chapter 4

MAINSTREAM COASTAL ADAPTATION

Mainstreaming is what gives adaptation the funding and authority to take place. Once adaptation needs and measures are defined, a mainstreaming process is required for formal approval, funding, and implementation of the measures. In most cases, it is best if you develop the mainstreaming mechanisms in parallel with conducting your vulnerability assessment and planning. This chapter describes the meaning of mainstreaming, and highlights three mainstreaming entry points. These are: 1) national or regional level public policy, 2) sectoral investments and projects, and 3) sub-national, place-based initiatives. Good practices for overcoming mainstreaming obstacles are also listed.

MAINSTREAMING

- ☑ What is mainstreaming?
- ☑ National and regional entry points
- ☑ Sectoral investments and projects
- ☑ Coastal places
- ☑ Overcoming barriers and obstacles in mainstreaming

4.1 WHAT IS MAINSTREAMING?

It is important to recognize that climate change adaptation presents a fundamental challenge to managing the coastal resources and should be "mainstreamed" into coastal management and development at all levels. Mainstreaming means integrating climate concerns and adaptation responses into relevant policies, plans, programs, and projects at the national, sub-national, and local scales. At the national level, climate change adaptation strategies will be more effective if they are mainstreamed into development and sectoral plans and strategies, and "owned" by those authorities responsible for preparing and implementing them. The long-term goal is to have climate change adaptation integrated into public policy across many sectors, woven into organizational missions, and routinely considered in decisions about development.

> "Climate change policies cannot be the frosting on the cake of development; they must be baked into the recipe of growth and social development."
>
> Robert Zoellick, President, the World Bank Group

Mainstreaming does NOT mean allowing the climate change adaptation issue to get lost amongst many other competing priorities. Rather, it means advocating strongly for climate change adaptation and for bundles of adaptation measures to address priority issues within the scope of development goals.

Mainstreaming recognizes that adaptation measures are seldom undertaken solely in response to climate change (IPCC, 2007b). Given the scale of the problem, and the linkages between climate change and development, coastal adaptation will happen as an overlay to other ongoing initiatives and governance frameworks. Existing institutions should be in the forefront of designing and implementing adaptation measures. This could include those responsible for managing water supplies, protecting public health, responding to natural disasters, protecting coastal areas and conserving and managing marine ecosystems.

As noted earlier, coastal countries or regions use many different entry points to incorporate climate change measures appropriately. Each entry point offers challenges; creates new roles for citizens, the private sector and government; and can open up new opportunities.

Constructing water tanks for schools in Tanzania's Wawi Watershed is critical to address current climate issues and to improve for health and sanitation of the community.

Successful mainstreaming requires reinforcing linkages among the many possible adaptation entry points. Government, together with non-government partners, must play a pivotal role in fostering the connections across national, sectoral, and place entry points. Examples include:

- *Creating enabling policy, finance and legal frameworks.* This includes, for example, prioritizing adaptation in national planning and budgeting; harmonizing sectoral policies; creating national coordination committees, chaired by a ministry with power; and providing the financial and technical support necessary for adaptation measures to succeed.
- *Capturing local experience.* Coastal adaptation in a specific place or area builds practical experience and a sense of ownership for those living and working there. This experience can be shared amongst different actors at the national level to build capacity. Linkages between local communities and government strengthen community voice in planning and national policy-making for coastal adaptation to climate change.
- *Public awareness.* Awareness raising and education campaigns help convey information about the impacts of climate change and gain consensus on adaptation options. Governments need to engage more actively with the scientific community and provide easily accessible and up-to-date climate change information relevant to the needs of coastal sectors.

ENTRY POINTS

Entry Point I: National / regional settings, e.g.:

- National Adaptation Programme of Action
- National coastal management programs
- Hazard mitigation or disaster preparedness
- Poverty reduction strategies
- National budgeting processes

Entry Point II: Sectoral investments and projects, e.g.:

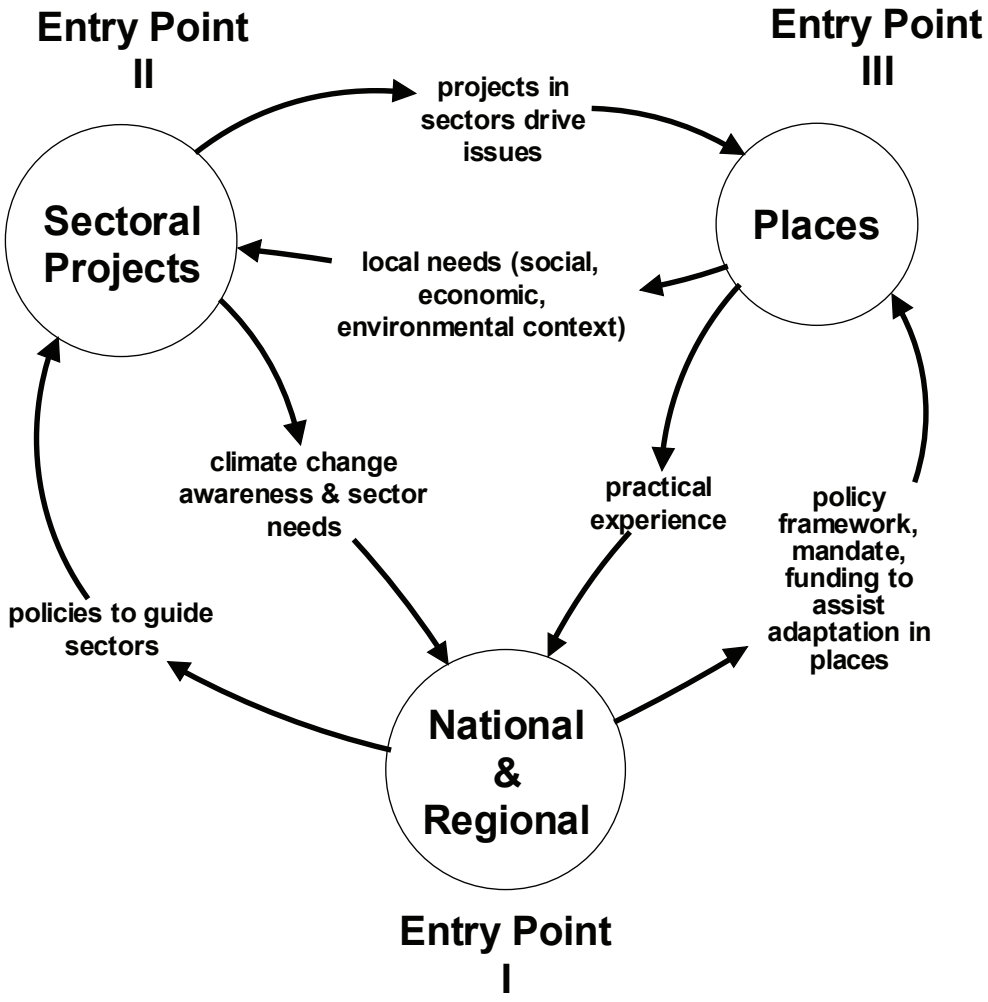
- Tourism development in specific sites
- Mariculture
- Fisheries
- Freshwater supply

Entry Point III: Coastal places, e.g.:

- Municipalities, districts, provinces
- Ecosystems (estuaries, rivers)
- Coastal watersheds
- Marine protected areas

National, sectoral, and place-based entry points share an important set of relationships as illustrated in Figure 4.1. No sectoral project can ignore the specifics—the local stakeholders, physical attributes and resources, and governance setting—of the place where it will be implemented. Likewise, a place-based approach needs to take into account the types of development trends occurring or being proposed by sectoral interests. Projects that are already or soon-to-be underway represent recognized priorities or issues for the area. They provide evidence of what is salient to leaders and citizens of the place. There are also complementary links between sectoral and place-specific entry points and the national entry point. For example, national policies, budgets and legislation provide the enabling conditions necessary for place-based and sectoral adaptation actions to occur. At the same time, it is experience in sectoral development and local adaptation initiatives that builds awareness and experience at the national level.

Figure 4.1 How entry points reinforce each other and contribute to a more integrated strategy



4.2 NATIONAL AND REGIONAL ENTRY POINTS

Until recently, national agencies and the development community seldom considered the threats posed by climate change to lives and livelihoods during development planning. That is changing slowly as climate change adaptation rapidly gains importance on national and international agendas. National climate change adaptation strategies need to be mainstreamed into other development initiatives such as poverty reduction strategies, country strategies and sector plans. The advantages of mainstreaming are two-fold. By mainstreaming climate change adaptation into development initiatives, there is ready access to the pool of resources already budgeted/identified for those initiatives. This eliminates the need to generate a separate resource pool for a stand-alone climate change adaptation effort. In parallel, by mainstreaming climate change adaptation into development investments, those investments are made more resilient. More resilient investments, in turn, serve the community more effectively, and maximize benefits and returns. It is also advantageous to integrate and mainstream adaptation to climate change into broader coastal management and disaster risk reduction programs, which often exist within the administrative framework of a country.

