Why the local level matters for adaptation

Development impacts are best observed and understood at the local level. Generally speaking, looking at the local level allows development practitioners to understand the actual impact of development decisions taken at other, higher levels – *i.e.* how are development policies, programmes and projects implemented on the ground and what do they deliver to people? Are individuals and households able to strengthen their livelihoods, improve the quality of their life and reduce their vulnerability to shocks and stresses? Answering these questions requires engaging with local actors and understanding local contexts.

In terms of climate change adaptation, the local level is important for three main reasons:

- First, climate change impacts are manifested locally. While climate change is broadly understood as an increase in global mean temperature leading to changes in regional climate patterns, it appears locally as, *inter alia*, hotter days, more intense storms, less rainfall, or changes in the onset and length of growing seasons. These climatic changes in turn affect local livelihood activities, economic enterprises, health risks, and so on. Thus global climate change is translated into localised phenomena in response to local geography and other environmental, economic and socio-political factors.
- Second, vulnerability and adaptive capacity are also realised locally. This is because vulnerability and adaptive capacity are context-specific; they result from the interactions between many socio-ecological factors and processes such as income level, settlement patterns, infrastructure, ecosystem and human health, gender, political participation and individual behaviour (Box 10.1). Independently or combined, these determinants shape the way in which people are able to reduce exposure to, cope with, and/or recover from negative impacts of climate change or, alternatively, take advantage of the opportunities afforded by climate change.

Regional or national vulnerability indices often mask the dramatic variations in vulnerability at local levels.

- Third, adaptation action is best observed at local levels. The anticipated or actual experience of climate change impacts shape adaptation decision making and action – the latter being the translation of knowledge and capacity into behaviours and activities. Individual and household decisions about livelihood strategies and investments (*e.g.* crop selection, equipment purchase, skills training, and contingency planning) can represent real-life demonstrations of adaptation. These demonstrations are important to development co-operation policy makers and practitioners since they allow for the monitoring and evaluation of how policies, programmes and projects are supporting adaptation, providing a basis for scaling up, revising, and learning.

Box 10.1. **Climate change adaptation and gender issues at the local level**

Within poor communities, women and children tend to be particularly vulnerable to environmental degradation and natural disasters. When developing and implementing adaptation strategies at the local level, either in rural or urban settings, it is critical to recognise and respect the greater vulnerability of women to the impacts of climate as well as the difference in the way they are affected in comparison to men. Institutions and policies are rarely gender-neutral, and it is therefore important to consider the gendered effects or impacts of policies implemented at the local level to avoid contributing to differences in the relative vulnerability to climate change of men and women.

Women can be supported in the implementation of livelihood activities that are more tolerant and/or less vulnerable to an increasingly extreme and variable climate. In Bangladesh, for example, women have been supported in their efforts to move away from raising chickens to raising ducks for household consumption and income generation purposes in light of the growing risk of floods (CARE Canada, 2008). The specific needs of women should be considered when developing or designing local-level adaptation strategies, programmes and activities. For example, the needs of women have to be taken into consideration when seeking to improve access to agricultural extension services, developing disaster risk reduction strategies and identifying and distributing tools for adaptation. At the same time, recognition needs to be given to women's knowledge and experience with respect to, for example, seed selection, medicinal plants, local hydrology, community organisation, and coping strategies that can promote adaptation to climate change. Adaptation plans, programmes and strategies need to include not only men's but also women's knowledge and experiences.

Source: CARE Canada (2008), "Bangladeshi Women are Knowledge Keepers in Mitigating Climate Change", *http://care.ca/main/?en&BangladeshiWomen*; IUCN (2007), "Gender Aspects of Climate Change", *http://cmsdata.iucn.org/downloads/climate_change_gender.pdf.*

A range of activities oriented towards reducing poverty, improving nutrition and education, promoting sustainable livelihood opportunities, and improving climate change information would enhance local adaptive capacity to respond to climate change impacts. However, while adaptation at the local level is important for sustainable development, it is not easy to generalise the process through which this occurs or should be facilitated. The more localised the scale of analysis and action, the more difficult it is to develop broadly applicable guidance on how to promote successful adaptation. Different

administrative levels will have different roles in development policy planning and implementation, often depending on prevailing governance structures and approaches in a country (including the type and extent of decentralisation). Other times, local decision-making processes are influenced by informal, unpredictable or idiosyncratic factors such as individual personalities (*e.g.* opinion leaders), cultural preferences (*e.g.* traditional decision-making bodies), or events (*e.g.* election, conflict, earthquake).Thus, this Policy Guidance should be viewed as providing general information that will need to be interpreted and applied in practice in light of local circumstances, opportunities, limitations and needs.

10.2. Linking local adaptation to the national, sectoral and project levels

To understand adaptation decision making, one must differentiate between decision making *at* and *for* local levels as both cases involve different scales and actors. In rural and urban settings, decisions *at* the local level can be taken by individuals, households, and other collectives such as co-operatives, community-based organisations, businesses, and local governments. Decision making *for* or affecting local actors can take place at higher levels, such as at the provincial or central government levels, as well as in multilateral and bilateral development agencies. Local actors are ideally, but not always, consulted during these externally driven decision-making processes.

Thus, adaptation at the local level is strongly related to the other levels of decision making previously described in this Policy Guidance. The efforts to integrate adaptation into development processes at the regional, national, sectoral and project levels should ideally create a set of conditions, plans and incentives that allow sub-national actors to understand the changing risks they face and take actions to reduce their vulnerability to these risks (top-down). At the same time, however, many of these conditions, plans and incentives should be devised with participation and inputs from sub-national actors themselves, in order to ensure their uptake, sustainability, inclusiveness and overall success (bottom-up). Local actors should therefore both benefit from and shape adaptation decision making at other levels in order to ensure successful adaptation action. Lessons and experiences with adaptation at the local level must feed into higher levels of decision making to make sure that local strategies remain relevant and appropriate, and provide a basis for transferring knowledge to other sectors and communities. Effective communication channels, institutions that support innovation and experimentation, and meaningful participation from community-level actors are central to achieving this objective.

10.3. Roles donors play at the local level

Development co-operation agencies interact with local actors both directly (with local governments and locally based non-governmental organisations (NGOs)) and indirectly (through financial support at the sector or national level) to plan, implement, monitor and evaluate development programmes and projects. Indirect interactions are more common, as donors will typically prefer to work through locally based organisations.

Some of the critical policy initiatives of development assistance agencies have clear implications for adaptation at the local level. For example, donor support for decentralisation in partner countries may have important implications for climate change adaptation. Whether focused on political, fiscal, and/or administrative decentralisation,

the overarching aim of the process is usually to increase participation, government accountability, and to make public services delivery more efficient, accessible, and responsive to local needs. As the process of decentralisation continues, local-level adaptation to climate change may provide a window through which donors can better understand the relationship between decentralisation and local vulnerability reduction.

Chapter 11

Local Contexts: Rural and Urban Settings

This chapter discusses key similarities between urban and rural settings and the implications for adaptation. In particular, it looks at the fact that adaptation is already happening; it underscores the strong link between poverty alleviation and adaptation; it states the need for "good development" and "good governance"; and it examines the roles, comparative advantages and limitations of local governments, the role of communities and civil society as well as the role of the private sector. Finally, it discusses the key differences between rural and urban settings and their implications for adaptation.

About three-quarters of the world's absolute poor (those living on less than one US dollar a day) live in rural areas, which are generally understood to be sparsely settled areas typified by agricultural activities, small towns and resource-dependent livelihood activities.[1] A strong agricultural sector is key to reduce poverty (and therefore enhancing adaptive capacity) in rural areas. However, agricultural productivity in many developing countries is either stagnant or declining. Recent decades have seen declining levels of public investment in agriculture. Changing global trading conditions have made it harder for the poorest countries to take advantage of world markets to bolster economic growth and diversification. Stressors such as HIV/AIDS and the degradation of environmental resources, such as water, topsoil and ecosystems, are reducing the productive capacity of rural areas. Climate change threatens to exacerbate these negative trends unless measures are taken to build adaptive capacity in rural areas.

Urban areas have also undergone dramatic transformations in the last few decades. Since 1950, there has been a sevenfold increase in the urban population of low- and middle-income nations and a much-increased concentration of people and economic activities in low-lying coastal zones or other areas at risk from flooding and extreme weather events. Most of the world's urban population and most of its largest cities are now in low- and middle-income nations. In addition, the United Nations Population Division suggests that almost all of the world's population growth up to 2025 will be in urban areas in low- and middle-income nations (UNPD, 2006). The way in which this very large and rapidly growing urban population is served and governed has major implications for development and for reducing vulnerability to climate risk.

Rural and urban settings must not be considered in isolation of each other. They are linked by interdependent functions and complementary flows of people, goods, wealth, employment, information, and technology. Urban areas are important markets for rural enterprises, and rural productivity influences the prices and availability of food, fuel and many industrial inputs in urban areas. Rural-urban links are typically most important for the poorest, as people may live in one setting but work or rely on opportunities and assets in the other to diversify and accumulate livelihood assets. For example, low-income rural dwellers may rely on off-farm jobs and remittances from relatives that have migrated to urban areas, while urban dwellers may rely on seasonal farm jobs or rural relatives for social support. The impact of climate change on rural systems will have profound socio-economic implications for urban areas and vice versa. Impacts on agriculture, for example, may increase food prices and disrupt food supplies to urban areas or degrade key ecosystem services upon which urban areas rely (such as water purification).

11.1. Key similarities between urban and rural settings and the implications for adaptation

In addition to these general trends and understanding of urban and rural dynamics, there are some important similarities and differences that are worth highlighting within the context of climate change adaptation. These will have implications for how adaptation is integrated at the local level.

11.1.1. Adaptation is already happening

Rural communities have a long history of responding to climate variability and change, but with varying levels of success. These short-term coping strategies can form the basis of successful long-term adaptation strategies. However, care needs to be taken

as some of these coping strategies could prove to be unsustainable over time as climate change progresses, leading to a greater risk of maladaptation. For example, short-term adaptation strategies in response to a decrease in rainfall could include over-exploitation of groundwater resources, which could actually exacerbate vulnerability over the longer term. Innovative approaches and new technologies and monitoring of the effectiveness of strategies in light of changing circumstances are needed to make sure that coping and adaptation strategies remain appropriate. Rural communities can therefore be seen as "living laboratories" for adaptation, and hard-won lessons can be learned, communicated and fed into adaptation decision making at higher levels.

Urban centres are also already adapting to change. All successful urban centres are constantly adapting to changing economic and political circumstances – and do so through the choices and investments of their populations and enterprises as well as their governments. Their built environment and infrastructure has also adapted to cope with extreme weather events. So in one sense, urban areas already have adaptation processes under way. It is these adaptation processes that need to be adjusted to cope with the increased and/or new risks that climate change is bringing or will bring.

11.1.2. Strong link between poverty alleviation and adaptation

Both urban and rural contexts experience poverty-related challenges and trends. As noted above, rural areas have more poor people but the number of poor people living in urban areas has increased. Poverty is an important determinant of vulnerability to climate change. Lower-income groups are hit hardest by the combination of greater exposure to climate hazards (*e.g.* those living in makeshift housing on unsafe and/or remote sites), less capacity to cope (*e.g.* lack of assets and insurance), less adaptive capacity, less state provision to help them cope, and less legal protection. There are strong complementarities between reducing poverty and reducing vulnerability – in part because poverty reduction involves better provision of infrastructure and services, and because higher incomes increase the adaptive capacity of households.

But poverty must be understood in a more multi-dimensional, disaggregated terms if local-level adaptation is going to be effectively supported. Levels of poverty range from the "productive" or "active" poor (people who are poor and experiencing food insecurity but are able to take advantage of development opportunities), to the "transient poor" (those who are poor for a short period of time, often as a result of an external shock), to the severely and/or chronically poor (those falling far below the poverty line, having few or no assets and opportunities, and/or those who remain poor for most or all of their lives (Chronic Poverty Research Centre, 2005)). For example, rural households can range from large-scale commercial agricultural households and enterprises, to subsistence agricultural households and micro-enterprises, to chronically poor rural households that are no longer economically active (OECD, 2006a). The way in which these different households experience climate change and the measures that will help them adapt to its impacts will reflect the different livelihood strategies, asset bases, social networks, and access to markets and services that characterise their respective circumstances.

The tendency towards higher rates of poverty among women relative to men, and a more severe poverty experienced by women than by men, also need to be taken into account - for female household heads, and among women and girls living within male-headed households because of unequal intra-household distribution of power and resources, such as food and property (Kabeer, 2008; Demetriades and Esplen, 2008).

Where women and girls have fewer capabilities and resources than men, this undermines their capacity to adapt to existing and future impacts of climate change.

