Chapter 6. CONCLUSIONS AND RECOMMENDATIONS

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The coral reefs of the Caribbean, a mainstay of the region's economic and social health, are beset by a wide range of threats resulting from human activities. Degradation of coral reefs damages not only the integrity of these important ecosystems but also the health, safety, and livelihoods of the human societies that depend on them. Although the potential human and economic losses are great, actions to reverse the threats to Caribbean coral reefs can often be undertaken at very low cost, with very high financial and societal returns, even in the short term.

Actions are required across a range of scales—from local to national and international. Such actions include the establishment of better management practices—to place fisheries on a more sustainable basis and to improve yields, to protect reefs from direct damage, and to integrate the sometimes conflicting approaches to management in the watersheds and adjacent waters around coral reefs. Fundamental to supporting these actions is wider involvement of the public and stakeholders in management processes, as well as an improved level of understanding of the importance of coral reefs. Better understanding of the economic value of coastal ecosystems, and of the linkages between human activities and changes in coral reef condition, will further support and underpin the necessary changes in management and will strengthen political and societal support for these changes.

To these ends, we recommend the following specific actions:

Create the Will for Change

- **Raise awareness of the importance, value, and fragility of coral reefs through targeted education campaigns.** Many residents and visitors to the Caribbean fail to realize and understand the connections between their own activities and the health of coral reefs. Targeted education and awareness-raising campaigns are needed to change behavior and create political will for policy change. Educators, universities, national governments, resource managers, NGOs, and others should work to raise awareness among residents and visitors alike through the development and dissemination of targeted educational materials. Key target audiences are community groups, fishers, workers in the tourist industry, tourists, developers, politicians, and students.

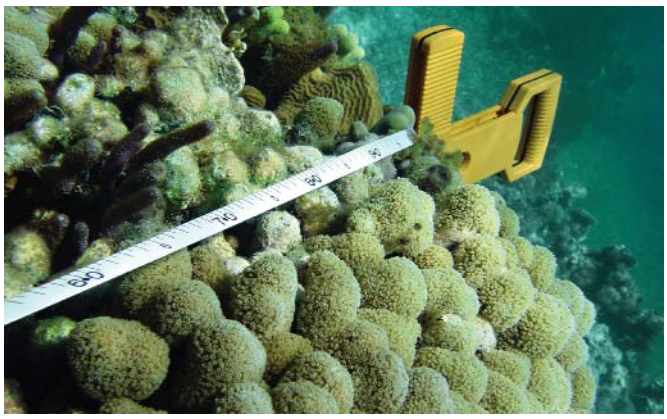
- **Factor the economic value of reef goods and services into development planning, policies, and projects.** The value of healthy coral reef ecosystems is poorly grasped by most people, but incorporating information on the economic value of the goods and services provided by coral reef ecosystems can help bolster arguments for strengthening and expanding reef protection and management programs. Greater efforts are needed to integrate information on the value of coral reefs and the potential costs of their degradation into economic and planning agendas. Universities, research organizations, and government agencies should undertake additional economic valuation studies of Caribbean coral reefs, using consistent methods that are applied in many different areas within the region. Planners, governments, and NGOs should use the results of these studies to debate the true costs of development options, select development that minimizes damage to reef ecosystems, and allocate sufficient financial resources for coastal management and conservation.

Build Capacity for Change

- **Develop local and national expertise for better management of coral reef ecosystems through training of resource managers and decision-makers.** Financial resources, educational levels, and availability of training vary widely across the region, and the small size of many countries may undermine their ability to sustain full scientific and administrative capacities. National governments, international organizations, NGOs, and others should support and implement expanded provision of training to managers and decision-makers across the region to strengthen the effectiveness of coastal planning and the implementation of management plans. For example, the UNEP-Caribbean "Training of Trainers" courses are designed to provide professionals from across the region with opportunities to strengthen their skills in all aspects of planning and management of marine protected areas. To multiply the impact of this training, participants, in turn, train additional practitioners back in their local communities.

- **Encourage free flow and exchange of information and experiences about management and protection of coral reef resources.** Across the Caribbean, there are examples of excellence in management, training programs, government and community involvement, research, and monitoring. Better systems are needed to encourage the free flow and exchange of information between scientists and management agencies, between countries, and between government agencies. Better networking and exchange is also needed to ensure that information and experience from one area can be accessed and used across the region. International NGOs and intergovernmental agencies should facilitate increased sharing of information and expertise on condition, management, and protection of coral reefs in the Caribbean. The International Coral Reef Action Network's (ICRAN) network of MPA demonstration sites and the Caribbean Coastal Marine Productivity (CARICOMP) network are examples of successful sharing.