While there are many possible entry points at the national level, it is essential to have a strong agency with the authority and capacity as the champion of your adaptation initiative. This helps ensure effective coordination with and avoids redundancy and/or inefficiencies amongst the various agencies involved. It also helps ensure coastal climate change adaptation finds a place in the national budget. In some cases the most effective approach is to create a national coordination committee, chaired by a government department with authority, such as a country's planning or finance department.

NATIONAL MAINSTREAMING EXAMPLES

Small island developing states in the **Pacific and Caribbean** have been among the first to work on adaptation. As a regional response to the Global Conference on Small Island Developing States in 1994, the Caribbean Planning for Adaptation to Climate Change project was established in 1997. One of their five pilot projects lead to the establishment of a National Climate Change Committee in **St. Lucia** that has advanced national level awareness, provided the information and built the capacity to address climate change.

The Pacific island of **Kiribati** successfully integrated adaptation into national development strategies from within the Ministry of Finance and Economic Planning and later from the Office of the President. This shows the effectiveness of coordination on adaptation from within an important ministry.

Bangladesh has produced a National Adaptation Programme of Action and has been successful in integrating climate adaptation in a concrete way into several sectors (e.g. coastal management, freshwater resource management, and disaster preparedness).

In **Mexico,** an Inter-Sectoral Commission on Climate Change was established in 2005, with the Environment Ministry responsible for coordinating climate change policy through the Commission. Institutional fragmentation and isolation of the adaptation agenda from the development agenda are cited as barriers to effective mainstreaming under this framework. The Environment Ministry has little leverage over other government departments.

Tanzania has prepared a NAPA and other East African countries are preparing theirs (**Kenya, Uganda, Sudan**). In Tanzania, a National Climate Change Committee was formed, chaired by the Department of Environment in the Vice-President's office. There are many opportunities for mainstreaming adaptation through existing coastal management and poverty reduction programs if the political mandate and funding can be found.

The National Adaptation Programme of Action (NAPA) carried out through the United Nations Framework Convention on Climate Change (UNFCCC) has led some developing countries to examine several facets of climate change and the need for adaptation measures. The UNFCCC provides support to the 50 least developed countries (many of which are coastal) to plan, mainstream, and implement climate adaptation. An assessment of the five-year performance of the NAPA is instructive on the implementation challenges of climate change adaptation. As Table 4.1 shows, most countries are considered to have effective institutional mechanisms for developing climate adaptation policy and strategy. Seventy-five percent have started their NAPA.

However, only 10 percent have established national programs and reached an early stage of implementation. This makes the point that having a NAPA does not immediately translate to mainstreaming.

Table 4.1 An assessment of the national adaptation programme of action

2007 'REPORT CARD' OF PROGRESS WITH NATIONAL ADAPTATION PROGRAMMES OF ACTION		
CHALLENGES	**MEASURE OF SUCCESS**	**PROGRESS**
Identify urgent needs and priorities in Least Developed Countries (LDCs)	All LDCs submit high quality NAPA documents that identify agreed vulnerabilities	75%: most LDCs have started NAPAs and are able to identify urgent needs
Identify priority projects for urgent action	All LDCs that undertake a NAPA process submit high quality projects for implementation	25%: countries have developed projects from initial profiles and these are now in the pipeline of the Global Environment Facility
Learning by doing: implementing adaptation projects	All submitted projects are successfully implemented; reviews of good practice achieved	10%of LDC countries: at early stage of implementation
Mainstream adaptation planning	All countries have effective institutional mechanisms for developing climate adaptation policy and strategy and good practice in integrating climate adaptation into relevant planning processes	10%: some 30 countries worldwide (not only LDCs) have established national programs

Source: Jallow and Downing, 2007. (More information on NAPAs can be found at the UNFCCC web site: http://unfccc.intnational_reports/napa/items/2719.php)

4.3 SECTORAL INVESTMENTS AND PROJECTS

There are a growing number of calls for mainstreaming climate change in existing development frameworks and sectoral investments. Development banks, such as the African Development Bank and the World Bank, are increasingly concerned that a substantial share of investments are at risk for direct impacts from climate change and from underperformance. The estimate is that 25% of the World Bank's portfolio may be at such risk (World Bank, 2006). This may, in turn, increase vulnerabilities. For example, infrastructure that cannot be adapted to withstand the impacts of climate change may expose more people and assets to risk.

In response, organizations such as the World Bank, USAID, and other donors have developed screening tools and guidelines for integrating climate change concerns into development assistance. Some donors are requiring that plans for sectoral investments (e.g., tourism, fisheries) consider climate change issues in all components of the projects they fund, including in project identification, assessment, ranking and selection, administrative design, financing, and throughout monitoring and evaluation.

Protecting existing and future economic development is an intrinsically strong and salient motivation for mainstreaming coastal adaptation. For example, tourism development investments in specific coastal sites need to account for dynamic shoreline processes, natural hazards such as potential flooding and storm events, and the effects of climate change that can accelerate, intensify or alter the coastal conditions required for successful tourism. Similar reasoning applies to open water or pond-based mariculture. Key infrastructure such as pond walls, intake structures, and canals are

Investments in composting toilets and wetland treatment for sewage, have been critical to reducing impacts to coral reefs in Akumal, Mexico, stressed by coral bleaching, increased tourist pressures, and land-based pollution.

already vulnerable to floods and storms. Aggressive development of pond-based mariculture can destroy the buffering effect of mangrove wetlands. This puts coastal property, settlements, and the economic well-being of its residents in jeopardy. In relation to fisheries investments, this would include an enhanced focus on improved management, reducing overcapacity, and establishing networks of fisheries reserves to increase resiliency

Figure 4.2 illustrates the significance of mainstreaming coastal adaptation in tourism. The center column lists the coastal conditions needed to ensure the success of a tourism investment. On the left side are threats that degrade critical features of coastal tourism. This includes those that are generated by unsustainable tourism development itself, and those that are provoked by the impacts of climate change. On the right side are a bundle of tourism adaptation measures that reduce or avoid the effects of climate change and inappropriate tourism development.

Sectoral investments often emanate from national goals and strategies, which define specific strategies for various sectors (livelihoods, food security, water accessibility, energy, infrastructure, health, safety, biodiversity conservation). This can be an effective starting point for mainstreaming adaptation, and for securing funds for effective implementation through capital investment plans, donors or other financing organizations (see Figure 4.3).

