Reefs at Risk in the Caribbean

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Foreword

The Caribbean region is endowed with a wealth of coastal and marine resources, including a wonderful multitude of unique plants and animals. Most Caribbean countries depend on the sea for the goods and services it provides. Reef fisheries are a vital source of protein for millions of people in the region and a source of employment for hundreds of thousands of full- and part-time fishers. Over 116 million people live within 100 km of the Caribbean coast and over 25 million tourists a year visit the Caribbean, almost all of whom spend the majority of their time in coastal areas. Tourism revenue alone brings in over US$25 billion a year to the region.

There is growing concern, however, that the accelerating degradation and loss of these resources would result in significant hardship for coastal populations, nations, and economies. This report identifies nearly two-thirds of the region’s reefs to be directly threatened by human activities, and estimates future economic losses from diminished coral reef fisheries, dive tourism and shoreline protection services at between US$350 – US$870 million per year. Coral reefs are extremely important to the economies of Caribbean countries today, and they are the capital stock for future economic and political security.

Ensuring the vitality of coral reefs and their ability to continue providing benefits to society and economies is critically important, but there is much we do not know about these resources. Until now, a comprehensive assessment of Caribbean coral reefs, including their location and threats, has never been undertaken. Reefs at Risk in the Caribbean seeks to analyze the full range of threats to these unique ecosystems as well as to orient the region’s policy-makers toward potential opportunities for capturing greater benefit from their sustainable use.

Because coral reefs do not conform to national boundaries, protecting and restoring them can only be achieved through collaboration among nations and organizations. In fact, this report would not have been possible without the many partners, organizations, and individuals in the region who came together with the sole purpose of making sure that this analysis was accurate and represented the needs and priorities of the region. We deeply appreciate their support and that of those agencies that kindly provided funds for this analysis.

Reefs at Risk in the Caribbean is an integral part of the work of the World Resources Institute, the International Coral Reef Action Network (ICRAN), and the UNEP Caribbean Environment Programme (CEP) in the Wider Caribbean. We hope that the report will serve as a valuable tool for governments and environmental organizations in the region to better understand the growing threats affecting the marine environment of the Caribbean and to identify priorities and sites for immediate action.

JONATHAN LASH
President
World Resources Institute

KRISTIAN TELEKI
Executive Director
International Coral Reef Action Network

NELSON ANDRADE
Coordinator
UNEP Caribbean Environment Programme
Since the age of seven, when my father threw me overboard, I have been observing coral reefs through a dive mask. I have marveled at the beauty, biological diversity, and productivity of coral reefs and have seen how important they are to the local people who depend on them for food, income, recreation, and spiritual enrichment. I have also seen how human activity has undermined the health and vitality of reefs. The coral reefs I observed in the 1940s are totally different today. Sadly, none has changed for the better.

When I think of coral reef ecology, the concepts of connection and interdependence come to mind. Corals have their symbiotic algal partners, while “cleaner fish” have their clients. Landscape management relates directly to sediment and nutrient delivery and to reef health, while energy use and carbon dioxide emissions link to global warming and coral bleaching. The historical over-harvesting of large animals has impaired reef vitality. Public awareness is essential for sustainable reef management. These are just some of the examples that underscore the vital connections in time and space that affect coral reefs. The tragic decline in reef health is due to human insult, and their restoration likewise depends on human action.

I am pleased to see that *Reefs at Risk in the Caribbean* addresses these connections and calls attention to the importance of people in the equation of reef health and restoration. The involvement of multiple partner organizations ensures that this report reflects the many facets of reef assessment and management, and will be widely used. Predictably, I totally concur with the need for greater public awareness. It is my view that without public support, rational and sustainable management will not occur. I am often told that our television shows were instrumental in inspiring many of our present ocean experts to pursue a career in ocean sciences. Of course, awareness is not action. *Reefs at Risk in the Caribbean* clearly outlines the critical steps required for building capacity and improving management. The focus on socioeconomic issues is crucial to ensuring that future generations will continue to benefit from coral reefs.

Ultimately, our challenge is not to manage reefs: it is to manage ourselves. I applaud the World Resources Institute for its admirable work to protect coral reefs, a priceless natural treasure.

JEAN-MICHEL COUSTEAU | Ocean Futures Society
The Reefs at Risk in the Caribbean project would not have been possible without the encouragement and financial support provided by the United Nations Foundation, the U.S. Agency for International Development, the United Nations Environment Programme - Caribbean Environment Programme, the U.S. National Oceanographic and Atmospheric Administration, the Swedish International Development Cooperation Agency, the Netherlands Ministry of Foreign Affairs, the Curtis and Edith Munson Foundation, the Henry Foundation, the World Bank / GEF Mesoamerican Barrier Reef System Project, the National Center for Caribbean Coral Reef Research, the Nature Conservancy, Environmental Defense, and the World Fish Center. The Reefs at Risk project is part of the International Coral Reef Action Network, a collaboration developed to reverse the decline of the world’s coral reefs. (See inside back cover.)

The World Resources Institute gratefully acknowledges the many partners and colleagues who contributed to this project. (See inside front cover for full institutional names.) We thank Philip Kramer (TNC) and Robert Ginsburg (AGRRA) for the provision of AGRRA data and guidance with the threat analysis; Mark Spalding (University of Cambridge) for sharing his knowledge of Caribbean coral reefs; Hillary Nobles (IRF) for compiling information on coral reef condition; Serge Andréfouët (Institut de Recherche pour le Développement) and Christine Kranenburg (USF) for coral reef maps; Jennifer Gebelein (FIU), Steve Rohmann and Aurelie Shapiro (NOAA) for land cover classifications; Ed Green, Corinna Ravilious, Emily Corcoran, Michelle Taylor, and Ed McManus (UNEP-WCMC) for providing maps of coral reefs and marine protected areas; Al Strong, William Skirving, Scott Baron and Andrew Barton (NOAA) for information on warming seas; Melanie McField (WWF) for reviewing the watershed model; Johnathan Kool (NCORE), Steven Menard, and Janet Nackoney (WRI) for support on GIS; John McManus, Cara Dickman, and NCORE staff, Marilyn Brandt, Wade Cooper, and Aletta Yniguez for organizing the project workshop; Ian Gillett (Belize Coastal Zone Management Institute), Julie Robinson (NASA), and Kathleen Sullivan Seeley (UM) for satellite images and coral reef maps; Bruce Potter (IRF) for sharing information throughout the Caribbean community; Rich Iovanna (U.S. Environmental Protection Agency) for assisting with validation of the threat model; Mahfuz Ahmed and Chiew Kieok Chong (World Fish), Suzanne Garrett (UM), Bob Leeworthy (NOAA), Suzie Greenhalgh and Siet Meijer (WRI), and Herman Cesar (Cesar Environmental Economics Consulting) for data, ideas, guidance, and review of the economic valuation; Dulce Linton and George Warner (UWI) for coral data and expert review; Clive Wilkinson (GCRMN) for providing links to the network; Uwe Deichmann (World Bank) for plume module implementation; Gregor Hodgson and Craig Shuman (Reef Check) for their data; Alessandra Vanzella-Khouri, Luc St-Pierre, Malden Miller, Nelson Andrade (UNEP-CEP), and Kristian Teleki and Alison Glass (ICRAN) for their guidance and support; and Barbara Best, Laura Cornwell (USAID), and Angel Braestrup (Munson Foundation) for their steadfast encouragement.

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