- **Integrate socioeconomic and environmental monitoring to increase understanding of coastal habitats.** Good management requires continued access to information about natural resources and how they change over time and in response to natural and human influences. Monitoring programs that integrate human, physical, and ecological data are essential to improve our ability to



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Coral reef monitoring and assessment needs to be well integrated with socioeconomic and environmental monitoring to provide information needed for better understanding of changes occuring on coral reefs.

link, for example, changes in upland activities with downstream impacts. The scientific community and resource managers should move toward such integrated monitoring programs and make the information widely available in useable formats. Where possible, these integrated monitoring efforts should use existing methods and protocols to facilitate comparison of findings among sites and countries. For example, Socioeconomic Monitoring Guidelines for Coastal Managers in the Caribbean (SocMon) provides simple, standardized guidelines for establishing a socioeconomic monitoring program at a coastal management site in the Caribbean that could serve as a basis for a regional system in which data can be compared.

- **Facilitate stakeholder participation in decision-making about management and protection of coral reef resources.** The absence of community inclusion and participation has played a key role in the failure of many reef management efforts. When stakeholders are excluded from decision-making, local knowledge and capacity is left untapped and reef management programs may fail to respond to the needs of users. National governments and resource managers should apply collaborative and cooperative (co-management) approaches to coral reef management that will involve all stakeholders. National governments and NGOs can work with resource users to promote the concept of co-management, moving beyond pilot projects to full-scale initiatives. The Coastal and Marine Management Program (CaMMP) of the Caribbean Conservation Assocation (CCA) is working to develop guidelines for successful co-management of coastal resources in the Caribbean.

- **Create the systems of governance required for effective management of coral reefs.** In many cases, the activities of different groups, agencies, or even international bodies work in opposition to one another or fail to take advantage of potential synergies to better manage marine resources. Clear institutional frameworks, legal authority, and administrative capacity to manage marine resources are critically needed. National governments should facilitate good governance of the coastal zone by carrying out national assessments of the institutional and legal framework for executing policy and updating institutional and legal frameworks where necessary. For instance, Barbados and Belize have successfully implemented specific legislation on institutional arrangements for management of the coastal zone, cutting across the prior sectoral approaches.

- **Use the Reefs at Risk indicators and apply the analytical methodology at finer resolutions to support decision-making on coral reef management.** The analysis tool and standardized indicators developed under this project provide a valuable and low-cost means of understanding the potential pressures on coral reefs where specific information on reef conditions is not available. The project uses an approach that is reproducible and can be implemented at local scales (full technical notes available online at http://reefsatrisk.wri.org). Use of such indicators increases confidence in and support for management decisions. National, provincial, and local resource agencies should contribute to the development of finer-scale indicators to inform policy and decision-making.

Improve Management

- **Develop sustainable fisheries through education, stakeholder involvement, and reduced intensity of fishing practices.** Fishing is exceeding sustainable levels in most Caribbean countries. National governments should work with resource users to implement sustainable fishing policies and practices. Licensing, incentives for sustainable practices, and penalties for illegal fishing can help reduce the intensity of fishing practices. Education of fishers regarding the impacts of different fishing gear will also promote sustainable harvesting of fish. In addition, "no take areas" or "marine fishery reserves" should be adopted, in part, as a strategy to replenish depleted fish stocks and serve as a source for recruits to adjacent fisheries. Critical to the success of such reserves will be educating stakeholders about their effectiveness in supporting fisheries and in providing

additional benefits such as alternative income generation and involving stakeholders to ensure community support for implementation.

- **Apply holistic approaches to coastal zone management.** Successful management of coral reef ecosystems entails dealing effectively with multiple influences and threats, many of which can be traced to activities taking place at considerable distances from the reefs themselves. Integrated coastal management (ICM) is the term given to such a holistic approach, involving participation from a wide range of stakeholders, including multiple government agencies, local communities, the private sector, and NGOs. National governments can provide incentives for agencies with disparate mandates and conflicting agendas to share information and work together holistically. Land management agencies (agriculture, forestry, etc.) need to have a stake in coastal management. Agencies at the national and provincial or district level should use the tools of ICM to help guide development and reduce impacts through zoning and regulation, and through planning and evaluation of the ecological carrying capacity of coastal areas.