Figure 4.2 Mainstreaming adaptation in coastal tourism

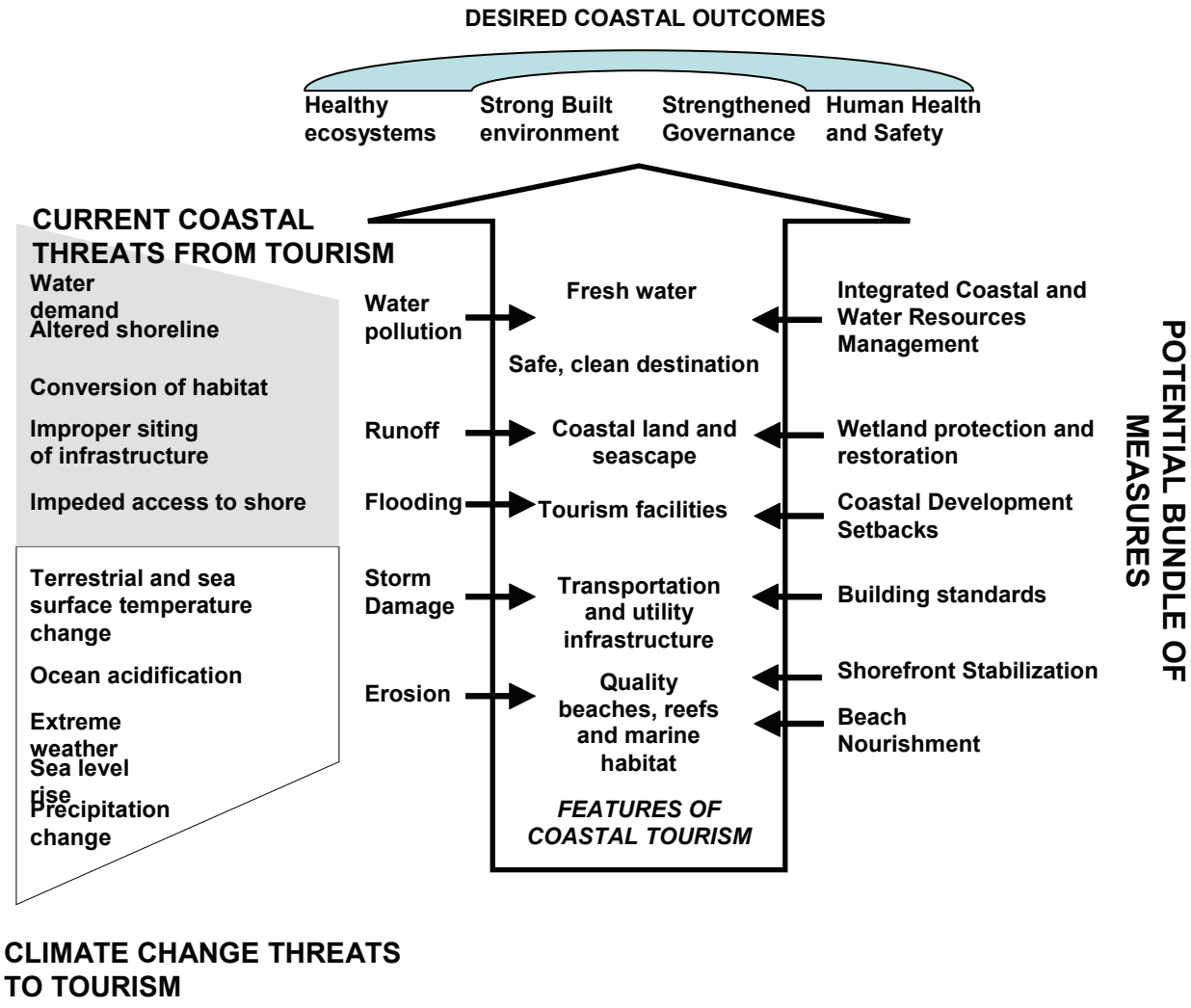
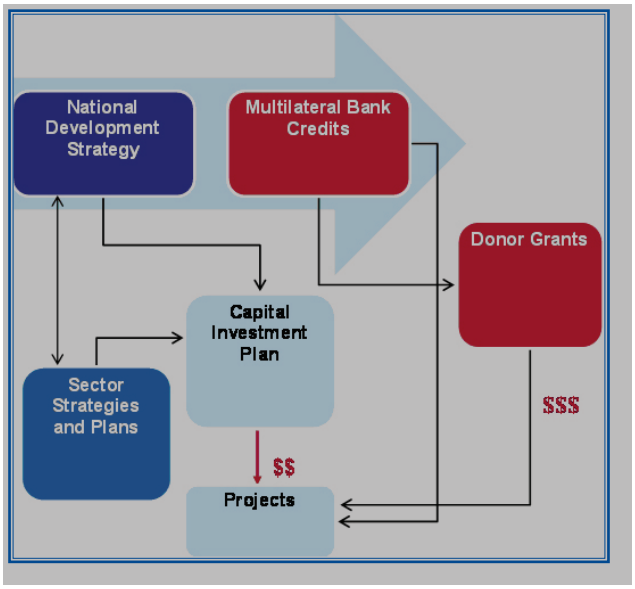


Figure 4.3 Adaptation can be mainstreamed within the national development strategy, sector strategies, or donor grants



In efforts to mainstream, it is important to think about existing processes where planning and capital investments are designed. Within a typical project cycle, there are several opportunities to mainstream climate change:

Project programming stage

- Vulnerability assessment and adaptation can be incorporated when countries communicate priorities, policies, and issues—reflected in country strategy documents.

Project identification

- Identify options and implement actions for adaptation (policy, program, or infrastructure changes).

Preparation, appraisal, approval

- Almost every development project design can include a description of the impact of climate change and vulnerability on the project and a proposed plan to minimize or mitigate impact. The agency financing the project can include criteria for assessing the project's climate-sensitivity and proposed adaptation strategy.

Monitoring and evaluation

- During impact evaluation, evaluators can ask whether the project appropriately anticipates and addresses climate change and vulnerability concerns.

4.4 COASTAL PLACES

A natural starting point for mainstreaming climate change adaptation—especially with implementing a vulnerability assessment approach as set out in Chapter 3 of this Guidebook—is with a specific coastal place. This is preferable to starting with overarching national plans and policies, or sectoral development. The reason is that municipalities, districts, provinces, and other sub-national entities already play an important role in disaster response and natural hazard planning. They often implement or co-sponsor local infrastructure, health and development projects as well. Mainstreaming cross-cutting coastal adaptation issues within overall government, and identifying citizen roles and responsibilities may appear difficult and costly. However, it is less so when stakeholders take ownership of the actions and the benefits to be gained are shared.

Place-based entry points are not restricted to existing administrative entities. Ecosystems such as coral reef systems, estuaries, coastal watersheds, and wetland habitats, are compelling focal points for adaptation planning as they also form the logical unit for scientific studies. Coastal shoreline systems, whether altered or natural, that are already subject to a mix of uses—e.g., settlements, tourism, fisheries, recreation, mariculture, and marine transportation—also need to be studied from an ecosystem perspective. Users of such areas must recognize that their continued use and benefits depend on the integrity of a functioning system.

COMMUNITY-BASED ADAPTATION PROGRAM

A new project supported by the Global Environment Facility will support 80-200 community-level climate change adaptation projects in 10 countries over the next four years, leveraging community action, while generating lessons on community-based adaptation best practices. (See www.undp-adaptation.org/project/cba/subscribe)

4.5 OVERCOMING BARRIERS AND OBSTACLES TO SUCCESSFUL MAINSTREAMING

Frequently, there is resistance to mainstreaming efforts and implementation of adaptation measures. Mainstreaming requires forging agreements with a broad array of agencies and groups, each with different

policies and constituencies. Thus, mainstreaming can be time-consuming and challenging. Some resistance is simply inherent in introducing any new policy idea. In the case of climate change adaptation, this is exacerbated by the cumulative nature and long-term timeframe of climate change impacts. It is also complicated by the fact that different individuals and organizations will have different perceptions of the uncertainties surrounding climate change and its impacts and will have different tolerance levels for risk. Other sources of resistance include:

- The scope of some adaptation measures may simply lie beyond the ability of a community to pay
- Other more immediate needs and concerns may overshadow considerations about the impacts of climate change, which are often measured in years or decades
- Investment decisions of some industries or firms may not have a long timeframe and may discount future risks
- Actors with the most to gain from adaptation measures may not be able to articulate or sufficiently influence decisions, while others have ready access to power and expertise

There is a great deal of experience in how to formulate strategies for addressing these and similar barriers to coastal adaptation. Good practices for successful implementation that have proven effective in coastal management worldwide include:

- Use pilot projects to test how a bundle of policy measures might contribute to societal benefits; then use the results of these pilots to inform the broader audience that will be essential to getting adaptation measures adopted and implemented more widely
- Move the debate from one focused on rights and narrow issues that focus on individuals being asked to modify their use of the coast, to one focused on a common search for desired societal outcomes—e.g., healthy coastal ecosystems that support livelihoods
- Build confidence by addressing a simple issue first; this sets the stage for then tackling issues that are more controversial or less clearly defined
- Conduct directed scientific research (vulnerability assessment) that adopts stakeholder concerns as real, and tests their hypotheses about the source of problems and their solutions
- Encourage a focus on interests and common threats, rather than on particular measures that might foster a hardening of positions
- Demonstrate fairness by creating broad policies that do not single out particular firms or groups, and do not deprive individuals of their constitutional rights (e.g. private property rights. See text box below)
- Encourage firms or entities to recommend and help test their own approaches and practices—possibly accompanied by a promise not to impose formal regulations on the sector as a result of the outcome of those tests
- Engage a full range of stakeholders in assessing vulnerability, selecting the course of action, and assisting in the process of mainstreaming. All important governing institutions and stakeholder groups need to be involved or informed of what is happening so that they can identify with the process and become active partners in implementation.

Community-based marine protected areas in North Sulawesi, Indonesia have increased awareness of fisheries and coral reefs, promoted local management and protection of marine resources while enhancing supplemental livelihoods. Such efforts contribute to nature-based adaptation initiatives being developed in the region.

'TAKINGS' OF PRIVATE PROPERTY AND ADAPTATION MEASURES

Potential legal constraints to certain coastal adaptation measures must be kept in mind when selecting and implementing an adaptation strategy. One potentially common legal constraint involves the takings issue.

