

Reefs at Risk in Caribbean

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Background

In 1993, coral reef scientists estimated that 10% of the world's reefs were dead, and that 30% were likely to die within 10 to 20 years. This estimate was based upon the best available, but limited, survey data, and anecdotal evidence. In 1996, the World Resources Institute (WRI) launched a project to examine the state of the world's coral reef ecosystems and to assess the degree of threat to these systems. In June of 1998, WRI, in collaboration with the International Center for Living Aquatic Resources Management and the World Conservation Monitoring Centre released Reefs at Risk (R@R), a detailed, map-based analysis of threats to the world's coral reefs. The R@R analysis confirmed that coral reefs are seriously threatened in most parts of the world. The analysis estimated that 58% of the world's reefs are highly or moderately threatened by human activity—ranging from coastal development and destructive fishing practices, to overexploitation of resources, marine pollution, and runoff from inland deforestation and farming.

This initial analysis concluded that pressure on coral reefs within the Caribbean was slightly higher than the global average, with over 60% threatened. Thirty percent of the reefs are estimated to be at high risk, from sedimentation, inland activities, coastal development, pollution and overfishing.

We are in the midst of implementing a more-detailed regional-scale analysis of the reefs of Southeast Asia, where an estimated 80% of all reefs are threatened, and are planning a similar analysis for the reefs of the wider Caribbean. Working in collaboration with partner institutions throughout the region, this finer-scale analysis will yield more detailed and accurate results, which will be valuable for evaluation of alternative development plans, and for conservation priority-setting within the region.

Goals and Objectives

Effective management of Caribbean reefs is often hampered by a lack of information. The majority of the

Caribbean's coral reefs have not been surveyed or consistently monitored over time. In addition, much of the data from monitoring has not been compiled or made publicly available. Although information from both scientific and volunteer surveys is increasing, this information is typically not well integrated with information on human activities that have the potential to contribute to the degradation of coral reefs. Development of an integrated base of information is the first step toward being able to better identify causes of reef degradation.

The Regional Reefs at Risk Project in the Caribbean has four primary goals:

- 1) Collect and integrate information to improve the base of information available for examining threats to, status of, and protection of coral reefs within the wider Caribbean.
- 2) Evaluate and model the relationships between human activities and reef condition, where available. Like the global R@R analysis, this will allow for extrapolation about threats to (and likely condition of) the many reefs for which survey information is not available.
- 3) Develop a geographic information system (GIS)-based tool for more local-level evaluation of development scenarios and related implications for coral reef health and economic value.
- 4) Raise awareness through wide dissemination of integrated data sets, model results, a published report, and the GIS-based planning tool.

Intended Audience

The outputs of the project are targeted for:

- Primary audience—national marine protection officials, policy-makers, and resource managers; trade and tourism ministers; international lending and development institutions;
- Secondary audience—NGOs and the general public; the scientific community

What is Proposed:

In collaboration with partner institutions in the region, we plan to implement a regional-scale analysis to link human activities with reef condition. The analysis will help to support conservation priority-setting through a systematic, data-rich analysis. This approach relies upon incorporating existing information on current threats to coral reefs, the condition and characteristics of surveyed coral reefs, and the level of protection afforded these reefs (through marine protected areas (MPAs) and other programs and incentives), coupled with estimates of economic and ecological value.

This analysis would be more detailed than the global Reefs at Risk analysis, both through implementation at a finer scale, and through broadening the analysis to include additional information where available on state of reefs, on biological diversity, socioeconomic factors affecting reefs, and economic value of reef resources.