11.1.3. Need for "good development" and "good governance"

Adapting to climate change in rural and urban settings often consists of strategies and activities already being undertaken under the rubric of "good development". In rural areas, for example, sustainable natural resource management and improved market access may be key to building adaptive capacity, while in urban areas the emphasis may be on provision of piped water or more robust and better situated infrastructure. Climate change is calling on development actors to think about what needs to be done more urgently or differently to meet these and other development objectives. Everything from information needs, infrastructure design, and technology use, to social networks, institutional arrangements, and management approaches must be considered. How can they be strengthened or adjusted to increase resilience to climate risks? The application of a climate lens may lead to adjustments to current practices, such as changing building codes, land subdivision regulations, land-use management and infrastructure standards. The sum of all these adjustments over time can build greater resilience without significant financial costs.

Making the necessary adjustments to support local adaptation will require "good governance" – that is, an agreement among all of the relevant components of local government to engage in this process, clarity in what each should do either independently or collaboratively, as well as efforts to partner with members of civil society and the private sector as appropriate. In urban areas, for example, this will mean involving a great range of government divisions and departments, some of which may be semi-autonomous public agencies. It will often need to involve many government agencies that work within sub-city or municipal levels and at higher (provincial/state and national) levels. Box 11.1 highlights the way in which co-operation and close partnership have allowed communities to adopt climate risk management strategies that support poverty reduction, and increased food security at the local level.

11.1.4. Roles, comparative advantages and limitations of local governments

"Local government" generally refers to the level of formal state governance closest to the people, and can consist of locally elected representatives, central government-appointed representatives, and publicly accountable decision-making and service-delivery organisations (Tyler, 2006). Local governments provide for the health, safety and welfare of communities through accountable decision making and service delivery. They oversee planning processes; construct, manage and deliver public services; establish and enforce policies and regulations; and educate, mobilise and respond to local opinion. Depending on the type or degree of decentralisation taking place within the country (deconcentration *vs*. devolution of authority), their authority in the planning and delivery of public services can vary.

Box 11.1. Climate risk management through Kenya's Arid Lands Resource Management Project (ALRMP)

Home to 10 million people, Kenya's arid and semi-arid lands have the lowest development indicators and highest incidence of poverty in the country. Over 60% of inhabitants currently live below the poverty line. Increasing population pressures, overgrazing and recurring conflicts between pastoralists and farmers all pose serious development challenges. These will be exacerbated by climate change, which is expected to bring increased frequency and severity of both floods and droughts.

In response to the devastating effects of past droughts — and the prospect of more frequent and/or extreme droughts as climate change intensifies — Kenya's Ministry of State for the Development of Northern Kenya and Other Arid Lands initiated the Arid Lands Resource Management Project. The objective of this project is to enhance food security and the delivery of social services, and to reduce livelihood vulnerability in 28 drought-prone arid and semi-arid area districts in Kenya. To build adaptation to climate change into this initiative, the Arid Lands Resource Management Project partnered with the Nairobi-based Centre for Science and Technology to implement strategies specifically designed to reduce the vulnerability of communities in the semi-arid district of Makueni to the impacts of climate change. As part of this initiative, climate and weather forecasts are being downscaled and communicated to farmers to help them select appropriate planting times. Local production systems are being diversified through the use of drought-tolerant crop varieties and better systems for collecting and storing seeds. Farmers have been trained in soil and water conservation; selection of seeds to fit climatic and land conditions; and early land preparation and planting. Also, such technologies as sand dams and drip irrigation have been introduced to improve access to water. Credit systems are being strengthened, allowing community members to pursue diversified or alternative livelihood activities.

Taken together, these interventions have built the resilience of the communities of Mukueni to current climate variability and long-term climate change, helping to ensure that the development objectives of the Arid Lands Resource Management Project are achieved in the face of climate change. Integrating adaptation into the Arid Lands Resource Management Project has meant modest adjustments to ongoing activities (*e.g.* selection of new seed varieties), or the introduction of new activities already familiar in rural development programmes (such as building sand dams). Moreover, project implementation has relied upon co-ordination between different government divisions and partnerships with civil society. For example, the project has called for improved communication between government agencies responsible for agricultural extension, rural livelihood creation and seasonal forecasting. Academic researchers have assisted with specific activities, such as the selection of drought-tolerant seeds and the promotion of micro-credit opportunities, while community-based organisations (*e.g.* farmer associations) have been instrumental in community mobilisation and the actual implementation of field activities. The process shows how co-operation between local communities, district officers and researchers can enhance rural adaptive capacity to climate change by integrating climate risk management strategies that support poverty reduction and food security.

Local governments create an enabling environment for local adaptation action. They should provide a supportive framework of norms, standards, financial incentives, and other types of knowledge, services and capacities to help individuals, households and community organisations take decisions that reduce their exposure to climate risks. Local governments can play several roles in helping communities understand and reduce climate risks – *i.e.* as educator, planner, regulator, enforcer and manager. This largely involves building on their core functions, which include:

- *Political representation* of local population in provincial or national decisions. Local governments can act to ensure that grassroots socio-economic and environmental priorities are understood and adequately reflected in regional and national decision making and policies.
- *Strategic development planning* for infrastructure, housing, land use and allocation, and regulation of natural resources. Rural development planning and enforcement processes offer some of the most concrete entry points for integrating climate change adaptation, as highlighted in Chapter 12. The incorporation of adaptation issues in these processes can lead to the identification of new development priorities, revised strategies, supporting by-laws, and law-enforcement mechanisms, as well as monitoring and evaluation frameworks. The more participatory the planning processes, the greater the opportunities for addressing the conditions that shape vulnerability to climate risk and adaptive capacity.
- *Delivery of public service.* Local governments have a role to play in the provision of services such as water and sanitation, health, law enforcement, education, emergency response, social protection, energy, and engineering and public works, such as road repairs and maintenance. These services, if delivered efficiently and equitably, can go far in building the adaptive capacity of communities, particularly if the delivery mechanisms (especially infrastructure and technology) are selected or designed with a climate lens.
- *Raising and managing local revenue* (depending on the form and extent of decentralisation in the country). Through actions such as collecting taxes or charges (including licences) and allocating the finances to identified budget items, local governments are able to generate the revenue needed to support adaptation efforts However, local governments in developing countries are often faced with financial constraints. Nonetheless, in cases where local governments are given the authority to raise revenues and allocate them to development priorities, addressing climate change adaptation may call for different levels and sources of local revenue, as well as for modified budget allocations.
- *Co-ordination of more localised development plans.* In some rural contexts, because the local government jurisdiction is vast, covering settlements over a large area, development planning at the grassroots level may be encouraged. The formulation of village-level development plans or micro-plans may help local governments in their own strategic planning processes. Civil society actors, who tend to operate more regularly at the grassroots level, can play an important role in ensuring that climate change adaptation is integrated into these localised plans and in making sure that these plans are adequately considered in district development planning processes.
- *Local administration.* Local governments are usually responsible for local administration, including human resources, which often includes the registration system for births, deaths, and marriages. Some of the information gathered and organised by local government administrations can be useful to the monitoring and evaluation of adaptation.

It is difficult to specify the most appropriate intervention points for adaptation within local government structures. There is such diversity in the forms of local government and their relationships to higher levels of government that it is difficult, if not impossible, to

generalise in regard to: *(i)* how much of the functions above fall explicitly to local governments; and *(ii)* the extent to which local government has internally allocated responsibility for planning, constructing and maintaining the buildings and infrastructure or the provision of services, co-ordination, finance, monitoring and regulation. In many urban centres, for instance, key functions are managed at the sub-municipal level (*e.g.* district or ward level). Also, many large cities are formed through the merging of many separate municipalities and experience serious constraints with respect to inter-municipal co-operation.

There are no obvious generalisations with regard to the "best" local government structures for climate change adaptation. For instance, it can be argued that local governments with a high reliance on intergovernmental transfers for funding infrastructure and services are at a disadvantage because this reduces the link between local needs and local resources – but some nations that have cities with high adaptive capacity are also highly dependent on these types of financial transfers. The need to root adaptation in local contexts and realities suggests primary roles for local governments; yet local governments often focus on short-term goals and often prioritise economic growth over longer-term risk reduction.

Some of the challenges and opportunities of local governments are applicable to both urban and rural contexts (Moser and Dilling, 2007). Local governments interact more directly with the local population and tend to be held more accountable to the constituents they serve than state and federal governments. Depending on the authorities in place, this can lead to more responsive governance, which is good for adaptation decision making. Local governments can also face severe financial constraints, making the prioritisation of development objectives and activities even more crucial in the planning process. The case for prioritising and/or incorporating adaptation must therefore be compelling and sound, especially in cases where the proposed measures have significant budgetary implications. Finally, because local governments are the level of governance ideally most attuned to responding to day-to-day local realities, it can be challenging for them to take a longer-term perspective, which can be necessary for climate change adaptation planning.

11.1.5. Role of communities and civil society

"Community" refers to one or several groups of people, usually with shared economic and cultural interests, living in close proximity at the local scale. Communities are themselves aggregates of individuals, households, and other local collectivities or institutions. As such, they are complex and dynamic, with identifying factors such as geography, culture, economic status, livelihood activities, language and/or religion creating divisions or linkages between people living in the same area.

Communities are the ultimate beneficiaries of development policies and strategies. The incentives offered by government policies should encourage individuals, households and other collectivities to take decisions that will reduce their exposure to climate hazards and/or increase capacity to withstand, cope or recover from their impacts. Thus, the role of local communities in local adaptation can be understood as:

- *Documenting and sharing information* on climate change, vulnerability and adaptation: Communities are often at the front lines of observing and experiencing climate variability and change. Thus, information about hydro-meteorological conditions, growing seasons, agricultural yields, local disease

patterns, and pest outbreaks should be collected and inform broader adaptation-related policies and programming.

- *Implementing adaptation decisions and activities*: As noted before, the process of translating knowledge and decisions into action is most visibly undertaken at the local level, and usually by individuals, households and other collectivities.
- *Sharing experiences and lessons learned:* Adapting to climate change is in itself a process of adaptive management, learning by doing. As the primary agents of adaptation action, communities are an important repository of experiences and lessons learned. These must be drawn upon to inform future actions – and policies that support actions – for adaptation.

Community participation in local-level processes is often realised through engagement with civil society organisations that represent grassroots interests and perspectives in different forums and decision-making levels. "Civil society" generally refers to non-state and non-private actors undertaking collective action around shared interests, purposes and values. They can be understood as those organisations that occupy the social space between individuals or families and the state or market. Civil society can include community-based (membership) organisations, co-operatives and regional, national or international NGOs. They tend to be most directly aware of, and involved in, day-to-day issues at the local level.

The role of civil society in the adaptation process is broad, sometimes overlapping with the roles of public- and private-sector actors. For example, civil society organisations can be subcontracted by government authorities to assist with the delivery of public services or receive funding from development agencies to implement adaptation programmes or projects. Nonetheless, their functions in supporting local adaptation are less about establishing and enforcing supportive policy and legislative frameworks but more about helping to inform them, promoting their transparency and accountability, and implementing adaptation actions. These adaptation functions can be understood in terms of:

- *Advocacy:* As the agents most directly linked to grassroots realities, civil society organisations can represent the community interests and priorities in local, and national, decision making. This role can be built upon when integrating adaptation into development policies and processes, with civil society actors making sure local conditions, trends, vulnerabilities and capacities are adequately reflected.
- *Research:* Civil society organisations can be important in the gathering and analysis of local-level information relevant to risk, vulnerability, adaptive capacity, and adaptation monitoring and evaluation. Again, their grassroots presence often provides them with more access to, and a better understanding of, detailed local data and knowledge.
- *Local awareness-raising*: Awareness is an important precursor to action, as communities need to know why they should adopt certain different measures and be informed of the risks, incentives and options associated with these measures. Civil society actors are knowledgeable of the most appropriate means for delivering messages to communities and are therefore instrumental in helping local governments inform their constituents of new or revised measures that seek to reduce climate-related risks.

- *Capacity building and training:* Adaptation strategies may require new or modified investments, livelihood activities, and behaviours. These, in turn, may require helping people and institutions to develop certain types of knowledge, abilities or skills. Civil society organisations are well placed to provide such support at the local level since they interface regularly with local actors and possess a detailed understanding of local priorities and capacity needs in a changing context.
- *Service delivery*: In many cities, civil society organisations are already helping local governments with service delivery in areas such as health care, water and sanitation, and disaster risk reduction. These roles will likely be strengthened as adaptation becomes more important in urban and rural settings.

11.1.6. Role of the private sector

Private-sector investment is widely recognised as central to poverty reduction, as it provides economic opportunities and improved access to essential services. The private sector at the local level consists of those collectivities that are not owned or directly controlled by the local or central government, whose activities usually generate economic profits. Examples can include local- and foreign-owned enterprises at different scales, from local restaurants and tourism operations, to large manufacturing plants and finance institutions. In developing countries, small businesses make up the majority of the private sector.