What is a "taking"? A "taking," or "expropriation," occurs when a government takes private property for a public purpose. A taking usually has four basic elements. First, it arises by government action. Second, it affects private property, which includes land and other assets. Third, it must be taken for a valid "public purpose." The constitutions of most countries require "just" and "fair" compensation for taking of private property.

Similarly, if a regulation would significantly reduce the value of private properties, it may be held to be a taking and the constitutions of many governments would require compensation to the property owners.

How could takings affect adaptation measures? If a government enacts specific adaptation measures that deprive a private property owner of all economically beneficial uses of the property, a court could potentially find that the measures imply a "taking." This would require the government to pay just compensation to the property owner for the loss of use of his or her property. Takings could make some measures prohibitively expensive.

Making adaptation measures "takings-proof." There are ways that governments can avoid costly takings claims. In developing the adaptation measure, the rationale for the measure should have a clear mandate (for example in the preamble to a regulation or law). This is important for political, social, and legal reasons, especially where individuals are likely to bear some of the burden. The government should make the case clearly and strongly for the new restrictions or obligations. If possible, the measures should be structured to allow some uses of the property, even if some uses are prohibited or restricted. That way, the land retains some use and some economic value. The adaptation measure could also provide in-kind compensation. Finally, adaptation measures should include a mechanism for providing exceptions and relief in isolated, extreme circumstances, for example through a waiver or other means.

For more information see Environmental Law Institute www.eli.org

SOURCES FOR MORE INFORMATION

Asian Development Bank 2005, *Climate Proofing: A Risk-based Approach to Adaptation,* Asian Development Bank, Pacific Studies Series: Philippines.
http://www.adb.org/Documents/Reports/Climate-Proofing/

International Institute for Environment and Development 2003, *Mainstreaming Adaptation to Climate Change in Least Developed Countries,* Climate Change Programme: London, England.
http://www.un.org/special-rep/ohrlls/ldc/LDCsreport.pdf

Klein, R. et al. 2007, *Portfolio Screening to Support the Mainstreaming of Climate Change into Development Assistance,* Tyndall Center for Climate Change Research, Working Paper 102: Stockholm, Sweden.
http://www.springerlink.com/content/268k680115575124/

Simpson, M.C., Gössling, S., Scott, D., Hall, C.M. and Gladin, E. 2008, *Climate Change Adaptation and Mitigation in the Tourism Sector: Frameworks, Tools and Practices,* United Nations Environment Programme, Oxford University Center for the Environment, United Nations World Tourism Organization, World Meteorological Organization.
http://www.geog.ox.ac.uk/news/events/ccamts

Tearfund Climate Change Briefing Paper 1 2006, *Overcoming the Barriers: Mainstreaming Climate Change Adaptation in Developing Countries,* Institute of Development Studies.
http://www.tearfund.org/webdocs/website/Campaigning/Policy%20and%20research/Overcoming%20the%20barriers%20briefing%20paper.pdf

United Nations Environment Programme (UNEP) 2007, *Making Mainstreaming Work: An Analytical Framework, Guidelines and Checklist for the Mainstreaming of Marine and Coastal Issues into National Planning and Budgetary Processes,* Global Programme of Action for the Protection of the Marine Environment from Land-based Activities, UNEP, & Stockholm Environment Institute: The Netherlands.
http://www.gpa.unep.org/documents/analytical_framework_for_mainstreaming_feb_08_1_english.pdf

World Bank 2006, *Managing Climate Risk: Integrating Adaptation into World Bank Group Operations,* The World Bank Global Environment Facility: Washington, D.C.
http://siteresources.worldbank.org/GLOBALENVIRONMENTFACILITYGEFOPERATIONS/Resources/Publications-Presentations/GEFAdaptationAug06.pdf

WEBSITES

Community-based Adaptation Project, United Nations Development Programme
http://www.undp-adaptation.org/projects/websites/index.php?option=com_content&task=view&id=203

Gender and Environment Network, International Union for Conservation of Nature
http://www.genderandenvironment.org/

Mainstreaming Adaptation to Climate Change Project in the Caribbean Community
http://www.caricom.org/jsp/projects/macc%20project/macc.jsp?menu=projects

National Adaptation Programmes of Action, United Nations Framework Convention on Climate Change (UNFCCC)
http://unfccc.int/adaptation/napas/items/2679.php

Tiempo Climate Portal, A Bulletin for Climate and Development
http://www.tiempocyberclimate.org/portal/bulletin.htm

chapter 5

IMPLEMENT ADAPTATION

Many initiatives fail or encounter major barriers when making the transition from assessment, planning, and preparation to implementation. This can be termed the "implementation gap." This chapter discusses the challenges of implementing coastal adaptation measures and responses to those challenges. It highlights nine areas that require attention during implementation.

5.1 ENSURE ADEQUATE ADMINISTRATIVE AND INSTITUTIONAL CAPACITY

All adaptation measures come with administrative and institutional challenges. For example, when a measure requires regulatory decisions or when it must be implemented through agencies that share jurisdictions and responsibilities, difficulties can arise. Implementation may reveal jurisdictional gaps. In such cases, it cannot be assumed that there will be effective coordination and communication between the players. When institutions are weak, management authorities may not be clear and may overlap. Considerable effort must go into ensuring the appropriateness of the design, and into coordinating the decision-making, financing and execution of adaptation measures. In addition, measures with a regulatory component and/or measures that must be carried out uniformly or area-wide—e.g., setbacks, buffers, zoning, coastal management—may struggle against an ineffective regulatory regime that has limited or no ability to carry out enforcement. If legal authority for the adaptation measure is inadequate, actions to strengthen legal and institutional frameworks are needed.

Responses to the challenge

- Closely supervise the implementation of adaptation measures to ensure they are undertaken properly. When institutions invest in the human resources to do this, they build their own institutional capacity for effective coastal adaptation. They also create gains for good governance.
- Provide support to nascent watershed organizations in building coastal adaptation into their work—alone they may lack the skills and experience to do so.
- When securing agreements and policy coordination with potentially competing line agencies that must play a role in coastal adaptation, try to locate the adaptation program in a high level position that is above line agencies. This legitimizes any agreements made and helps create a viable institutional mechanism where none exists.
- When using integrated tools such as special area management planning, tie them closely to the tools and programs of other agencies. In cases where there is no regional or national institutional support, think creatively. For example, establish a para-municipal organization or a multiple jurisdiction entity such as a council of governments.
- When dealing with measures to control development, conduct a careful review of existing policies and regulations to identify how the measures can be best incorporated.
- Use strategic planning tools, such as a modified SWOT (Strengths/ Weaknesses/ Opportunities/ Threats) analysis to formulate an implementation strategy.

IMPLEMENTATION CHALLENGES AND STRATEGIES

- ☑ Ensure adequate governance capacity
- ☑ Strengthen legal frameworks
- ☑ Strengthen personnel capabilities
- ☑ Highlight costs of "doing nothing"
- ☑ Develop sustainable funding
- ☑ Plan for externalities
- ☑ Maintain scientific basis for policy
- ☑ Maintain an inclusive and participatory process
- ☑ Select technically appropriate and effective measures

5.2 STRENGTHEN LEGAL FRAMEWORKS AND ENFORCEMENT

Legal frameworks and enforcement are common concerns to many of the measures in this Guidebook. Judicial systems may not support rigorous enforcement of some measures such as zoning and setbacks. In some countries, local government lacks jurisdiction

for enforcement over marine and coastal resources. Meanwhile, national governments that do have this control may have little interest or requirement to work with local governments, or may have no influence over local decisions in urbanized areas. When an adaptation measure does not result in the expected change in target group behavior, it is necessary to take corrective action. It may not be a faulty legal framework that is the problem. Rather, it may be that incentives for the target groups to change their behavior are lacking or ineffective. For example, developers of hotels along the coast might be induced by receiving density bonuses (allowances to have more units) in exchange for increased setbacks. You may also fail to see expected behavior change when costs to the target group for implementing the measure are too high.

Responses to the challenge

- Make modifications to the legal framework to strengthen the adaptation program
- Establish inter-agency arrangements or mechanisms to address jurisdictional conflicts
- Create economic alternatives for people adversely affected by implementation of the measure
- Encourage individual or collective self-enforcement through cooperative user groups

5.3 STRENGTHEN PERSONNEL CAPABILITIES

Many personnel in both government and private organizations are not well versed in climate change issues. Often, they also do not understand how they could contribute to climate change adaptation. A first step toward changing this is to create an understanding of the impacts of climate change, the need for adaptation, and the actions that can be taken by the individual and by others inside and outside the individual's own organization/agency.