- **Expand Marine Protected Areas and improve their management effectiveness in safeguarding coral reef ecosystems.** Marine Protected Areas (MPAs) are an important component of comprehensive coastal-area management; however, only a small minority of coral reefs are located within formally designated MPAs, and an even smaller percentage (5%) are located in MPAs rated as having fully or partially effective management. MPAs should be expanded to cover additional coral reefs, and the management effectiveness of many existing MPAs needs to be strengthened. Expansion of MPAs should reflect a regional perspective, recognizing the interdependence of reef communities and the transboundary nature of many of the threats. Siting of new MPAs should include reefs likely to be highly resistant to coral bleaching (such as deep reefs in areas of high water circulation) and/or highly resilient to disturbance to help reduce risks from changing climate. To bolster the management effectiveness of existing MPAs, national governments, donors, NGOs, and the private sector should provide financial and political support to help MPAs build needed capacity and adequately train staff. MPAs must also strive to be financially self-sustaining with a diverse revenue structure.

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Effective coastal zone management must consider activities taking place on the land, far from reefs.

- **Develop tourism sustainably to ensure long-term benefits.** Tourism is vital to the Caribbean region. Decision-makers should be aware of the negative impacts of unplanned and unrestricted development and take steps to limit such damages. Education of tourists, particularly divers and snorkelers, is essential to reducing impacts. Informed tourists can become a driving force for better practices by demanding high environmental standards at their destinations. The development and use of certification schemes, accreditation, and awards for good environmental practices for hotels and dive-and-tour operators may also provide incentives for environmentally sensible development. Several organizations in the region are partnering with industry to reduce the impacts of tourism, including the Caribbean Tourism Organization, the Caribbean Hotel Association, and the Caribbean Association for Sustainable Tourism. However, wholly independent validation of environmental standards may be preferable to industry-led certification schemes.

- **Implement good marine practices to restrict dumping of waste at sea and the clearing of ballast waters.** Regional bodies, national governments, NGOs, and the private sector should work together to develop best practices (for example, in the cruise industry). Ports, harbors, and marinas need to develop pump-out and waste treatment facilities to reduce the pressure on vessels of all sizes to dump grey-water, bilge, and wastewater in the sea. Some of these needs are addressed under MARPOL, an international convention on the prevention of pollution from ships, which has been signed by most Caribbean nations. MARPOL should provide a framework for more national regulations across the region. Development of regulatory frameworks to implement these agreements should be expedited.

International Action

- **Ratify and implement international agreements.** International agreements are an important tool for setting targets and achieving collective goals. Important international agreements addressing the threats evaluated in this study include the protocols of the Cartagena Convention (addressing land-based sourses of pollution, oil spills, and protected areas and wildlife), the UN Convention on the Law of the Sea (on ocean governance), MARPOL (on marine pollution), and the UN Framework Convention on Climate Change. Signing such agreements is a first step, but implementation is essential.

- **Promote international cooperation and exchange.** Even in the absence of international legal instruments, regional collaboration on issues such as fisheries and watershed management could greatly reduce some threats. Priorities for the region should be coordinated through entities such as the Forum of Ministers of Latin America and the Caribbean and the Caribbean Small Islands Developing States Group. Sub-regional bodies, such as the Organization of Eastern Caribbean States (OECS) or the Central American Commission on Environment and Development (CCAD), could play a key role in dealing with sub-regional resource management issues. International NGOs, intergovernmental agencies, and funders should actively support cooperation and exchange to promote synergy and foster partnerships to protect Caribbean coral reefs. A good example is the Mesoamerican Barrier Reef Systems (MBRS) Project, funded by the Global Environment Facility (GEF) and the World Bank, which recognizes this reef system as a shared resource requiring a coordinated management approach. National bodies dedicated to the protection of reefs, such as the U.S. Coral Reef Task Force, should receive full support from their governments to engage issues of coral reef protection at regional as well as domestic levels.

The Caribbean presents a unique realm: a large, hyperdiverse marine ecosystem, with coral reefs at its heart. The threats to these reefs are many and complex. Because of the high degree of connectivity among coral reefs, a threat to one reef area can become a threat to many.

Much needs to be done if the serious and growing threats to Caribbean coral reefs are to be turned around, but there is reason for hope. Examples from across the region show that marine conservation not only can be done but can also generate considerable benefits for local communities. The tide can be turned, but it will require commitment and action from all relevant stakeholders—in government and in the private sector—across the Caribbean region.

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