Businesses in climate-sensitive sectors have a direct interest in adaptation. Climate risks can undermine the infrastructure, energy supply and transport networks needed for business operations. Buildings located in hazard-prone areas may have to be moved or reinforced in light of climate change. Day-to-day operations that rely on steady water supplies may need to be redesigned as climate change constrains water availability. Supply chains reliant on climate-sensitive geographic areas may have to be diversified. Climate risks may translate into less disposable incomes and reduced market shares, while associated health risks may affect the productivity of the workforce. Reducing or managing these risks can translate into competitive advantage, cost savings (but perhaps not in the short-term), reduced liabilities, and investor confidence.

In addition to acknowledging and internalising climate change adaptation into their own decision-making processes (see Chapter 12), businesses can support local-level adaptation by serving a number of functions:

- *Provision of economic opportunities and growth*: Job creation, better incomes, improve access to social protection, and increased productivity from private-sector investment can increase household expenditure on key components of local adaptive capacity such as education, health and housing.
- *Service delivery*: Private-sector institutions can provide efficient delivery of state services (health, water), thereby increasing people's access to resources that are important to building local coping and adaptive capacity.
- *Political influence*: Businesses can often have more political influence than civil society, which should be leveraged for adaptation. Making the business case for adaptation should therefore be a priority for communities seeking to maximise access to influence of local and national governments.

- *Provision of financial, technical and human resources.* Private-sector entities may have access to innovations and technologies that help to reduce local risks (such as technologies for water conservation; more resilient buildings). They may have more sophisticated management skills needed to run large-scale development strategies. Formal and informal businesses may have access to networks that can help mobilise communities in areas such as general awareness-raising or early warning.
- *Public-private partnerships* can enhance the impact of adaptation-friendly regulatory frameworks. For example, "…the public sector sets a rigorous framework to reduce the physical risks, provides cover for high levels of risk or segments with high administration costs and sets the rules for a private market for other risks, while the private sector provides services and offers coverage for lower levels of risk and segments that are more easily accessible" (Dlugolecki and Hoekstra, 2007). However, the potential to establish public-private partnerships in low- and middle-income countries may be limited. In most rural and urban areas in low- and middle-income nations, governments do not provide the framework for risk reduction for lower-income households. It is difficult to see how insurance companies can offer good coverage at affordable premiums to low-income households that live in particularly dangerous sites to which governments will not provide infrastructure.

11.2. Key differences between rural and urban settings and their implications for adaptation

Despite the broad similarities described above, there are some important differences between urban and rural settings that cannot be overlooked when seeking to support adaptation at the local level. Urban and rural settings are characterised by, among other things, different population dynamics, settlement patterns, economic activities, environmental conditions, and levels of public investment. For example:

- livelihoods in rural areas are typically based on the natural resource base, while in urban settings they are drawn from non-agricultural labour markets and the provision of goods and services;
- individuals and households in rural settings tend to rely more on self-provisioning of goods and services (food, water, sanitation), while those in urban settings tend to rely more on cash to secure access to these goods and services;
- access to land for housing is not usually a problem in rural settings, while it can be a serious one in urban settings, especially for the poor (OECD/DAC, 2000).

These and other differentiating characteristics result in different vulnerability profiles for rural and urban areas. Specifically, those characteristics that define rural and urban settings also shape:

- how climate change will manifest itself locally (more intense rainfall may mean flash floods in one setting, but not in another);
- the sensitivity of a system to change (livelihoods directly dependent on natural resources tend to be more sensitive to climate changes than those that are dependent on manufacturing, for example); and

- the capacity to adapt (some settings may have better access to public services while others rely more on social networks).

Cities concentrate people and production, and all the inputs and goods they use and the wastes they generate. By doing so, they are also concentrating a wide range of hazards. Moreover, urban centres in low- and middle-income nations concentrate a large proportion of the people most vulnerable to the effects of climate change. In contrast, rural livelihoods such as farming, forestry, livestock rearing and fishing, are natural resource-dependent and extensive. Climate change is expected to affect the productivity, distribution and overall functioning of the ecosystems upon which these livelihoods depend.

The drivers of vulnerability – *i.e.* the political economy of exposure, sensitivity and adaptive capacity – can also be different, but linked, in urban and rural settings. For example, increasing rates of rural-urban migration may result in the expansion of unregulated settlements in hazard-prone areas such as flood plains. In rural areas, a volatile global agricultural commodities market may lead to unpredictable income flows for farmers, leaving them less able to accumulate and diversify assets in order to prepare and cope for climate-related disasters.

Differences between rural and urban settings can also lead to different levels of adaptive capacity. That is, the resources needed and available to implement adaptation options may differ in each setting. For example, urban residents may have more access to economic infrastructure (roads, ports, and sewerage systems) or public services (telecommunications, health care, and electricity) than rural residents, who may rely more on the existing social networks and traditional knowledge to manage risk. Table 11.1 summarises some of the factors that enhance or constrain adaptive capacity in urban and rural settings. These are broad generalisations that are not necessarily applicable in all countries. But they illustrate some of the issues that must be considered when assessing vulnerability of people within these settings, and point to some of the different resources and tools[2] that may be most appropriate for supporting adaptation.

Table 11.1. **Factors enhancing or constraining adaptive capacity in urban and rural areas**

	Urban	Rural
Strengths	Greater access to financial resources	Strong social capital
	Diversified economies	Strong social networks
	Greater access to services (*e.g.* health care, social services, education)	Strong attachments to community
	Higher education levels	Strong traditional and local knowledge
	Well-developed emergency response capacity	High rates of volunteerism
	Highly developed institutions	
Limitations	Higher costs of living	Limited economic resources
	More air-quality and heat-stress issues	Less diversified economies
	Lack of knowledge of climate change impacts and adaptation issues	Higher reliance on natural resource sectors
	High dependence on potentially vulnerable electricity grid	Isolation from services and limited access
	Ageing infrastructure	Lower proportion of population with technical training
	Issues of overlapping jurisdictions can hinder decision-making ability	

Source: Adapted from Natural Resources Canada (2007), *From Impacts to Adaptation: Canada in a Changing Climate 2007*, Ottawa, Canada, *http://adaptation2007.nrcan.gc.ca*.

Finally, rural and urban communities usually have different (immediate) development objectives or different strategies for achieving similar development objectives, leading to different adaptation options and needs. Encouraging economic growth in an urban context may prompt increased investment in service-sector training, or expansion or improvement of infrastructure, while achieving the same goal in rural areas may be through improving market access for local farmers and promoting the diversification of livelihood opportunities. Protecting the achievement of these objectives in the face of climate change will require different interventions.

Notes

1. But rural economies are not purely agricultural. While largely dependent on agriculture, the rural poor also rely on non-farm (and sometimes non-rural) activities for income. Agro- or timber processing, retail trade, local transport, domestic services, tourism, and equipment repairs are all examples of non-farm livelihood activities that can contribute to a diversified income portfolio, allowing people to protect themselves against adverse shocks and trends.

2. A growing number of tools and methodologies are being developed to improve decision making, to reduce risks and facilitate adaptation to climate variability and change. They include information portals for climate data and adaptation activities, tools for screening development activities regarding climate risk, and guidelines to assist decision makers on implementing adaptation. See Annex A for an overview of some of the available tools and screening approaches to adaptation to climate change.

Chapter 12

Integrating Adaptation into Local Development Processes

This chapter identifies elements for successful integration of climate change adaptation at the local level, which include: broad and sustained engagement and participation with local stakeholders; awareness-raising and targeted messaging on climate change; gathering and using appropriate information; and reconciling time horizons. It looks at the four entry points: (i) *development planning processes by local governments;* (ii) *adjusting local regulatory and service provision frameworks;* (iii) *adjustment of accountability mechanisms; and* (iv) *private sector and civil society processes.*

The process for integrating climate change adaptation into development policies and activities is broadly the same in urban and rural settings. In general, this involves linking two separate but related processes in order to achieve stated objectives: *(i)* the process of understanding climate risk and selecting adaptation options; and *(ii)* the process of formulating and implementing development policies (as described in Part II).

Integrating adaptation into planning processes means asking and answering the right questions about climate risk (Who is vulnerable to what risks today? Why are people vulnerable? How will they adapt to climate change?) at the right time to understand: *(a)* how it will affect the achievement of development objectives; and *(b)* how the achievement of development objectives can contribute to managing climate risks (*i.e*. build adaptive capacity, minimise maladaptation).

Differences in the integration process between urban and rural settings can be understood in terms of the details, for example:

- Resources and information used to assess current and future climate risks: Indigenous knowledge and participatory appraisal tools may be used in rural settings, while urban settings may rely more on centralised data sources.
- Types of stakeholders engaged in the process: Different actors may influence the adaptation decision-making process in rural and urban contexts. For example, in urban contexts private-sector actors may have more influence on local development planning processes in terms of setting priorities and supporting policy implementation. In rural contexts, traditional leaders (and traditional knowledge) may be important for mobilising local opinion and action.
- Specific adaptation options presented, as well as the mechanisms used to implement the options: It follows from the above that the range of adaptation options presented to decision makers in rural and urban settings will be different. To diversify rural production systems in the face of climate change, adaptation measures may include enhanced conservation agricultural techniques and a shift in crop or livestock species. Improving urban infrastructure in the face of climate change may mean locating new sites, using new building materials and construction techniques, as well as changing building codes to support these measures.

12.1. Elements for successful integration of climate change adaptation at the local level

The successful integration of climate change adaptation into local development processes depends on a number of enabling conditions.

12.1.1. Broad and sustained engagement and participation with local stakeholders

In both urban and rural contexts, local authorities need to move beyond a unidirectional, top-down relationships and reliance on technical experts, to adopting a collaborative approach where local actors are seen as legitimate decision-making agents. Participatory approaches using specific tools such as participatory budgeting (Box 12.1) will likely render development plans more supportive of local adaptation.

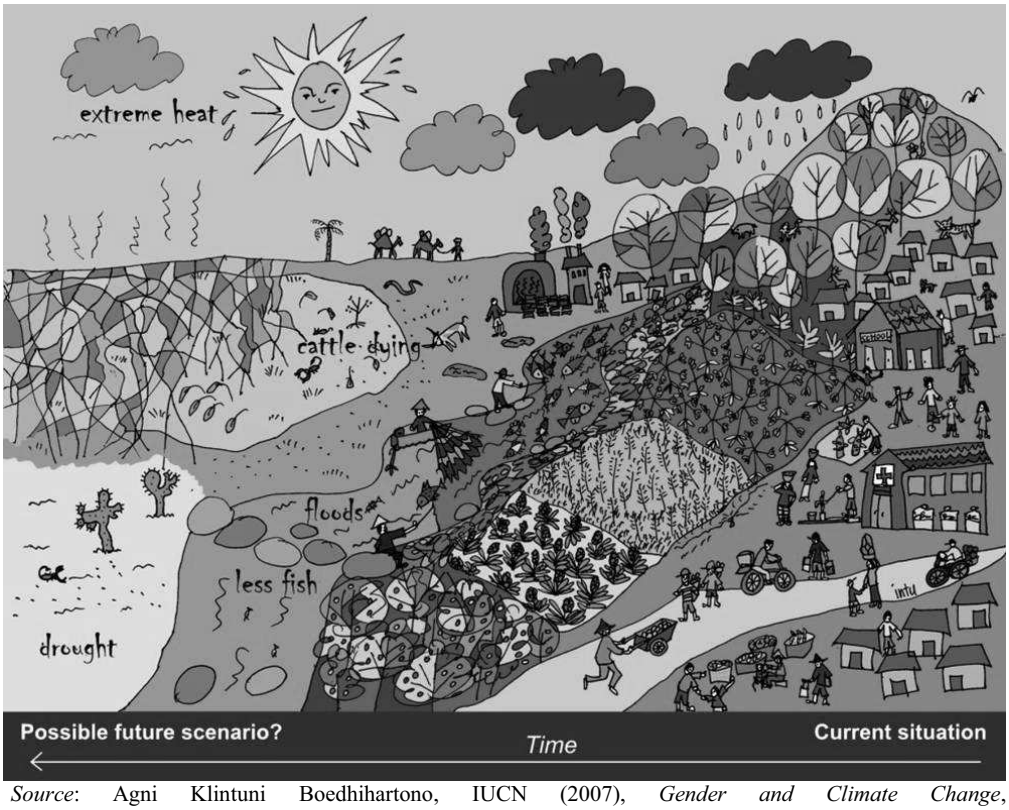
Box 12.1. **Participatory budgeting**

Participatory budgeting is a system whereby the inhabitants of a locality are able to make proposals on how to allocate part of a public budget. By instituting more accountable and democratic governance processes, local realities are better reflected and addressed in development decision making. For example, guided by an awareness of the risks associated with climate change, residents in a settlement at risk from landslides can prioritise spending on slope stabilisation infrastructure or land management practices, whereas residents in another area can prioritise increased water and sewerage connections.