Responses to the challenge

- Provide information on the climate change problem that can help planners and policy makers justify new or intensified use of certain adaptation measures
- Conduct training and extension on the practical aspects of implementing measures—improving chances that implementation will more closely match requirements
- Offer tailored professional guidance at the operational level—e.g., on purchasing required equipment, conducting inspections and monitoring

5.4 HIGHLIGHT COSTS OF DOING NOTHING AND COSTS OF ADAPTATION MEASURES

Often, at the point when leaders are looking for agreement to move forward with coastal adaptation measures, there has not yet been a determination of the costs of implementing those measures. Nor has there been a projection of the costs of doing nothing. This lack of cost information makes it difficult to reach agreement on moving forward.

Responses to the challenge

- Use life-cycle cost analysis in weighing benefits against costs of adaptation investments
- When possible, calculate the economic effect of expected climate change impacts on the local economy (currently most such projections are at national and global scales—when they exist at all)

Building capacity and providing opportunities for exchange among practitioners will be key to successful mainstreaming

5.5 DEVELOP SUSTAINABLE FINANCING

Even the simplest of measures requires funding and effort to first put it into action and then to maintain it. For example, if a plan stipulates that vegetated buffer zones will be in place for an area of coastline, there needs to be money and manpower to supervise

the actual implementation of those zones. They do not happen just because there is a plan.

Securing funding for a few projects or pilot efforts may be relatively easy during times when the adaptation issue is on the agenda of the government or a donor. It is more difficult to secure funding for area-wide implementation of measures, for staff to carry out regulatory measures, and for those measures that require large capital investments and follow-up monitoring and supervision.

Responses to the challenge

- Engage with international nongovernmental organizations, many of whom are incorporating climate change adaptation into their local aid programs
- Identify and tap into complementary programs such as coastal management programs, fisheries projects, and livelihood initiatives
- Mainstream climate into coastal development, thus using those funds to build resilience
- Seek out international organizations that offer national level assistance (see text box)
- Explore the use of environmental performance bonds, tourism fees, and user fees

5.6 PLAN FOR EXTERNALITIES

Many adaptation measures are "no-regrets" measures. In other words, there are net benefits, including some positive externalities. These can create new opportunities. On the other hand, adaptation measures may also generate unplanned-for negative external effects in the short term. For example, a marine protected area (a measure) might adversely affect some fishers in the short term with the intent of increasing stocks. Developing these measures should occur with the fishers so that they "own" the process and are investing in their future livelihoods. Another example is when armored structures are used as a measure to stem beach erosion and protect property. These same structures that are "protecting" one area, can also change the ecosystems and affect adjacent property owners who lack such protection.

FUNDS FOR COASTAL ADAPTATION

The United Nations Framework Convention on Climate Change has established several funds managed by the Global Environment Facility and implemented by the United Nations Development Programme, the United Nations Environment Programme, and the World Bank to assist developing countries with adapting to changing climate. Two of the funds are described below.

- **The Least Developed Country Fund.** In November 2001, Parties to the UNFCCC decided that least developed countries should be assisted in preparing National Adaptation Programmes of Action to identify urgent needs related to adaptation to the adverse effects of climate change. Countries can use LDC funds to prepare NAPAs or to implement actions identified in the NAPAs.
- **The Special Climate Change Fund (SCCF).** The SCCF under the Convention was established in 2001 to support projects and programs in development sectors most sensitive to climate change, including coastal zone management, disaster risk reduction, agriculture, and water resources management.

For more information, see: GEF/UNDP Adaptation Funds (http://www.undp.org/gef/adaptation/funds/04_1.htm) or UNFCCC Support for Adaptation (http://unfccc.int/adaptation/items/4159.php)

Responses to the challenge

- Use an area-wide approach to policy implementation—this helps account for some of the unanticipated or downstream impacts of particular measures
- Look across the full landscape of the watershed when selecting the area of concern where you will

work and, when possible, select an area where you can engage a wide range of stakeholders to address multiple issues

- Always select your place and your issues before you select your management measures
- Emphasize the precautionary approach when there may be spillover effects from measures, especially measures difficult to reverse—e.g., shoreline armoring, flood control and water management options

5.7 MAINTAIN SCIENTIFIC BASIS FOR POLICY AND MONITORING

Sustained, long-term implementation requires scientific credibility. What is needed is good, comprehensive, science-based information that includes long-term trends. For example, the general reasoning in favor of a setback needs to be substantiated by data analysis that compares past, current and projected future trends for the area of concern. Also, the measure must be monitored over time to track its effectiveness. Stakeholders need to know if the measure is doing what it was meant to do.

Responses to the challenge

- Tap into the growing wealth of scientific and technical knowledge residing in national governments, international agencies, and in professional peer networks
- Conduct periodic program reviews at the national or local levels to ensure agencies and places are aware of each others' successes and failures
- Research, evaluate, document and compare the benefits and costs of different adaptation strategies
- Conduct continuous scientific monitoring of coastal areas tapping into volunteers, students and local universities

5.8 MAINTAIN AN INCLUSIVE AND PARTICIPATORY PROCESS

Nearly all the measures in this Guidebook are best selected, developed, and implemented with active stakeholder involvement. Yet, the lead implementing agency may not have stakeholder involvement as a priority. Or, it may lack the skills needed to carry out a good inclusive process. Further, climate change adaptation is time consuming. It requires issue analysis, stakeholder dialogue and consensus building. Even simple measures need to be accepted by fishers and other marine resource users, since enforcement

Reef, habitat, and fisheries characterization and subsequent monitoring implemented by a local Mexican NGO has been essential for siting of marine protected areas. policy development, and land use decisions.

through command-and-control actions is costly and not necessarily effective. Stakeholder involvement is hard to sustain—waxing and waning based on the issues themselves and multiple other external factors. Climate change is a cross-cutting issue and requires a bundle of actions that will likely require multiple stakeholder negotiations. Yet, it can be a challenge to keep stakeholders involved and engaged over a long period of time.

Responses to the challenge

- Before designing the policy, ensure you have the support of those with the biggest stake in coastal adaptation
- Design policy to incorporate participatory management
- Increase social capital and interpersonal networks to build community resilience against natural hazards
- Promote community involvement and leadership of projects to build a sense of ownership
- Implement small, achievable actions that build support for a larger effort
- Educate the public and property owners and encourage them to be active in the stakeholder process in order to keep coastal adaptation on the public agenda

- Seek top-level government support and leadership to build trust and make participation and negotiations with stakeholders worthwhile
- For actions that need formal adoption by multiple entities (e.g., special area management plans), treat the process as a major, serious public policy formulation effort right from the start

5.9 SELECT TECHNICALLY APPROPRIATE AND EFFECTIVE MEASURES

Measures need to be appropriate for the area and its issue(s). They must also be effective—i.e., they must achieve their intended goals. There is any number of reasons, however, that can lead to the failure of even well designed and fully implemented measures. One reason is poor execution. Another is overly conservative design—i.e., one that fails to account for the accelerating rate of change expected from climate dynamics. Poor construction can also result in failure. For example, appropriately sited armored structures can be effective in addressing coastal shoreline erosion—but only if those structures are well constructed by a skilled builder.

Responses to the challenge

- Ensure that climate change adaptation measures and best practice guidelines are effective
- Engage economic actors and industry in preparing standards and formulating designs
- Take a performance-based approach to policies and actions with a focus on outcomes
- Use pilot projects and studies to test the benefits and implementation challenges of particular measures
- Conduct monitoring and scientific studies to reduce uncertainty about effectiveness
- Ensure that the preconditions necessary for a measure to succeed are in place

SOURCES FOR MORE INFORMATION

Carruthers, P. 2007, *Lessons Learnt Piloting Community Approaches to Climate Change Adaptation in the Cook Islands,* Presentation at the UNFCCC Expert Workshop for SIDS, February 27th 2007, Rarotonga, Cook Islands. http://unfccc.int/files/adaptation/adverse_effects_and_response_measures_art_48/application/pdf/200702_cook_islands_community_adaptation.pdf

Leary, N. et al. 2007, *A Stitch in Time: Lessons for Climate Change Adaptation from the AIACC Project,* Assessments of Impacts and Adaptations to Climate Change (AIACC) Working Paper 38: Washington D.C. http://www.aiaccproject.org/working_papers/Working%20Papers/AIACC_WP48_Leary_etal.pdf