The analysis of coral reefs would integrate a wide range of data:

- A. *Threats to Coral Reefs* would be examined through a more detailed implementation of the Reefs at Risk methodology—development of refined decision rules, using more complete and higher resolution data sets to reflect threat, and more socioeconomic background information to provide context and to differentiate threats.
- B. *State/Condition of Coral Reefs*—The global R@R analysis treated all reefs as a binary flag—presence/absence within a 4 km resolution grid cell. Within a regional analysis, we can incorporate the following additional information about specific reefs to differentiate reefs as to vulnerability and value:
 1. Information from existing monitoring programs about the condition of reefs
 2. Information on reef type and depth
 3. Information on biological diversity (species richness and endemism) would be incorporated at the highest resolution possible, along with estimation of the economic value of the biological resources and ecosystem services provided by the reef.
- C. *Protection of Reef Resources*—Current global information on marine protected areas (MPAs) is poor. A richer and more detailed data set on MPA locations,

extent and effectiveness could be developed in conjunction with local partners. This data “layer” is invaluable to the process of establishing conservation priorities. Additionally, information on coastal zone management and other policies relevant to pressures on reefs would be integrated.

All data integration and model results will be evaluated and revised based upon a workshop held in the region. Based upon the model implementation and results, we also plan to develop a GIS-based planning tool which allows examination of different coastal development and management scenarios and their implications for coral reef health, diversity and value. This tool would be developed and implemented with local partners.

Regional Extent of Analysis

The project will be implemented at two levels of detail:

1. Regional scale data integration and analysis—Initially, base data layers which are of consistent source and quality for the wider Caribbean will be collected and integrated, allowing for standardized comparison of threats to, condition of, and protection of coral reefs across the region.
2. More detailed analyses will be implemented with local partners. Countries and partners will be chosen opportunistically, based upon importance of the country in terms of coral reef holdings and diversity, and the contribution the partner can make in terms of data, expertise, and interest in the project. At a minimum, we intend to establish collaboration with partners in Cuba, Mexico, Belize, Honduras, Costa Rica, Jamaica, the Bahamas, and US Territories, but hope to establish similar relationships with partners in some of the smaller island states.

Analysis Components

We propose developing teams of partners to examine different threats to coral reefs. At present, we are proposing five analysis components to examine threats from:

1. Land-based sources of pollution and sedimentation;
2. Coastal development, including tourism development;
3. Marine-based sources of pollution;
4. Overexploitation, especially overfishing;
5. Coral bleaching

Collaboration

Collaboration will be critical to this project. We propose again collaborating with the International Center for

Living Aquatic Resources Management and the World Conservation Monitoring Centre, but wish to also work closely with more national and regional partners. These include UNEP's Regional SEAS program, the Island Resources Foundation, the Caribbean Conservation Association, the National Center for Caribbean Coral Reef Research (NCORE), the Atlantic and Gulf Reef Assessment (AGRA) and several national partners. Partners would be sources of data, expert advice on the methodology, and would serve as a site for implementation of the planning tool.

Expected Outputs:

1. Hardcopy maps reflecting best available mapping of coral reefs, and if possible, mangrove and sea grass habitats;
2. Hardcopy maps reflecting available information on coral reef condition, protection and threats to coral reefs;
3. Digital data sets reflecting best estimates of threats, value and protection status;
4. Full-color report summarizing findings, including maps of reef condition and threats to coral reefs;
5. Full-color poster of reef maps and summary of findings;
6. A webpage with information on the results of the project,—methodology, maps and policy recommendations;
7. A GIS-based planning tool for scenario evaluation, linking human activities with reef degradation.

Impact and Evaluation

Although the most important impacts of the Regional Reefs at Risk project will be long-term, there are some indicators that gauge project effectiveness in the near term. In looking back at the global Reefs at Risk analysis, we can look at the press coverage the report has received, the number of reports requested, the number of times the results are cited at professional meetings and in professional journals, the number of visits to the Reefs at Risk web site, and the number of users that have down-loaded the data from the web site. The global analysis was aimed at raising public awareness, and was very successful in this regard. The Regional project also has a goal of raising awareness, but the project also intends to improve the ability of policy makers in the region or working on the region to have good information and tools for decision-making. Here, we can assess project impact by the number of people in the region using the map and dataset outputs

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