12.1.2. Awareness-raising and targeted messaging on climate change

Local actors need and deserve to know why they might have to take different decisions or call on different or additional resources in conducting their livelihoods. Thus, they need to know about the changing risk context, how it may affect them, and what they can do to prepare and protect themselves. Awareness should be raised among a number of different local stakeholders, such as households, local organisations, opinion leaders and educators. This highlights the importance of targeted messaging and the use of appropriate communication tools (local radio, drama, flyers, posters, workshops, video, and so on). Figure 12.1 is an example of how visual art was used to communicate the potential impacts of climate change in a community in Zambia, including a depiction of current coping strategies and how they may be overwhelmed in the future.

Figure 12.1. **The potential impacts of climate change**



Source: Agni Klintuni Boedhihartono, IUCN (2007), *Gender and Climate Change*, *http://cmsdata.iucn.org/downloads/climate_change_gender.pdf.*

It is important to bear in mind that women and men generally use different information channels. Women and girls often have less access to information than men and boys because of their limited participation in the public sphere. Information about climate change and adaptation measures must therefore be designed and disseminated in gender-sensitive ways and be combined with explicit efforts to ensure that women and girls – especially those who are poor or have been denied the right to an education – can easily have access to and absorb the necessary information.

Awareness-raising about climate change at the local level must be balanced and delivered through appropriate mechanisms. This means striking a balance between providing too little and too much information; either situation can end up disempowering people, as they may feel they do not have enough information to act or feel overwhelmed by too many details and options. This raises the question of how much information to convey, since climate change is a relatively complex issue, and how best to do so. Some development practitioners have argued that local communities do not need to know about the causes and projections of climate change *per se*, and that the focus should be on communicating the increasing risk of climate-related disasters. Experience has demonstrated, however, that climate change can be effectively communicated to local authorities and community members. In some cases it can generate interesting discussions about observations of long-term climate trends and validate local observations, and it can also answer important questions. A message that combines both – an explanation of climate change and its implications for local disaster risk – is probably ideal. The *Climate Guide* of the Red Cross/Red Crescent (IFRC) provides tips to its field staff on how to communicate climate change and its impacts to local communities (Box 12.2).

12.1.3. Gathering and using appropriate information

Individuals, households, organisations, businesses and local governments all need information to take decisions that will reduce their vulnerability to current and future climate risks. The types of information each actor needs, and the way in which it is gathered, depends on the questions being asked and the output. Thus, adaptation decision making can require anything from a regional climate change projection to a village hazard map, to a city-wide assessment of informal and formal networks for disaster preparedness.

Regional, national and global information on climate change is increasingly available, although having access to or translating this information may be challenging for local authorities and communities. This level and detail of information may be useful for framing the problem and understanding general trends. However, integrating adaptation into development at the local scale is more dependent on local-level information. It is the detailed understanding of the local context that will help local actors translate broader development frameworks and goals into appropriate, adaptive strategies.

Many of the methods and tools for gathering climate risk information at the local level are already familiar to the development community, as they can be drawn from the participatory rural appraisal or rapid rural appraisal toolbox. Other types of information may rely on more scientific or quantitative data gathering, analysis, and translation methods – particularly for information related to biophysical and climatic conditions. This highlights the importance of collaborating with academic and research institutions, as well as government land surveying, hydrometeorology and census departments – particularly those operating at the appropriate sub-national level (province, district, parish, etc.).

Box 12.2. **Excerpts from the IFRC *Climate Guide* on communicating climate change**

"Remember that using multiple communication channels is more likely to get people engaged. Tell people in communities that climate change is caused by the burning of oil, gas, coal and trees all over the world, and that gases are forming a kind of transparent blanket around the world, letting the sunlight come to our planet but preventing the heat from escaping back into space.

The warming of the earth is changing the weather.

The main change is that the weather can become more extreme. When it is raining, the rains may be heavier. When it is dry, the drought may last longer. Ice and snow on mountains are melting, which might at first lead to more water in rivers and then to less (when glaciers are no longer there). Storms and cyclones may be stronger and go to unusual places, and more rain may fall out of them.

Also the seasons may change. The rainy season may begin earlier or later. Winters may be less cold, but snow may fall in great quantities.

These changes will also have an impact on how plants and animals behave. Insects and pests may come and go in greater numbers.

It is also important to highlight that thousands of scientists all over the world are busy trying to understand what is going on, but because of the complexity of the problem, they find it difficult to say exactly what will happen.

We will have to prepare for surprises. But a lot can be done to avoid surprises becoming disasters.

You need not go into all the details of climate change with communities. The different scenarios for climate change developed by scientists for your country may be too confusing.

The question of what should and should not be shared with vulnerable people is likely to be a permanent issue for the Red Cross and Red Crescent. Exchanging experiences with colleagues will therefore be important in years to come."

Source: IFRC (2007), *Red Cross/Red Crescent Climate Guide*, International Federation of Red Cross and Red Crescent Societies, *www.proventionconsortium.org/themes/default/pdfs/RCRC_climateguide.pdf*.

Table 12.1 summarises some of the types of information needed to take the right local-level adaptation decisions, as well as some of the tools, toolkits and frameworks available for gathering and organising this information.

Table 12.1. **Local information for climate change adaptation and associated data gathering/organisation tools**

Information for adaptation	Examples of tools for gathering and organising information	
	Climate-specific tools	Generic tools
Climate forecasts, predictions and projections Information regarding anticipated weather forecasts, seasonal weather predictions and projected long-term climate trends are essential for understanding current climate-related hazards and potential future hazards.	Scientific / quantitative: • daily weather forecasts • seasonal weather forecasts • cyclone/hurricane monitoring • regional climate models and global circulation models Indigenous / qualitative: • traditional knowledge	
Natural hazards and environmental assessments Information on past experience with natural hazards, as well as on current deviations from past practice, is essential for understanding future risks associated with climate change. Information related to current environmental conditions, such as deforestation, wetlands functioning, coastal erosion, and soil degradation is also important, as these factors influence the vulnerability and adaptive capacity of communities to future climate change.	Scientific/quantitative: • wind, rainfall and temperature data (historic and current) Indigenous/qualitative: • traditional knowledge	Scientific/quantitative: • geological hazard maps • hydrological maps (flood-prone areas) • local rainfall and flood level records Qualitative: • participatory local hazard maps • time lines
Vulnerability and capacity assessments These assessment frameworks and toolkits support identifying, understanding, quantifying and assessing the degree to which a rural community is vulnerable to climate change, and its capacity to cope and adapt to anticipated impacts.	• Capacities and vulnerability analysis • IFRC vulnerability and capacity assessment • CARE international climate vulnerability and capacity assessment framework	Participatory rural appraisal tools: • stories and oral histories • household surveys • transect walks • wealth and well-being ranking • semi-structured interviews and focus groups • time-lines • seasonal calendars • problem trees and flow charts • Venn diagrams
Livelihood analysis Understanding of the livelihood context in a rural community (its human, natural, financial, physical and social capitals) and how these assets could be affected by climate change helps identify potential sources of vulnerability and possible responses.	• CRiSTAL (community-based risk screening tool – adaptation and livelihoods)	
Local coping and adaptation strategies Rural communities have established strategies for coping with historic climate variability, and might be introducing new strategies to adjust to new climatic experiences. These strategies might help or hinder long-term adaptation efforts.		

While local actors take planning and management decisions on a much shorter time-scale, climate change projections are typically understood using 20- to 100-year time horizons. Climate change is exacerbating current climate-related stresses, with communities facing increasingly unpredictable rainfall patterns, or more frequent and intense extreme events. As a result, the starting point for adaptation at the local level is often current climate variability, whether it is believed to be caused by climate change or not. Actions to address these existing vulnerabilities must also take into consideration the longer-term impacts of climate change.

By adopting these elements of success, decision makers can take full advantage of opportunities to integrate climate change adaptation into local development planning processes. These opportunities can be understood in terms of entry points and are discussed in the remainder of this chapter.

12.2. Entry point 1: Development planning processes by local governments

Development planning is the process of setting goals for human and economic development, and designing strategies to achieve these goals through the allocation and management of human, financial, and natural resources. This can range from the process of producing locally driven, semi-autonomous plans (*e.g.* city development plans, village development plans) to contributing to the central government's annual planning process (*e.g.* district development plans) or sectoral programming reviews (*e.g.* agriculture, water and sanitation, forestry, health, disaster risk reduction). These processes engage some of the most powerful stakeholders and provide frameworks within which adaptation priorities can be addressed.

The general steps in the planning process – from understanding the current development situation, to articulating development visions and goals, to devising specific activities and allocations to address priority concerns – are similar to the planning steps described in other chapters of this Policy Guidance. But at the local level, the planning process is obviously focused on a much smaller scale, tends to have a shorter time horizon, and strives for more targeted outcomes suited to local circumstances. As a result, the information needs, decision support systems and stakeholder participation can be quite different for development decision making at other levels.

12.2.1. Rural development plans

Rural development plans focus on the distribution and management of natural resources in sustainable production systems and associated human resource development, in addition to the effective delivery of public services. The aim is therefore to protect and strengthen rural livelihoods, contributing to poverty reduction and economic development at all scales. Climate change considerations (knowledge about climate risks, local vulnerability, and coping experiences) need to be incorporated into locally driven rural planning processes. These can include:

- Village action plans or micro-planning: Small-scale, community-driven and somewhat autonomous development plans, usually targeted at a particular sector (such as health, education) or problem (food security, water quality) and resulting in the formulation of community micro projects.
- Integrated rural development plans, district development plans: Short- to medium-term (1- to 5-year) plans providing guidance for development at the decentralised decision-making level (parish, district), usually developed by local governments through a consultative process with community stakeholders. These plans are supported by appropriate budgetary allocations and fall within a framework of an overall national development planning process.

The general steps – and corresponding entry points for thinking about climate change issues – in these local planning processes are summarised in Figure 12.2.

12.2.2. City development plans or strategies

City development plans prioritise economic growth and the development of infrastructure to support it. A key part of any well-conceived city development plan is building resilience to a range of hazards and the risks they produce individually and as they combine. To be effective, this not only has to reduce the vulnerability of urban

dwellers and infrastructure but should also address the factors that generate both poverty and vulnerability to climate risk. In practice, this means applying a climate lens to the different elements of a city development strategy, which are described in Table 12.2.

Land-use planning and performance standards should encourage both private and public investment in buildings, long-lived capital and infrastructure to take account of climate change.

There is little experience to draw upon when discussing the development of adaptation plans for urban areas in low- and middle-income nations. The only well-documented example is Durban, one of South Africa's largest cities (Box 12.3). This gives a strong example of how adaptation is being promoted, and the information base to support it is being developed.

12.3. Entry point 2: Adjusting local regulatory and service provision frameworks

Local government can promote climate change adaptation by ensuring there is an appropriate and widely understood information base about climate change and its likely local impacts. This includes information on past and current climate conditions, environmental hazards, and vulnerability. Key to this is providing infrastructure and the services needed to gather, store and analyse this information. Such information and databases will allow authorities to understand an area's hazard profile, as well as the impact of past extreme weather and other disasters on the local area. This should seek as much detail as possible, drilling down to include "small disasters" (those that are not included in international disaster databases).[1] For instance, a database in Cape Town sought to record all events registered over 12 500 incidents, which contrasts with the 600 identified large events and declared disasters (Bull-Kamanga *et al*., 2003). Almost half of these occurred in informal settlements. An analysis of disaster events in Mexico, 1970 to 2001, sought to document all events with at least one death; it found that floods were the most common disaster, and that a quarter of all deaths from flooding came from events with fewer than four deaths.[2]

Figure 12.2. **Key questions and priorities for integrating adaptation into the rural development planning process**