Levina, E. et al. 2007, *Policy Frameworks for Adaptation to Climate Change in Coastal Zones: The Case of the Gulf of Mexico,* Organization for Economic Co-operation and Development: Paris, France. http://www.ccap.org/docs/resources/434/Policy_Frameworks_for_Adaptation_to_Climate_Change_in_Coastal_Zones-_The_Case_of_The_Gulf_of_Mexico.pdf

Mataki, M., K. Koshy, and V. Nair 2006, *Implementing Climate Change Adaptation in the Pacific Islands: Adapting to Present Climate Variability and Extreme Weather Events in Navua (Fiji),* AIACC Working Paper 34: Washington D.C. http://www.aiaccproject.org/working_papers/Working%20Papers/AIACC_WP34_Mataki.pdf

Olsen, S., K. Lowry and J. Tobey 1999, *The Common Methodology for Learning: A Manual for Assessing Progress in Coastal Management,* Coastal Resources Center, University of Rhode Island: Narragansett, RI. http://www.crc.uri.edu/download/SEL_003F.PDF

WEBSITES

Assessments of Impacts and Adaptations to Climate Change
http://www.aiaccproject.org

Global Environmental Facility Adaptation Funds (GEF), United National Development Programme (UNDP)
http://www.undp.org/gef/adaptation/funds/04_1.htm

Support for Adaptation, United Nations Framework Convention on Climate Change (UNFCCC)
http://unfccc.int/adaptation/items/4159.php

chapter 6

EVALUATE FOR ADAPTIVE MANAGEMENT

Once coastal adaptation measures are implemented, there will likely be considerable interest in how they perform. Policymakers will be keen to demonstrate that the measures are beneficial to the citizenry. They will want to assuage stakeholders who have borne some of the costs associated with the measures. The public will seek assurances that the measures afford them as much protection as possible from the impacts of climate variability. All parties will expect the measures to be adjusted if they do not perform according to expectations. *Evaluation* and *adaptive management* can help address these concerns.

6.1 EVALUATION OF ADAPTATIONS

Evaluation is the process of review and analysis of all relevant data and information required to determine if the set of adaptation options is performing to expectation. Evaluation may involve a single project review or a series of formal and informal time-dimensioned assessments. Table 6.1 summarizes the motivation for evaluation and the benefits or anticipated use of evaluation results.

All evaluations of coastal adaptation measures involve a similar methodology and steps. They may vary in their scope, types of evaluation tools employed, and the resources devoted to the evaluation. However, the basic goal of the evaluation is the same—to assess the performance of the adaptation measures in terms of their design and implementation. The steps of the evaluation include the following:

EVALUATION AND ADAPTIVE MANAGEMENT

- ☑ Specify the evaluation questions
- ☑ Establish roles and responsibilities for evaluation
- ☑ Select evaluation tools and develop timeline
- ☑ Conduct evaluation
- ☑ Communicate evaluation results
- ☑ Adapt policies, adaptation measures and strategies on the basis of evaluation results

1. ***Specify evaluation questions***—The role of evaluation is to determine if the adaptation approach is working as it should. The evaluation may need to include several questions based on the original set of criteria used to assess the proposed and selected adaptation measures. The questions should be identified early in the process. This way, evaluators can determine if the necessary baselines and data monitoring and management procedures are in place to support the evaluation.

2. ***Elaborate an evaluation plan***—The evaluation plan should clearly state the roles and responsibilities for the evaluation. Who will conduct, review, approve, and communicate the results of different evaluation results? What types

Table 6.1 What motivates evaluation and what are the benefits

Type of Activity	Motivation for Evaluation	Benefits of Evaluation
One-time Project	• Project completion • New or follow-on project	• Gauge project success • Compile lessons learned • Replicate project design
Place-based Plan or Program	• Planned/regular review • Special request from government • Unanticipated (e.g., result of natural disaster)	• Communicate performance • Adjust design of adaptation measures • Adjust implementation strategy • Identify and implement emergency measures • Compile lessons learned • Replicate plan or program
National/ Regional Policy	• Planned/regular review • Special request from government • Unanticipated (e.g., result of natural disaster)	• Communicate performance • Guide design and implementation of new policies and adaptation measures • Identify and implement emergency measures • Compile lessons learned

of evaluation methods or tools are required to answer the evaluation questions? What is the timeline for conducting the evaluation? Ideally, the evaluation plan is developed in concert with the implementation strategy. This helps ensure there is full consideration of the staff and financial resources needed to carry out the evaluation.

3. ***Conduct the evaluation***—Evaluation entails a set of individual analyses, designed to answer specific questions for specific audiences. Evaluation helps policymakers review performance, guides reforms in adaptation measures, and prompts adjustments to their implementation. For purposes of transparency and accountability, it may be advisable to use independent evaluators. This is especially important in terms of answering those questions most important to landowners, business, and the general public. These often include but are not limited to questions about the benefits and costs of the measures and their impacts on the environment.

4. ***Communicate the results***—Disseminating the evaluation results to the appropriate audiences is very important. Make sure your overall evaluation plan covers this in detail.

Climate change occurs over the long term. That means some outcomes of adaptation measures also require long periods of time before they can be properly evaluated. As well, there are certain evaluation questions—e.g., "What are the impacts of adaptation policies on biodiversity or habitat?"—that can only be answered over time.

One of the key challenges in evaluation, particularly when it is conducted over a long timeframe, is to "filter out the noise." This is necessary in order to focus only on the relevant information and analyses that answer the specific evaluation question. The following factors can contribute to both good or poor evaluation results:

- ***Attributes of the adaptation measure***—Most often, the adaptation measure will provide incentives and/or sanctions for behavior change among business and the general public. The evaluation will often try to determine how businesses and individuals react to the adaptation measure. Do they recognize its legitimacy, do they attempt to circumvent it, and if so, why?

- ***Implementation strategy***—The adaptation measure may be appropriate, but poorly implemented. There may be insufficient staff to monitor implementation. There may be too few financial resources to conduct the education and awareness activities needed to inform the public on their obligations related to a new adaptation measure.

- ***Changes in the political, economic, social, or cultural context***—A variety of factors can affect performance of the adaptation measure. These include greater or lesser political support, chronic inflation or a prolonged economic boom or recession, new policies that impact the incentives, or sanctions of the adaptation measure.

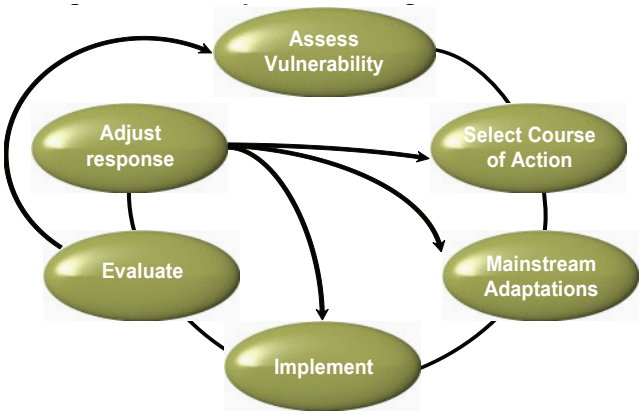
- ***Unanticipated climate variability and change***—If adaptation measures are evaluated over short time intervals, the observed climate for say a five-year period might not accord with the vulnerability assessment upon which the adaptation measure was, in part, designed. An extreme weather event—for example a 500-year flood—that occurs within the period of the evaluation may severely test the adaptation measures.

Attributing change to the relevant factors is critical in reaching the correct conclusions about performance and determining whether changes are needed in the adaptation measure or the way it is implemented.

6.2 ADAPTING EVALUATION RESULTS

The process of developing and implementing adaptation measures entails mutual learning on the part of policymakers, stakeholders, and the general public. The selection of the adaptation measure is based on the information set, analyses, and best predictions or forecasts of the future. As time passes and implementation proceeds, the database of information and analysis will change. It will expand to include information on the performance of the adaptation

Figure 6.1 Adaptive management process



measure. Also added will be information on the factors listed in the previous section. Meanwhile, time and changing contexts may also alter the stated goals, objectives, and the expected results of the adaptation measure.

Thus, as evaluation results become available, policymakers, stakeholders, or the public may be motivated to press for changes in the choice of adaptation measures, their design, or their implementation. The process of reflecting on these changes based on evaluation results is referred to as *adaptive management*[2]. In Figure 6.1, adaptive management is depicted by the oval "Adjust Response."

Adaptive management and the adjustment of responses entail a participatory/analytical approach similar to what is recommended in this Guidebook for the initial analysis, selection, and mainstreaming of adaptation measures:

1. Review the evaluation results and attribute poor performance to flaws in design and/or implementation of current measures;
2. If flaws in the design of the adaptation measure are to be addressed, determine whether current measures can be fine-tuned or if alternative or complementary measures are required;
3. If modified or new adaptation measures are promoted, revise the implementation strategy; and,
4. If flaws in implementation are to be addressed, identify, assess, and incorporate recommended changes into the implementation strategy.

Table 6.2 illustrates the types of adaptive management responses that might be considered as a result of evaluation in a hypothetical place with three types of implemented adaptation measures. In this example, the evaluation focused on management responses following a devastating hurricane with high sustained winds and seas, and flooding of a local river.

2 Adaptive management also refers to an overall management approach that embodies a "learning by doing" philosophy and is ideally suited to management of natural resources under uncertainty inherent in climate variability and change. Adaptive management approaches emphasize: 1) ongoing monitoring of performance through the tracking of key variables, complemented by research to improve the body of information and analysis; 2) periodic assessments (evaluation); and 3) modification of policies, practice, and institutional capacity as needed to improve performance.

Table 6.2 Adaptation measures and adaptive management responses

Adaptations	Evaluation Results	Adaptive Management Responses
Community-based disaster risk reduction	• Significant numbers of visitors and residents unaware of evacuation routes	• Preparation of awareness materials for residents and visitors (posted in hotels and restaurants) • Improved signage • Increased staff and volunteers to assist with evacuation
	• Scale of disaster not anticipated in disaster planning	• Revise preparedness, response, and mitigation plan to anticipate more intense and/or sustained weather events
	• Poor coordination with regional and national authorities on post-disaster support/financing	• Convene participatory discussions with regional and national authorities to coordinate roles and responsibilities • Establish emergency "bank" of supplies and equipment needed for post-disaster mitigation
Coastal development setbacks	• Severe shoreline erosion observed beyond setback distance from the shore	• Revise setback regulation to increase distance
	• Properties not subject to setback regulations suffer severe damage	• Accelerate removal or relocation of buildings within the setback distance
	• New construction observed in violation of setback regulations	• Strengthen capacity for permitting, inspection, and enforcement; increase penalties
Building codes	• Significant wind and water damage observed	• Revise building codes
	• New buildings not complying with building codes	• Strengthen capacity for permitting, inspection, and enforcement; increase penalties • Prepare awareness materials for builders, businesses, and residential buyers
	• Levies failed to contain flood waters in river	• Assess options for improved watershed management, structural options for containing flood water in main channels and overflow reservoirs
	• Significant beach erosion	• Establish natural erosion protection measures and structural shoreline stabilization options

SOURCES FOR MORE INFORMATION

Crane Droesch, A. et. al, 2008, *A Guide to the Vulnerability Reduction Assessment,* UNDP Working Paper
http://www.undp-adaptation.org/projects/websites/docs/CBA_VRA_Guide_Dec_08.pdf

National Research Council 2004, *Adaptive Management for Water Resources Project Planning,* Panel on Adaptive Management for Resource Stewardship, Committee to Assess the U.S. Army Corps of Engineers Methods of Analysis and Peer Review for Water Resources Project Planning, National Academies Press: Washington D.C.
http://www.nap.edu/catalog.php?record_id=10972

Oglethorpe, J. 2002, *Adaptive Management: From Theory to Practice,* International Union for Conservation of Nature (IUCN): Gland, Switzerland.
http://www.cababstractsplus.org/google/abstract.asp?AcNo=20023131426

Salafsky, N., R Margoluis, K.H. Redford 2001, *Adaptive Management: A Tool for Conservation Practitioners,* Foundations of Success: Bethesda, MD.
http://www.fosonline.org/Adaptive_Management1.cfm

WEBSITES

Chesapeake Bay Program, *Chesapeake Adaptive Management Model*
http://cap.chesapeakebay.net/managementmodel.htm

Collaborative Adaptive Management Network
www.adaptivemanagement.net/whatis.php

references

Adger, N. 1999, *Social Vulnerability to Climate Change and Extremes in Coastal Vietnam,* World Development, Vol. 27, No. 2, University of East Anglia: Norwich, UK.
http://www.sciencedirect.com/science/article/B6VC6-3X7VR3H-2/2/38ca3a1089f684fe3de2c26739bfc4ee

Allison, E. 2007, *Fisheries and Aquaculture Can Provide Solution to Cope with Climate Change,* Issues Brief 1701, WorldFish Center: Malaysia.
http://www.iclarm.org/v2/files/CC-ThreatToFisheries1701.pdf

Dasgupta, S., B. Laplante, C. Meisner, D. Wheeler, and J. Yan 2007, *The Impact of Sea Level Rise on Developing Countries: A Comparative Analysis,* World Bank Policy Research Working Paper 4136, World Bank: Washington, D.C.
http://go.worldbank.org/XU9B5UFR30

Day, J.W., J.F. Martin, L. Cardoch, and P.H. Templet 1997, *System Functioning as a Basis of Sustainable Management of Deltaic Ecosystems, Coastal Management*, Vol 25. No. 2, pp. 115-153.
http://md1.csa.com/partners/viewrecord.php?requester=gs&collection=ENV&recid=4103991

Hoegh-Guldberg, O. et al. 2007, *Coral Reefs Under Rapid Climate Change and Ocean Acidification,* Science, Vol. 318, No. 5857, 14 December 2007, pp. 1737–1742.
http://www.sciencemag.org/cgi/content/full/318/5857/1737

Intergovernmental Panel on Climate Change (IPCC) 2007a, *Climate Change Impacts, Adaptation and Vulnerability, Chapter 6: Coastal Systems and Low-Lying Areas,* Contribution of Working Group II to the Fourth Assessment Report of the IPCC, Cambridge University Press, UK.
http://www.ipcc.ch/ipccreports/ar4-wg2.htm

IPCC 2007b, *Climate Change Impacts, Adaptation and Vulnerability, Chapter 17: Assessment of Adaptation Practices, Options, Constraints and Capacity,* Contribution of Working Group II to the Fourth Assessment Report of the IPCC, Cambridge University Press, UK.
http://www.ipcc.ch/ipccreports/ar4-wg2.htm

IPCC 2007c, *Climate Change 2007: The Physical Science Basis, Summary for Policymakers,* Contribution of Working Group I to the Fourth Assessment Report of the IPCC, Cambridge University Press: Cambridge, UK.
http://ipcc-wg1.ucar.edu/wg1/docs/WG1AR4_SPM_PlenaryApproved.pdf

International Federation of Red Cross (IFRC) 2005, *Solomon Islands: From Risk Assessment to Community Action,* IFRC: Switzerland.
www.ifrc.org/Docs/pubs/disasters/resources/reducing-risks/cs-solomon-islands.pdf

International Union for Conservation of Nature (IUCN) 2007, *Climate Change and Marine Ecosystems,* Coastal Ecosystems Newsletter, Issue #6, October 2007.
http://www.iucn.org/about/work/initiatives/climate_news/_/climate_change_and_marine_ecosystems/index.cfm

Jallow, B. and T. Downing 2007, *National Adaptation Programmes of Actions (NAPAs): Priorities to Policies,* Tiempo, Issue 65, International Institute for Environment and Development, and the Stockholm Environment Institute, & the Swedish International Development Cooperation Agency: London.
http://www.cru.uea.ac.uk/tiempo/portal/archive/pdf/tiempo65low.pdf

Kaiser, G. 2007, *Coastal Vulnerability to Climate Change and Natural Hazards,* Disaster Reduction in Climate Change, Karlsruhe University: Karlsruhe, Germany.
http://www.cedim.de/download/39_Kaiser.pdf

Nakalevu, T 2006, *Capacity Building for the Development of Adaptation Measures in Pacific Island Countries,* South Pacific Regional Environment Programme. Workshop presentation, 18 and 19 April 2006: Pohnpei, FSM.
http://www.sprep.org/

Nellemann, C., Hain, S., and Alder, J. 2008, *In Dead Water: Merging of Climate Change with Pollution, Over-harvest and Infestations in the World's Fishing Grounds,* United Nations Environment Programme: GRID-Arendal, Norway.
http://www.unep.org/pdf/InDeadWater_LR.pdf

Revkin, A. 2008, *The Dangers of Deltas,* New York Times, 11 May 2008.
http://www.nytimes.com/2008/05/11/weekinreview/11revkin.html

Saunders, M and A. Lea 2008, Large Contribution of Sea Surface Warming to Recent Increase in Atlantic Hurricane Activity. *Nature*, 451, 31 January 2008, pp. 557-560. http://www.nature.com/nature/journal/v451/n7178/pdf/nature06422.pdf