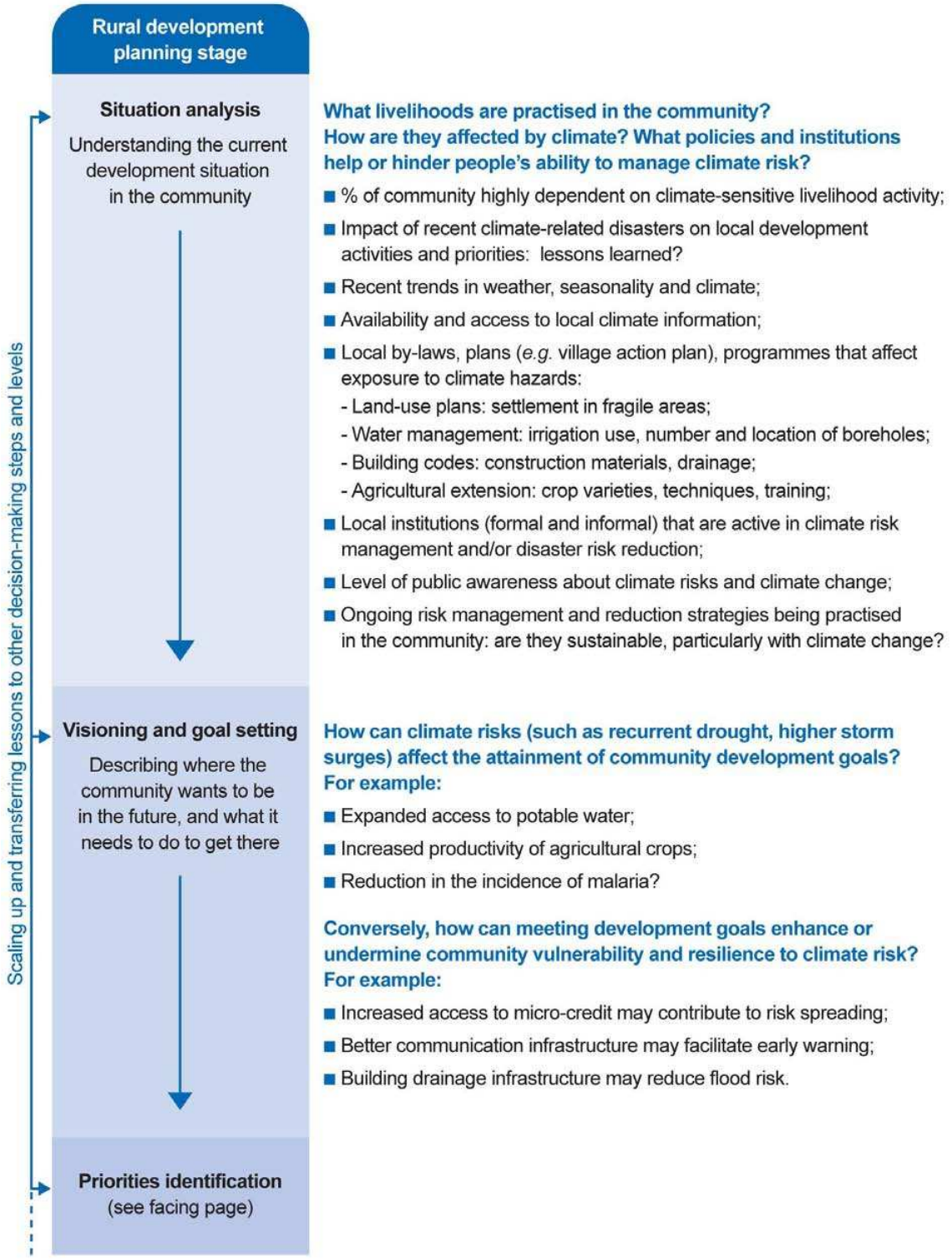


Figure 12.2. **Key questions and priorities for integrating adaptation into the rural development planning process** (continued)

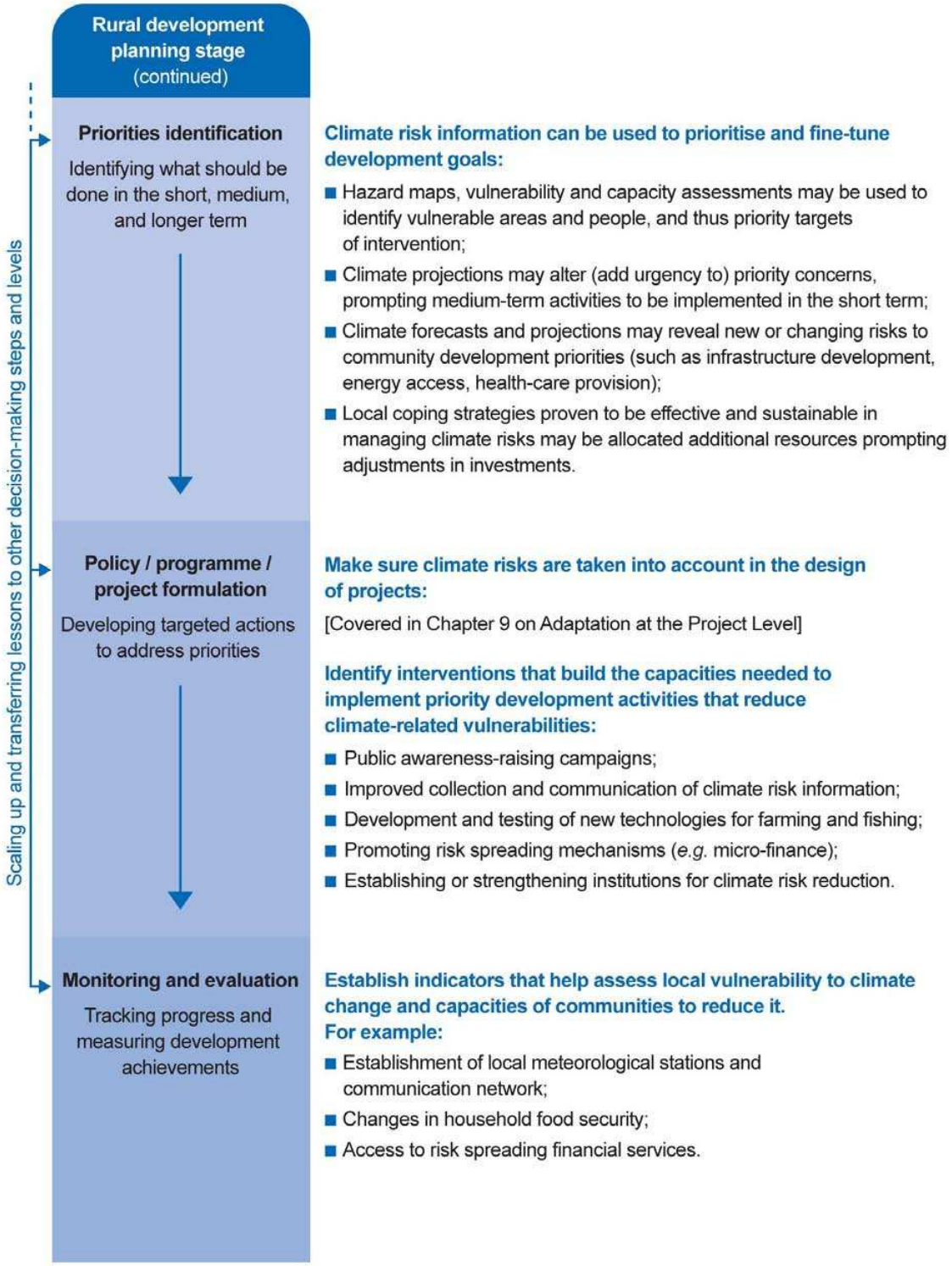


Table 12.2. **Applying a climate lens to steps in the urban development planning process**

Initiate a city development strategy process
• Senior officials and politicians agree on the need to undertake a city development strategy. • Key stakeholder group is formed, chaired by the mayor and with representatives of key developmental constituents (including formal local and foreign businesses, informal business community, labour and low-income residential communities).
ADAPTATION ENTRY POINT: Representation of environmental and poverty reduction issues in key stakeholder group.
Establish initial parameters
• Key stakeholder group agrees on guidelines for the process, as well as the spatial scale, scope and key issues to be addressed in the city development strategy. • Key stakeholder group also agrees upon the structure, content and process for undertaking a detailed assessment, involving all stakeholder groups, representatives, to develop a vision and set of strategic actions for its realisation.
ADAPTATION ENTRY POINT: Ensure environmental and climate information is included in the terms of reference for the assessment, specifically looking for information on increases or changes to climate-related risks.
Conduct a detailed assessment
• Study to understand the internal and external drivers of the city's economy, both in terms of growth and stagnation or decline, which helps to identify its local, national and global roles. • Use of city-wide scans of the economy, public service delivery, environment, spatial and built form and social conditions, which helps to assess the quality, coverage and fiscal sustainability of the city's infrastructure and services. • Use of quantitative and qualitative data and data collection methods. Interviews, discussions and workshops are always valuable – but especially so in cities with very limited official data.
ADAPTATION ENTRY POINT: Link information on climate-related risks to the quality, coverage and sustainability of the city's infrastructure and services – *i.e. h*ow have flash floods affected public transport systems or health care services? And will this risk increase?
Develop a city vision
• Develop a short, precise and unifying statement of where the city wants to be in 10 to 15 years, drawing on the assessment. • Articulate and draw from the city's comparative and competitive advantages, as well as from the values and preferences of residents, the relationship to local, regional and global economies, all within the local context of history and culture, location and climate.
ADAPTATION ENTRY POINT: Consider how climate change may affect the realisation of the vision or, conversely, how the realisation of the vision may undermine or enhance local capacity to adapt to climate change.
Identify strengths, weaknesses, opportunities and threats to achieving the vision
• Here, there is an obvious need for opportunities to build on the institutions with most capacity for implementing strategic thrusts.
ADAPTATION ENTRY POINT: Consider how climate-related risks may affect strengths, weaknesses, opportunities and threats for achieving the vision or, alternatively, how addressing these may undermine or enhance adaptive capacity.
Select a few key strategic priorities
• Identify a set of actions to be pursued in order to produce results within a given time period, measured by key indicators (relating to outputs, outcomes and impacts). • These almost always involve capital investment from the public and private sectors, and usually involve changes to policy frameworks, modifications to regulatory frameworks and strong awareness-raising and education components.
ADAPTATION ENTRY POINT: Consider how climate-related risks may affect the pursuit of strategic thrusts or, alternatively, how actions to pursue them may undermine or enhance adaptive capacity. Develop some simple indicators for local vulnerability to climate change and adaptive capacity.
Raise awareness of the vision and strategic priorities
• Disseminate details of the vision and strategic thrusts to obtain buy-in and contributions from different stakeholder groups. • Action plans and implementation task forces are developed for each strategic thrust that are explicit about who does what and which have clear financial and economic analyses with needed funding sources identified. These often begin with early, rapid implementation, high-profile and low-risk initiatives.
ADAPTATION ENTRY POINT: Consider using appropriate messaging about climate change or climate-related disasters in awareness-raising activities if it will secure greater attention and buy-in.

Box 12.3. **Durban's Climate Protection Programme**

Durban established an Environmental Management Department in 1994. Much of the initial work of the department was to see how the municipality's strong developmental orientation could also incorporate pressing environmental concerns. Durban was one of the few cities in Africa to have a local agenda 21, in line with what the world's governments agreed to at the United Nations Earth Summit in 1992. Various departments within the municipal government also became aware of the need to factor climate change into their plans – for instance for water supply and for health care. But municipal officials are unlikely to act if they have little idea of what climate change means for their city. To address this, the Environmental Management Department initiated the development of a Climate Protection Programme in 2004. The roll-out of this programme has occurred in three phases:

Phase 1: Reviewing and developing an understanding of the global and regional climate change science and translating this into an understanding of the implications of climate change for Durban. Key impacts include increases in temperatures, changes in the distribution of rainfall (long periods of no rainfall punctuated by short periods of intense rainfall), decreased water availability, increased range of water- and vector-borne diseases, sea-level rise, and the loss of biodiversity.

Phase 2: Developing a "'Headline Climate Change Adaptation Strategy" for the city to highlight how key sectors within the municipality should begin responding to unavoidable climate change. Interventions look to enhance and expand existing initiatives (such as the modelling of vector-borne diseases and their relationship to climate change) or stimulate new activity such as the "climate-proofing" of the city's open space system through matrix management (*i.e.* the management of the urban landscapes surrounding natural areas in a way that assists the survival and dispersal of indigenous species) and the creation of north-south dispersal corridors.

Phase 3: Incorporating climate change into long-term city planning, which includes developing a model enabling the simulation, evaluation and comparison of strategic urban development plans within the context of climate change. This seeks to understand the effects of climate change in Durban and allows a model-based assessment of the effectiveness of alternative approaches to mitigation and adaptation. This will involve the use of greenhouse gas (GHG) emissions accounting (*i.e*. producing an inventory of all the GHG emitted by activities within the municipal area) together with an assessment of the city's vulnerability in key sectors such as health, water and sanitation, coastal infrastructure, disaster management and biodiversity.

Sea-level rise: Durban's coastline has already been incorporated into the work of the municipality's Coastal, Storm Water and Catchment Management Department over the last two decades and this is expected to continue. Mapping of 1:100 and 1:50 floodlines for 90% of rivers has been completed, within a programme to inform citizens and support adaptation. New developments need catchment management plans to ensure that excess runoff is contained on site. Development setback lines and potential erosion lines have been identified that incorporate 1:50 sea storms and a 50-year sea-level rise prediction. There is concern that the port does not have development setback lines. The mapping programme under way will show sites at risk. The municipality is investing in developing the city's coastline for tourism, with key development areas along the coastline planned for the next 10 to 20 years. Rises in sea level could affect these developments, if not properly taken into account. Natural systems in Durban are capable of adapting to a 20-cm rise – but they may need to cope with much more than this.