United Nations Framework Convention on Climate Change (UNFCCC) 2008, *Coral Gardening in Cuvu Mina, Fiji,* Database on local coping strategies. http://maindb.unfccc.int/public/adaptation/adaptation_casestudy.pl?id_project=171

U.S. Agency for International Development (USAID) 2007, *How Resilient is your Coastal Community? A Guide for Evaluating Coastal Community Resilience to Tsunamis and other Hazards.* U.S. Indian Ocean Tsunami Warning System Program: Bangkok, Thailand. http://www.crc.uri.edu/download/CCRGuide_lowres.pdf

United States Agency for International Development (USAID) 2008, *Adapting to Climate Variability and Change: A Guidance Manual for Development Planning.* http://www.usaid.gov/our_work/environment/climate/docs/reports/cc_vamanual.pdf

U.S. Environmental Protection Agency (USEPA) 2008, *Synthesis of Adaptation Options for Coastal Areas,* Climate Ready Estuaries Program, Office of Water, EPA 430-F-08-024. http://www.epa.gov/cre/index.html

Woman's Environment & Development Organization (WEDO) and International Union for Conservation of Nature (IUCN), 2007, *Gender Equality and Adaptation.* Fact Sheet http://www.genderandenvironment.org/admin/admin_biblioteca/documentos/Factsheet%20Adaptation.pdf

and interactions of components of the ecosystem and resource use activities. Since the SAMP strategy bundles together many different management initiatives, the information that is collected needs to address several issues. This information is gleaned from the combination of available studies plus targeted short term research that seeks the answers to key questions related to one or more of the issues.

A SAMP site might be large enough in geographic scope to allow for downscaling of regional climate scenarios. Other information that could be useful includes sector-specific information (e.g., future river flow from anticipated changes in land cover or upstream glacier melting; or basin-wide rainfall pattern shifts, which could help in understanding likely scenarios with sediment supply or estuary salinity gradients).

DESIGN CONSIDERATIONS FOR DEVELOPING THE MEASURE

There are a variety of ways to approach detailed planning for a special area. A national coastal program might survey all coastal sites and choose those at greatest economic and/or ecological risk or of high national significance. This is what Sri Lanka has done. In other cases, the SAMP starts with local leaders who care deeply about the future of the ecosystem they depend upon. These leaders work to gain the attention of stakeholders and scientists in order to prompt a response from government agencies. For a SAMP to become adopted as public policy it is necessary to:

- prepare a proposal for review by government and stakeholders that sets the geographic scope of and issues to be addressed in the SAMP;
- develop a terms of reference and funding proposal to initiate and sustain what typically is a multi-year process;
- confirm funding and a workplan for preparing the SAMP—multiple funding sources are needed to cover costs of meetings, technical studies, research and stakeholder participation;
- appoint one or more committees, boards, or commissions to oversee preparation of the plan;
- organize the project team, and incorporate scientific knowledge and technical expertise;
- create mechanisms to engage the participation of key actors and ensure a full range of opinions and concerns; and
- sustain this participation throughout all phases of the SAMP—issue identification, analysis, consideration of options, and adoption—as SAMPs need to tap into a wide policy network in order to attain consensus and carry out adopted measures.

IMPROVING THE LIKELIHOOD OF SUCCESS IN APPLYING THIS MEASURE AS A CLIMATE CHANGE ADAPTATION

The need for climate change adaptation is not sufficient reason alone to initiate a SAMP. Rather, a SAMP is part of an integrated approach that addresses multiple issues and objectives. That said, climate change will likely cut across these issues. Scenarios on how climate change might affect a special area may call into question the existing rules for controlling development in that area. Or, it may question key assumptions used by coastal investors and authorities to make decisions about coastal infrastructure. Special area planning can be time consuming. It requires high quality technical support and sustained facilitation of committees, including stakeholder groups and agency staff not always accustomed to interacting. The concerted and coordinated action of many public and private entities is necessary in order to carry out the specific, sometimes costly measures involved in implementing a SAMP. For this reason, a national or regional government may prefer to adopt simpler, more focused and uniform policies such as setbacks, designated hazard zones and construction standards.

All elements and phases of a SAMP—from its design, to its guidelines, and its adoption into regulation—must be incorporated into the policies and work agenda of multiple institutions as few legal structures (national or regional) specifically recognize this form of plan. It is also essential to establish unified leadership and advocacy for the SAMP; secure appropriations; raise additional funds; and establish permanent budgeting within agencies, advocacy groups or special government funds.

The cost of mobilizing stakeholder involvement combined with the cost of conducting scientific and technical studies for a special coastal area or ecosystem varies. In rare cases—depending on the scale of the

special area, the number and severity of issues, the extent of discord and the outcomes at stake—it can cost as much as a few million dollars. Raising a portion of such funds is generally feasible when: 1) the area faces severe threats, 2) a number of people and groups are affected, 3) there is an international dimension, and 4) potential solutions can serve as a model for other locations.

SRI LANKA RELIES ON SPECIAL AREA MANAGEMENT PLANS AS A 'SECOND GENERATION' COASTAL MANAGEMENT APPROACH.

"Special area management projects study in detail the problems relating to specific areas under severe development pressure. Management strategies must consider critical issues and impacts arising from their interactions. Climate change issues facing Sri Lanka include: (a) inundation of low-lying areas, including coastal settlements and coastal wetlands; (b) coastal erosion; (c) flooding and storm damage; (d) quality of surface and groundwater; (e) salinisation of estuaries and freshwater aquifers; (f) degradation of marine ecosystems—coral reefs; (g) changes in the hydraulic force regimes of sea-defense structures and breakwaters leading to greater vulnerability to impacts of increased erosion and extreme events. SAMs can address these issues in the context of national policies related to erosion management and disaster preparedness." (S.S.Hettiarachchi and S.P. Samarawickrama, 2005) SAMP sites are noted for the economic and livelihoods value of the resources they hold. Together the SAMP sites, Ramsar sites, and marine protected areas help protect ecosystem services for conservation and/or use, while also addressing hazards of low lying coastal areas, erosion, and other damaging affects of extreme weather events including tropical storms and tsunamis. (IUCN, Sri Lanka)

SOURCES FOR MORE INFORMATION

Aeron-Thomas, M. 2000. *Integrated Coastal Zone Management in Sri Lanka, A Policy Review:* Livelihood-Policy Relationships in South Asia. Working Paper 4.
http://www.york.ac.uk/inst/sei/prp/pdfdocs/slpolicy.pdf

Coastal Resources Center, Graduate School of Oceanography, University of Rhode Island. 2002. *Santa Maria Bay Management.*
http://www.crc.uri.edu/index.php?actid=9

Davis, B. C. 2004. *Regional planning in the US coastal zone: a comparative analysis of 15 special area plans.* Ocean & Coastal Management 2004.
http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VG5-4CB09CM-2&_user=657938&_coverDate=12%2F31%2F2004&_alid=848985868&_rdoc=1&_fmt=high&_orig=search&_cdi=6029&_sort=d&_docanchor=&view=c&_ct=3&_acct=C000035679&_version=1&_urlVersion=0&_userid=657938&md5=77e01ed3a44931de26bca1df474f2838

Ecuador Coastal Resources Management Program. *Atacames Special Area Management Plan.*
www.crc.uri.edu/download/Atacames_English_1.pdf

(Excerpted from: Hettiarachchi, S. S. L and S. Samarawickrama, 2005. Planning and implementing coastal management in Sri Lanka. Proceedings of the Institution of Civil Engineers Maritime Engineering 158 March 2005 Issue MA1Pages 25–32.)

International Union for Conservation of Nature (IUCN), Series on Best Practice Guidelines. (Sri Lanka) *After the Tsunami: Safeguarding Special Area Management sites, Ramsar Sites and Marine Protected Areas.* Information Paper No. 14
http://www.securinglivelihoods.org/en/nodes/Disasters-Tsunami/1991%20-%201995/2974

Lowry, K. and H. Wickremeratne. 1988. *Coastal Management in Sri Lanka.*
http://www.crc.uri.edu/download/SLKemICM.pdf

Ochoa, E. 1995. *The Special Area Management Process in Ecuador. Published in Eight Years in Ecuador: The Road to Integrated Coastal Management.* Robadue, D. Jr., ed. Coastal Resources Center, University of Rhode Island.
http://www.crc.uri.edu/download/8YRSTO_1s7.pdf

WEBSITES

Rhode Island Coastal Resources Management Council.
http://www.crmc.ri.gov/samp/

Sri Lanka Coast Conservation Department. Special Area Management Programs.
http://www.coastal.gov.lk

U.S. Office of Ocean and Coastal Resource Management. Special Area Management Plans.
http://coastalmanagement.noaa.gov/special.html