All cities need to consider how climate change will affect them. The example from Durban shows how the departments that most need to take action on adaptation, such as water, energy, health, infrastructure, tourism and urban planning, should have an idea of what climate change implies for their work and future investments. In addition, a review of changes in weather and in extreme weather events over the past few decades can help identify who is vulnerable to some aspects of climate change. In Durban, the damages to infrastructure from high tides and waves in March 2007 helped alert many government officials to the kinds of impacts that climate change will bring.

Sources: Roberts, D. (2008), "Durban Adapts to Climate Change", case study in *Cities and Climate Change*, id21 Insights, Institute of Development Studies, January.

Satterthwaite, D. *et al.* (2007), "Adapting to Climate Change in Urban Areas; The Possibilities and Constraints in Low- and Middle-Income Nations", *IIED Working Paper*, IIED, London.

Local governments can also adjust regulatory frameworks that allow for effective land-use planning and resource management. For example, this can include legislation that ensures that:

- new developments avoid high-risk areas (*e.g.* flood plains, steep hillsides), and low-income groups in particular can have access to affordable land-for-housing that is not on a dangerous site;
- public services, businesses, and households account for changing water supply (*e.g.* incentives or regulations for water conservation, closer monitoring for toxic algal blooms in water reservoirs);
- buildings and infrastructure take account of climate change risks in ways that do not impose additional costs that are unaffordable (*e.g.* legislating the use of specific building materials and construction techniques);
- livelihoods are more climate-resilient (*e.g.* regulations and incentives for training in the use of new crop varieties, storing and processing techniques); and
- ecosystem goods and services are protected and enhanced (*e.g.* protection of watersheds; promotion of conservation agriculture; forest management).

Table 12.3 highlights the many areas in which urban governments could be active in different aspects of climate change adaptation – longer-term protection against likely changes, damage limitation just before an extreme event, immediate post-disaster response and rebuilding after an extreme event.

Table 12.3. **The role of city/municipal governments in the four aspects of adaptation**

Role of city/municipal government	Long-term protection	Pre-disaster damage limitation	Immediate post-disaster response	Rebuilding
Built environment				
Building codes	High		High[1]	High
Land use regulations and property registration	High	Some		High
Public building construction and maintenance	High	Some		High
Urban planning (including zoning and development controls)	High		High[1]	High
Infrastructure				
Piped water including treatment	High	Some	High	High
Sanitation	High	Some	High	High
Drainage	High	High[2]	High	High
Roads, bridges, pavements	High		High	High
Electricity	High	Some	High	High
Solid waste disposal facilities	High	Some		High
Waste water treatment	High			High
Services				
Fire protection	High	Some	High	Some
Public order/police/early warning	Medium	High	High	Some
Solid waste collection	High	High[2]	High	High
Schools	Medium	Medium		
Health care/public health/environmental health/ambulances	Medium	Medium	High	High
Public transport	Medium	High	High	High
Social welfare (includes provision for child care and old-age care)	Medium	High	High	High
Disaster response (over and above those listed above)			High	High

1. Obviously it is important that these do not inhibit rapid responses.
2. Clearing/de-silting drains and ensuring collection of solid wastes have particular importance just before an extreme rainfall; many cities face serious flooding from extreme rainfall that is expected (for instance from the monsoon rains) and this is often caused or exacerbated by the failure to keep storm and surface drains in good order.

12.4. Entry point 3: Adjustment of accountability mechanisms (local government)

Targeted measures supporting local climate risk management can be included in government accountability mechanisms such as annual district performance contracts (Box 12.4).

Box 12.4. **Imihigo – Annual performance contracts in Rwanda**

In Rwanda, the government has instituted a system of performance contracts, called Imihigo, between different levels of government in order to monitor, evaluate and ultimately hold decision makers accountable to local populations. These performance contracts are made between the central government and provinces; provinces and districts; districts and sectors; sectors and villages; and villages and cells (the latter being a verbal agreement rather than a signed agreement). Each contract consists of a summary of the development situation in the village/sector/district/province, as well as a series of tables outlining specific development goals, indicators that will be used to measure the achievement of these goals, and activities that will be undertaken to achieve them. Development goals in these performance contracts are typically divided into four main categories – health; education, culture and sports; agriculture and livestock; infrastructure, energy, water, environmental protection and co-operatives.

These performance contracts hold real potential for integrating and supporting climate risk reduction. The International Institute for Sustainable Development has been working with the Kigali Institute for Science and Technology in Rwanda to implement a series of field-based and policy-relevant activities that will reduce the vulnerability of two hydroelectric stations to climate variability, as well as enhance the livelihoods of upstream communities through measures that simultaneously protect the watershed (and therefore hydro potential) and local resilience to climate stress. These activities are being undertaken in two districts in Rwanda's northern province. Upon closer review of the performance contract between one of the sectors and its corresponding district, a few entry points for adaptation were identified.

For example under the "health" category, development interventions targeting increased access to drinking water and identification of families vulnerable to poverty could contribute to climate risk management in the communities. Drinking water sources can be identified with a climate lens (*i.e.* locating wells and boreholes in areas less prone to flooding and contamination), while methods for identifying vulnerable families can take into account climate risks.

The potential for integrating climate risk into Imihigo seems obvious, but challenges remain, as awareness about climate change remains low.

12.5. Entry point 4: Private sector and civil society processes

Private-sector and civil society organisations can support adaptation at the local level by internalising and institutionalising climate risk management into their own decision-making processes and operations. These include:

- *Strategic planning process*: It is an organisation's business plan, articulating "what to do, why it should be done, how it should be done, and who should do it" (Geyer, 2006). This is one step above project planning, as it involves the overall vision, mandate and direction of an organisation. Private-sector and civil society organisations may decide to promote climate risk management approaches, or target communities or markets that are especially vulnerable to climate risk, and/or consider how climate risks will affect their operations.

- *Business planning process:* Apart from seeing how the organisation's overall vision and mission relate to climate risk at the local level, local actors can also look at issues such as where to build infrastructure; whether supplies/inputs are reliant on climate-sensitive sectors; and whether demand may be affected by climate risk (*e.g.* tourism). Table 12.4 presents some considerations that businesses can make when thinking about how to adapt to climate change at different scales – within their own operations, in partnership with surrounding communities, and in collaboration with global markets. The benefits therefore extend beyond the business operation itself, and can contribute to overall community resilience-building.

Table 12.4. **Areas for business action on adaptation**

	Climate change-related risks	Actions to minimise risk	Actions to leverage opportunities
Within own operations and supply chains	Water scarcity, which limits operations Impacts to physical assets Increased insurance costs Supply chain interruptions	Redesign to minimise water use Redesign for resilience Emergency response preparedness Supply chain balancing and contingency planning	Design of new products and services
In partnership with surrounding communities	Unhealthy workforce Impacted logistics Unstable communities Increased regulatory pressure	Community emergency response Infrastructure planning Logistics contingency planning Community health plans Watershed management	Enter new markets for products and services
In collaboration with global community	Weakened global consumer markets Water scarcity, which restricts product use Damage to reputation Displaced populations	Support of global health programmes Improved information systems	Enter new markets for products and services

Source: WBCSD (2007), *Adaptation: An Issue Brief for Business*, World Business Council for Sustainable Development, Geneva and Washington.

- *Insurance*: Access to insurance pay-outs can lessen the net adverse impact of climatic events on policy holders. At the same time, insurance is also an instrument for motivating adaptations aimed at reducing climate risks. Properly set insurance premiums can, in principle, send appropriate signals to policy holders to undertake adaptation measures that reduce exposure to various risks, including those posed by climate change. On the other hand, poorly designed premiums that do not adequately reflect the underlying risk can actually impede adaptation or even promote maladaptation. A number of insurance products are available to protect against climate risk; index-based insurance schemes particularly could promote adaptation in the local context (Box 12.5).

Box 12.5. **Protecting livelihoods against climate risks through index-based insurance**

Index-based insurance mechanisms are an innovative way to address climate impacts on poverty, notably in rural contexts, and increase the resilience in agricultural systems. They have a potential to help protect livelihoods against climate risks, *e.g.* when small-scale farmers suffer losses from climate shocks. In addition, they can help lift people out of poverty traps.

A key example of an index-based financial risk transfer product is weather index insurance. The basic idea of this insurance is that it is linked to the occurrence of a weather event (*e.g.* rainfall, streamflow or temperature), rather than to the actual consequences of weather, such as crop failure.

This subtle distinction resolves a number of fundamental problems that make traditional insurance unworkable in rural parts of developing countries. One key advantage is that the transaction costs are low. As the insurance is not based on actual losses, but paid out if the rainfall amount is below an earlier agreed threshold, the insurance company does not need to visit farmers' fields to determine premiums or to assess damages.

Another advantage of index-based insurance is that perverse incentives of crop insurance are removed. Situations are avoided where farmers may actually prefer their crops to fail so that they receive a pay-out. Rather, insured farmers still have an incentive to make the best decisions for crop survival.

Index-based insurance can be implemented in many different ways, with different actors purchasing the insurance contracts. They can range from micro-level clients such as nomadic herders or small-scale farmers, to meso-level institutional clients such as water user groups or credit institutions and to national governments or non-governmental organisations.

Successful implementation of index-based insurance depends upon the identification of an appropriate index. It should be highly correlated to the loss (*e.g.* drought is clearly correlated with crop failure), but also measurable in a reliable and consistent way. The availability of adequate data to construct the index can be a challenge, particularly due to a lack of sufficient weather stations in many rural areas in developing countries. Notably, the construction of weather indices is further complicated by climate change. The design of weather indices is based on the assumption that historical climate statistics provide a reasonable expectation of the future climate, which is invalidated by climate change. Thus, while index-based insurance can provide an effective tool for climate risk management, climate change, at the same time, poses a serious challenge to the implementation of such insurance schemes.

Index-based insurance is being tested for poverty reduction and climate change adaptation in various countries, like Bangladesh, China, Ethiopia, India, Malawi, Morocco, Mexico, Peru, and Tanzania.

Sources: Agrawala, S. and S. Fankhauser (2008), "Putting Climate Change Adaptation in an Economic Context", *Economic Aspects of Adaptation to Climate Change*, OECD, Paris, pp. 19-28.

Barrett, C.B. *et al.* (2007), "Poverty Traps and Climate Risk: Limitations and Opportunities of Index-Based Risk Financing", *IRI Technical Report 07-03*, International Research Institute for Climate and Society, International Research Institute for Climate and Society, Columbia University, New York.

- *Private finance institutions* can provide financial frameworks that support and motivate local-level adaptation. For example, the provision of some savings and loan products, which are usually more accessible to low-income groups, can be conditional on the adoption of climate risk reduction measures that simultaneously strengthen local livelihoods (Box 12.6).

Box 12.6. **Reducing climate vulnerability through micro-credit in Nicaragua**

Located in the impoverished coffee-growing region of Matagalpa, Nicaragua, Fundación Denis Ernesto González López offers small loans to enable area farmers to purchase the necessities required to engage in subsistence farming activities. Access to capital represents a significant challenge for members of this rural community. Most families are unable to receive services from more established micro-finance institutions being too remote from the central area where most micro-finance institutions operate and lacking the essential collateral to obtain and repay loans.

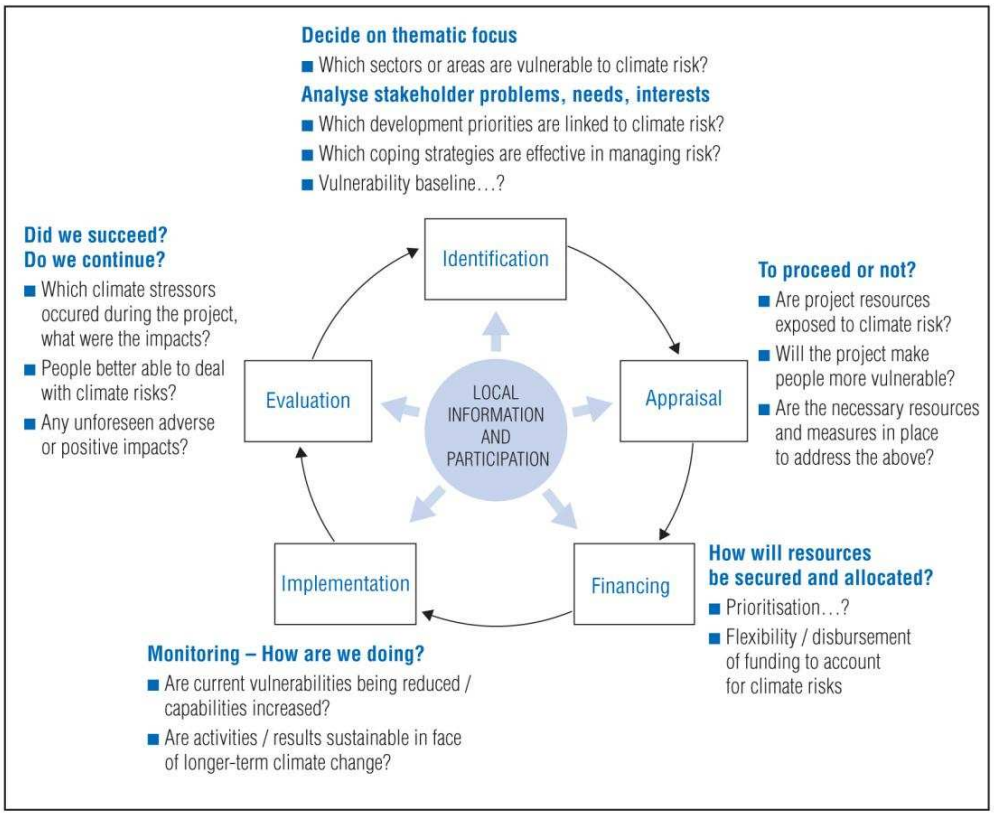
While the Foundation provides these small loans as part of its sustainable agriculture and poverty alleviation work, it has found a way to connect these loans to its environmental conservation work as well. Out of concern over water scarcity and water quality as well as heightened soil erosion in the region, the Foundation actively encourages community members to practice soil conservation and reforestation on their private lands. As an additional incentive to encourage community members to participate in these conservation activities, the Foundation offers a lower interest rate to those farmers willing to participate in these environmentally beneficial agricultural practices. Fundación Denis Ernesto González's environmental micro-credit provides the essential capital that farmers need while also producing positive environmental benefits for the wider community.

Lending conditions such as this may prove to be an innovative and effective way for reducing vulnerability in poor rural communities. In addition to helping farmers make investments that result in increased returns, the lending conditions also encourage risk management behaviour. Farmers took steps to protect themselves from erosion and landslides, which are common during heavy rainfall periods, and therefore secure livelihood activities over the longer term. While Fundación Denis Ernesto González may have viewed the loan condition as a simple means of reducing the risk of loan default, It effectively supported community-level adaptation to climate change.

Source: Starobin, S. (2008), *Sustainability at the Crossroads of Finance, Social Responsibility and the Environment: A Primer on Microfinance for Conservation Practitioners*, Nicholas School of the Environment and Earth Sciences, Duke University, Durham, North Carolina, *http://hdl.handle.net/10161/483*.

- *Project cycles:* As mentioned in Chapter 9, the project cycle offers a number of entry points for considering climate risks. These are largely the same at the local level but the main difference may be the type and scale of information used to identify distribution and type of risks. Also, project planning at or for the community level is presumably tailored to the realities and needs of the local population, which highlights the importance of having information about *(a)* how people conduct and sustain their livelihoods, *(b)* how their livelihoods are affected by climate risk, and *(c)* how their livelihoods contribute to or involve climate risk management. Figure 12.3 elaborates and contextualises the project cycle described in Chapter 9 to consider some of the questions that a civil society organisation may be asking when trying to integrate climate change into its work.

Figure 12.3. **Integrating adaptation at the local level**



Specific project design and management tools, such as the Community-Based Risk Screening Tool – Adaptation and Livelihoods (CRiSTAL), which is highlighted in Chapter 9, can provide frameworks for undertaking detailed local climate-livelihoods analyses and translating the results into concrete actions. Box 12.7 explains how this analysis informed project design decisions in Zambia.

Box 12.7. **Planning for adaptation – application of CRiSTAL in Zambia**

From January to September 2007, the International Union for Conservation of Nature (IUCN) implemented the pilot phase of the Climate Change and Development Project, funded by the Ministry of Foreign Affairs of Finland. The aim was to provide the government of Zambia with options for better supporting and empowering small-scale farmers and other natural resource-dependent communities to face the risks associated with climate variability and climate change. As part of this project, community-level assessments were undertaken in four ongoing field project sites in Zambia, using the Community-Based Risk Screening Tool – Adaptation and Livelihoods (CRiSTAL). The process involved community consultations in seven sites, covering four provinces and three agro-ecological zones of Zambia.

The CRiSTAL assessments yielded a range of results serving a number of purposes:

1. IUCN staff gained a more detailed understanding of the climate change-related risks that should be included in the full-size Climate Change and Development Project proposal. The proposal emphasised the need to increase community resilience to the risks identified in the CRiSTAL assessments. Resilience-building strategies would build on current coping strategies for dealing with climate variability, specifically by enhancing livelihood resources that are important to coping.

2. Managers and implementing teams for the four ongoing projects were introduced and trained on how to use CRiSTAL, an easy-to-use tool which provides a framework to assess climate risks and adjust project activities to avoid negative impacts and enhance positive impacts on communities' adaptive capacity in the face of climate variability and change.

3. The assessment provided complementary information on climate hazards and current coping strategies at the local level for decision makers. This information will be especially valuable for the completion and implementation of the National Adaptation Programme of Action (NAPA). The information collected during the vulnerability assessment was communicated to stakeholders during a workshop and to Zambian parliamentarians responsible for climate change issues.

Thus, project developers, local implementing staff, as well as policy makers all benefited from the application of the CRiSTAL process in Zambia, providing one mechanism of linking community perceptions and experiences with different decision-making levels.

Notes

1. The Centre for Research on the Epidemiology of Disasters (CRED), which holds the only publicly accessible global disaster database, defines disaster as "a situation or event, which overwhelms local capacity, necessitating a request to national or international authorities for external assistance." To be entered into the EM-DAT database, at least one of the following criteria has to be fulfilled: 10 or more people reported killed; 100 people reported affected; a call for international assistance; and/or declaration of a state of emergency. For CRED EM-DAT; see http://www.em-dat.net/. See also IFRC (2007), *World Disasters Report: Focus on Reducing Risk*, Oxford University Press, Oxford and New York, 239 pages.
2. Data source is DesInventar, *www.desinventar.org/desinventar.html*.

Chapter 13

Key Challenges and Priorities for Actions

This chapter sets out the challenges with regard to integrating adaptation into development at the local level and then outlines priority actions for national governments in supporting local adaptation. These priority actions include: (i) *collect and provide information for climate change adaptation;* (ii) *provide human, financial, technical resources and services to support local adaptation;* (iii) *provide social protection; and* (iv) *ensure a supportive policy and institutional framework. The chapter also identifies priority actions for donors. These include:* (i) *review sectoral priorities in light of climate change;* (ii) *explore different options for channelling funds and engage stakeholders in building local adaptive capacity;* (iii) *support decentralisation processes that transfer authority to elected local governments;* (iv) *enhance local government capacity to take up the responsibilities afforded by decentralisation.*

13.1. Challenges with integrating adaptation into development at the local level

Despite the establishment of enabling conditions and the identification of entry points, the process of integrating climate change adaptation into local development still faces several challenges. These include:

- *Awareness*: Awareness about climate risks is important to help communities deal with current climate variability and change. Lack of awareness on the part of government authorities, educators and trainers represents a significant impediment to integrating climate change considerations at local decision-making levels.
- *Information*: The role of different types of information for local-level adaptation decision making has already been discussed. Perhaps the most challenging of these is the availability of climate change projections at a scale that is relevant to rural communities. Efforts to downscale global and regional climate models proceed, but their utility at the community level is still limited. General trends (it is going to become hotter/wetter/drier over the next *x* years) can provide a starting point for considering changing risks, but may not be enough to encourage behavioural change.
- *Capacity*: Local governments and organisations are almost always under-resourced and over-committed. Budgets are typically stretched, whether local government revenue is raised locally or allocated by central government. Technical knowledge in the area of climate risk is correspondingly limited, as hydro meteorological knowledge is typically housed in a small department of a ministry, often removed from local communities. These inadequacies reflect local governments lacking the resources to meet their responsibilities – and often with very limited capacities to invest (as almost all local revenues go to recurrent expenditures or debt repayment).
- *Competing local (and national) priorities/needs*: Climate change is competing with other development priorities such as HIV/AIDS, conflict and access to primary education. In rural communities, because managing climate risk may be viewed as a "way of life" (as in the Sahel), local authorities may be reluctant to allocate too many resources to it. Instead, they may want to focus on more immediate threats to development such as infectious diseases, illiteracy, and food insecurity. The key to making sure climate risk management and climate change considerations do not remain ignored is to make the links between these development priorities and climate risk. For example, climate risk management may have an important role to play in reducing disease transmission and food insecurity.
- *Institutional structures that inhibit adaptation*: Complicated and unresolved institutional questions or conflicts may present a barrier to the integration of adaptation into community decision making. For example, poorly defined or insecure land tenure may impede a revision of local land-use plans and prevent people from adopting certain resilience-building strategies, since there may be no guaranteed returns on risk reduction investments on the land if land is suddenly taken away.

13.2. Priority actions for national governments in supporting local adaptation

To help overcome these challenges and promote adaptation at the local level, national governments can undertake a number of priority actions.

(i) Collect and provide information for climate change adaptation

Decisions require information. For adaptation decision making, information about climate hazards, vulnerability, resilience and coping or adaptive capacities– is especially important for identifying options. This requires harnessing knowledge and experience at the local level, and having access to information sources housed at higher levels.

(ii) Provide human, financial, technical resources and services to support local adaptation

Once community actors have identified and selected appropriate options to help them better manage climate risk, the role of governments and civil society is to assist with the implementation of these options. This can mean allocating financial resources to climate-sensitive infrastructure, offering education and skills training through extension programmes and projects, and assisting with the transfer and uptake of appropriate technologies, for example.

(iii) Provide social protection

For the poorest and most vulnerable, governments (and to a lesser extent, civil society) play a crucial role in providing resources and services that protect them from the negative consequences of economic, social and natural hazards. Specifically, social protection programmes in the form of social insurance, social assistance, and/or labour market regulations can help people reduce their vulnerability to these hazards by ensuring basic levels of consumption, facilitating investment in productive livelihood assets and strengthening their capacity to manage risk (Barrientos and Hulme, 2008). Climate change will amplify the impact of existing hazards or introduce new ones, making it more challenging for people to move out of poverty. Adapting to these changes may require people to adopt new activities and shift resource allocations, potentially introducing more or new livelihood risks. In some instances, short-term risks must be taken to ensure longer-term welfare. If these risks are realised, where adaptation activities lead to diminished or varying returns, people may turn to coping strategies such as withdrawing children from school, selling off liquid assets, or engaging in low-productivity farming activities, that lead to increased rates of transient poverty and further entrenchment of chronic poverty. Social protection measures can therefore help people buffer themselves against a changing hazard profile and adopt sustainable adaptation strategies.

(iv) Ensure a supportive policy and institutional framework

Finally, in addition to providing resources and services for local adaptation action, governments must create a supportive policy and institutional framework. This means devising policy incentives for risk management behaviour (*e.g.* secured land tenure, modest subsidies for climate-resilient crop species, improved access to social protection measures), reviewing or revising policies that increase climate-related vulnerabilities (changing zoning plans that permit settlement in flood plains, stronger enforcement of

building codes), and strengthening the institutions needed to manage the communication and decision-making processes. It can also mean introducing a greater measure of flexibility into the overall policy process, establishing provisions for increased bottom-up feedback and more regular reviews.

13.3. Priority actions for donors

Donors and international agencies can support the development of adaptive capacity within rural and urban settings in a number of ways. Depending on their policy priorities, mandates and capacities, different agencies may focus on one or several of the options below.

(i) Review sectoral priorities in light of climate change

In urban areas, this may mean drawing attention of partner governments to the urgent need to increase funding for infrastructure**.** Most bilateral aid agencies have given a relatively limited support to "economic infrastructure" (for such things as transport, communications and energy) and to water supply and sanitation. The deficit in urban infrastructure provision is a serious constraint to adaptive capacity in developing countries. It can therefore be argued that there needs to be a correspondingly large increase in international funding for these types of investments. However, a climate lens should be applied to make infrastructure resilient to anticipated climate change-related impacts. This may well imply some changes in standards for cities in high-risk sites, and may also imply some more fundamental changes in the design of the infrastructure, as well as other changes.

In rural areas, this may mean a continued increase in support for agriculture and rural development. Given that the large majority of the world's poor reside in rural settings, generating livelihoods in these areas is central to reducing poverty and hunger, and to helping developing countries adapt to climate change. After decades of decline in the share and value of aid to the agricultural sector, flows seem to be increasing again. But the increase still falls short of what is needed to improve agricultural performance, particularly in the face of climate change. In addition to applying a climate lens in agricultural and rural development investments, donors should continue supporting agricultural research and development to help rural populations better manage their climate-sensitive livelihoods, as well as funding discrete projects that pilot or test new approaches and target neglected sub-sectors, such as smallholder agriculture.

(ii) Explore different options for channelling funds and engage stakeholders in building local adaptive capacity

In many nations, a substantial municipal infrastructure fund to which local governments and civil society groups can apply may be the most appropriate way through which international donors can channel much-needed funding for infrastructure. Such a fund should also be proactive in helping identify cities or smaller urban centres most at risk and develop appropriate local responses. It should also encourage and support civil society's engagement with adaptation. This may also mean working more collaboratively with lower-income and other high-risk groups, especially those living in homes and locations most at risk from the direct and indirect impacts of climate change, or those most directly dependent on climate-sensitive livelihoods. There are good experiences in

"slum and squatter upgrading", for example, in which local governments have worked with the inhabitants of informal settlements to provide infrastructure and services and improve the quality of housing. These kinds of grassroots initiatives require donor support.

(iii) Support decentralisation processes that transfer authority to elected local governments

General Budget Support tends to stay in central government coffers and resistance to devolution can be strong at this level. Yet decentralised governance structures show the most promise for helping local stakeholders understand and successfully manage risks associated with climate change. Encouraging a more effective and politically palatable transition to decentralised governance should therefore be considered.

(iv) Enhance local government capacity to take up the responsibilities afforded by decentralisation

Support for more meaningful and effective decentralisation must be coupled with efforts to help local governments fulfil their corresponding roles and responsibilities. This may present many more difficulties for official development assistance agencies than the actual funding. Developing more competent and accountable city and municipal governments is a complex and usually highly contested process. It is very difficult for any external organisation, however well informed, to know how best to support this. Table 13.1 illustrates this by highlighting the different local government contexts.

Table 13.1. **Different local contexts through which national governments and international agencies can pursue "good governance" for adaptation**

Resources available to local government	The quality of local government/governance	
	From democratic and accountable local government structures…	…to undemocratic, unaccountable and often clientelist local government
From relatively well-resourced local government institutions with the needed technical competence…	Local government can be well served by external funding, including funding to support adaptation by households and private enterprises, and funding for needed infrastructure and support services (whether provided by community organisations, non-governmental organisations, private enterprises or government agencies).	Long-term support needed for governance reforms at all levels of government; also support needed for local private and community provision both to improve conditions and to build local pressure on government for better governance.
...to poorly resourced local governments lacking funding, a strong local revenue base and technical capacity	Need for a strong focus on capacity building for local government and support for its partnerships with civil society and local private-sector infrastructure and service providers (including informal providers).	As above but with strong support for local private providers and community provision within a long-term goal of supporting more competent, accountable and transparent local government.

(v) Increase support to civil society organisations

Because civil society organisations interface most directly with communities, they represent a key constituent in local-level adaptation. Supporting civil society actors at the local level usually means supporting projects as the primary aid instrument. Despite limitations associated with project funding, civil society projects – and the actors that plan, implement and monitor them – are often the most direct line to local-level realities and priorities. They can be the most effective and efficient way of targeting low-income

and other high-risk groups that are underserviced by the public sector. Ideally, projects should be undertaken with as much local and national government ownership as possible to ensure transfer of lessons and experience, and therefore the longer-term sustainability of results.

Annex A

Examples of Tools and Screening Approaches for Adaptation to Climate Change[1]

As of December 2008

Operational agency	Tool name	Substantive coverage	Where and when applied?
Asian Development Bank (ADB)	**Climate-FIRST (Climate Framework Integrating Risk Screening Tool)**	Climate risk screening software tool for rapid assessment of potential risk of projects from a number of pre-determined climate change impacts and risk factors; classification of projects into high, moderate and low risk categories.	Tool / checklist in draft stage (March 2009).
Danish International Development Agency (DANIDA)	**Climate change screening matrix** *http://ccs-asia.linddal.net*	Guidance and check-list for use by field-mission representatives and Danish development partners. Climate change integrated as part of wider "environment" as a cross-cutting issue.	Testing on sector programmes in 17 countries. Results available for Benin, Bhutan, Burkina Faso, Cambodia, Kenya, Mali, Nepal, Niger.
Department for International Development (DFID), United Kingdom	**Opportunities and Risks of Climate Change and Disasters (ORCHID), and Climate Risk Impacts on Sectors and Programmes (CRISP)** *http://tinyurl.com/ccorchid*	Portfolio (ORCHID) and sector-based (CRISP) climate risk assessment methodologies.	ORCHID piloted on DFID bilateral portfolios in Bangladesh and India in 2007/08. CRISP piloted in Kenya in 2008.
	Integrated screening	Integrated environment, climate change and disaster risk reduction screening.	Piloted in five programmes in India, Nepal, Bangladesh, Afghanistan and Pakistan.
Dutch Ministry of Foreign Affairs (DGIS)	**Climate quick scans** *www.nlcap.net*	Consultant-based "quick scans" of bilateral portfolios to screen them for risks and identify adaptation entry points.	Netherlands Climate Assistance Programme led work in Bangladesh, Bolivia and Ethiopia. Completed in 2007.
German Technical Cooperation (GTZ)	**Climate check** *www.gtz.de/climate-check*	Climate-proofing and emission saving; ensuring that climate risks and emissions reduction potentials are taken into account for all affected or relevant development co-operation activities.	Piloted in Morocco and India in 2008.

Operational agency	Tool name	Substantive coverage	Where and when applied?
Swiss Agency for Development and Cooperation (SDC) / Inter-cooperation	**Community-based Risk Screening Tool – Adaptation and Livelihoods (CRiSTAL)** *www.iisd.org/security/es/resilience/climate_phase2.asp*	Project management tool to help *(a)* understand the links between local livelihoods and climate; *(b)* assess a project's impact on livelihood resources important for climate adaptation; and *(c)* devise adjustments to improve a project's impact on these key livelihood resources.	Field-tested on natural resources/livelihoods projects in Bangladesh, Mali, Tanzania, Nicaragua, Sri Lanka, Ecuador and India.
United States Agency for International Development (USAID)	**SERVIR-viz climate mapper** *www.servir.net*	GIS-based information tool for environmental decision-making.	Meso-America, with current development of tools for Africa.
World Bank	**World Bank climate change portal, including ADAPT tool** *http://sdwebx.worldbank.org/climateportal*	Google maps-based platform representing wide range of data; the portal presents climate model outputs, historical climate observations, natural disaster data, crop yield projections and socio-economic data.	ADAPT tested in South Asia and sub-Saharan Africa.

1. Table produced by Thomas Tanner and Anne Hammil.

Annex B

How to Integrate Climate Change Considerations into Sectoral Policies, Plans and Programmes through Strategic Environmental Assessment

Strategic Environmental Assessment (SEA) refers to "a range of analytical and participatory approaches that aim to integrate environmental considerations into policies, plans and programmes (PPPs) and evaluate the inter-linkages with economic and social considerations" (OECD, 2006c). It offers a structured approach to integrating environmental considerations into PPPs at different levels, including the sector level. The OECD/DAC Good Practice Guidance document on *Strategic Environmental Assessment* (OECD, 2006c) suggests the following key stages for carrying out an SEA: establishing the context, implementing the SEA (including by undertaking the needed analysis with appropriate stakeholders), informing and influencing decision making, and monitoring and evaluation.

The questions outlined below demonstrate how climate change considerations can be integrated into each of the key stages of an SEA. The questions address *i)* possible effects of climate change impacts on the objectives of the sectoral PPPs and *ii)* possible effects of the PPPs on the vulnerability of the natural and human systems that are affected by the sector. They are intended to stimulate ideas rather than to cover all aspects that may need to be considered. They will have to be adapted to partner countries' circumstances, development agency mandates, and the specificities of the targeted sector.

Step 1: Establishing the context

Assessing the need for climate change considerations in the context of SEA

- What are the main risks from climate change to the sector in question? (*e.g.* loss of coastal systems for tourism, reduced runoff and recharge for water, increased rainfall variability for agriculture, expansion of disease vector ranges for health).
- Is there any reference to climate change adaptation needs in the national development plans or poverty reduction strategies? Is there a national climate change strategy in place (*e.g.* a National Adaptation Programme of Action (NAPA)) that the PPPs would need to be fully-aligned with or at least consistent with?
- Is reference made to climate change in the PPPs?
- Have climate change risks been taken into account in the PPPs?

Setting objectives

- Concluding from the general assessment, is climate change a relevant consideration in the SEA process? (If it is so, the objectives of the SEA could include assessing the viability of sectoral PPPs under different climatic scenarios, ensuring sustainability of sectoral reform, or identifying vulnerabilities of natural and human systems to the sector in question).

Identifying stakeholders

- Which decision-making bodies are most involved with affected sectors or activities? Which groups (*e.g.* demographic or socio-economic groups) and geographical areas experience highest exposure to existing climate-related risks? (*e.g.* for a PPPs related to coastal zone management, communities in low-lying coastal areas will be key stakeholders).
- Which groups will be most affected (both positively and negatively) by possible adaptation interventions? (*e.g.* poor households by water pricing, energy-intensive businesses by increased fuel costs, coastal communities by managed realignment).
- Are there other stakeholders and decision-making bodies that have been dealing with climate risks for the sectors or activities of interest? For example, links to the disaster risk reduction/management community could be identified at this stage.

Step 2: Implementing the SEA

Scoping

- Are climate change signals already apparent, and if so, do they affect social and economic development? (*e.g.* impacts of reduced rainfall or increased rainfall variability on food production, or changes in rainfall or temperature correlated with increased incidence of climate-sensitive diseases).
- Do existing studies based on extrapolation of current trends or climate change projections identify specific likely or plausible impacts on development? If so, through which mechanisms? (*e.g.* future loss of productive land or salinisation of groundwater due to accelerating coastal erosion and sea-level rise).
- How is the exposure and vulnerability to existing and anticipated climate change risks and hazards distributed over different groups?

Collecting baseline information

- What data are available at scales relevant to the sectoral PPPs (*e.g.* projections from global and regional climate models; specialised models *as* for coastal change, water resources, agricultural productivity)? Are there any major information gaps?
- If crucial information is not available or is inconsistent, which *ad hoc* studies should be commissioned to fill these critical information gaps?

- Is there sufficient institutional capacity for the collection, management and interpretation of information?

Analysing the potential effects of the proposals and any alternatives

- Are the development objectives of the proposed PPPs at risk of being undermined by projected climate change impacts?
- Is there any risk that the PPPs may lead to increased vulnerability of the affected natural and human systems?

Identifying how to enhance opportunities and mitigate impacts

- Could measures to reduce disaster risk support adaptation to climate change? (*e.g.* preparedness planning, improved zoning laws and building codes, risk education and early warning systems).
- How can the proposed PPPs help to enhance the resilience of people affected by climate change impacts?

Identifying alternatives

- Where PPPs proposed might fail to deliver their development outcomes because of climate change impacts, are there any alternative options that are likely to be more effective under the given climate change scenario? (*e.g.* where reduced rainfall may affect viability of hydropower generation, hydro could be substituted or complemented with micro-generation, including biogas, solar, etc.).
- Which measures could be built into the proposed PPPs to enhance its sustainability under climate change scenarios?
- What key policy and legislative changes are required to promote adaptation in the context of the PPPs? What mechanism or structure could be established to prompt lower-level decision makers (*e.g*. regional, project levels) to adopt climate change responses?
- To what extent are the different adaptation options robust under different climate change scenarios? Do they represent "no regrets" interventions, particularly where climate change impacts are associated with high levels of uncertainty?

Step 3: Informing and influencing decision makers

- Is there sufficient awareness among decision makers and stakeholders of climate change, its impacts, and appropriate adaptation responses? How can relevant information be communicated to decision makers?
- Are there are any reasons why decision makers may be likely to neglect (long-term) climate change impacts or to object to integrating adaptation measures into sectoral PPPs? What incentives can be set to ensure that the identified adaptation measures are integrated? (*e.g.* policy drivers, new legislation, development and enforcement of regulation, taxes on carbon emissions, etc.).

Step 4: Monitoring and evaluation

- What tools and indicators might be used to assess adaptation measures in terms of development outcomes?
- How and by whom (*e.g.* those responsible for developing the PPPs, climate change experts, an independent commission) should these indicators be tracked? Are any capacity development measures needed to ensure effective monitoring and evaluation?
- Did any climatic event or trend affect the attainment of the PPPs' objectives? If so, had the SEA taken such risks into account?
- Are there any indications that the PPPs led to increased vulnerability to climate change impacts of the recipient system? Were such impacts anticipated? (Feedback should be solicited from stakeholders throughout the SEA and PPPs implementation process so that negative or counter-productive impacts may be identified at an early stage).
- Did the SEA improve the capacities of senior decision makers, civil servants and other stakeholders to understand climate change issues and management?
- Did SEA enhance the transparency and accountability of decision-making processes on climate change issues in general and those specifically related to the PPPs?

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