

## **Reef Check Philippines: Building Capacity for Community-Based Monitoring**

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### **Introduction: What is Reef Check?**

The Reef Check (RC) global coral reef monitoring program began in 1997 with an international collaboration to take a “snapshot” look at the current status of the world’s most pristine coral reefs. The success and popularity of this first survey led to its continuation as an annual event among participants. The first attempt of this kind, RC makes use of a single straightforward sampling methodology for reefs located throughout the tropical and subtropical regions of the world, so data are comparable on national, regional and global scales. The major objective of this program is to provide rapidly available data on overall reef health and condition, with an emphasis on visible effects of human impact. Data are obtained on substrate composition, target and indicator species of fish and invertebrates, coral condition (including bleaching and signs of disease) and obvious signs of human impact (garbage, anchor damage, abandoned fishing line, etc.). This monitoring provides a quantitative view of the extent of human impacts on reefs considered to be in the “best” condition. Most surveys incorporate either video or still photography documentation.

Personnel involved in Reef Check consist of reef scientists and lay divers interested in conservation-related diving activities. Marine biologists train local divers in the methodology and supervise data collection and transcription. Because the methods are straightforward and easy to learn, they are less intimidating to non-scientists. Participation is strictly voluntary, promoting a sense of community and stewardship among reef users and appreciators. Reef Check, therefore, serves a dual purpose; it is

an invaluable source of scientific information comparable on a global scale, and a highly effective mechanism for promoting conservation and community activism using a cost-effective approach. At many sites, RC is the only monitoring conducted in a systematic way; data from RC reports provide the only existing information about the status of such reefs. When it began, a total of 30 countries were involved; this number has increased by an additional 10 countries per year. The number of divers initially involved was estimated at 850 (including both reef scientists and lay divers) and had climbed to well over 1,000 by 1999. Interest and involvement are clearly increasing, though the search for the minimal funding necessary to sustain surveys presents a continuing challenge. Because of the growth of this program, the need for support for national coordinators and training centers has been recognized as well. It is vital that support for this program be developed so that the continuity of data sets is ensured.

### **The Philippines Involvement**

In the Philippines, participation has been continuous since 1997. The geographical spread of sites has increased over the four years of involvement (see Figure 1). Danjungan Island, Negros Occidental and Batangas, southern Luzon, was first surveyed using Reef Check techniques in 1997. In 2000, a total of 23 surveys were conducted in Palawan, Western, Central and Eastern Visayas, and Tubbataha by local groups headed by marine scientists (Table 1). Results of these surveys added to the global database on reef health and condition; data that were recently compiled and presented in the GCRMN's Status of Coral Reefs of the World (Wilkinson 1998, 2000). Among the findings in this report was evidence that there is little difference in reef health and abundance of target species between protected and non-protected reefs in the Asian region (Chou 2000). The conclusion reached by the author was that marine

reserves throughout the western Pacific may be falling short of their stated objectives of protecting coral cover, fish habitats and fish stock.

**Table 1.** Summary of Reef Check surveys throughout the Philippines, 1997-2000.\*

Site/Region	Number of surveys			
	1997	1998	1999	2000
Batangas, So. Luzon	2	-	-	-
Palawan	-	9	2	9
Central Visayas	-	1	11	4
Western Visayas	3	2	3	1
Eastern Visayas	-	-	-	1
Tubbataha	-	-	-	8
<b>Total Reef Check Surveys</b>	<b>5</b>	<b>12</b>	<b>16</b>	<b>23</b>

\*additional survey information supplied by M. Beger of Coral Cay, and A.T. White, of Earthwatch and CRMP.

Reef Check has also collaborated with other reef monitoring groups in the Philippines, and has established links with the Coastal Resources Management Project (CRMP) and Department of Environment and Natural Resources (DENR). Personnel from the Bureau of Fisheries and Aquatic Resources (BFAR) and Philippine Coast Guard have participated in these surveys. Discussion is currently underway to review and standardize the methodologies that these groups use in monitoring, so data can be shared and monitoring efforts made more efficient.

### **Contributions of Reef Check to Reef Management: Apo Island Marine Reserve**

It is the generation of long-term data sets on reefs annually monitored that can provide the best information on changes in reef health and condition over time, and

responses of these reefs to catastrophic events or global climate change. Apo Island Marine Reserve was first surveyed in August 1998; the height of the 1997-98 El Niño bleaching event. The extent of bleaching on Apo was, therefore, well-documented. Subsequent surveys in 1999 and 2000 have quantified the long-term impacts of this bleaching event and the reef's subsequent recovery. These surveys revealed that the massive coral *Galaxea fascicularis*, which dominates along the reef crest, was severely affected by the El Niño. Reef structure within the reserve is unique because of dominance by this species; *G. fascicularis* colonies attain an unusually large size on this reef. At the height of the El Niño bleaching, 80-90% of the colonies along RC transects displayed bleaching, with between 50-100% of each colony affected. Subsequent surveys in 1999 and 2000 revealed that much of this bleached tissue had died, leaving large patches of bare substrate open to colonization along the reef crest. This is reflected in the substrate composition data obtained during these three years (Table 2).

**Table 2.** Changes in relative abundance of hard coral, recently killed coral, and coral rubble along multiple permanent Reef Check transects over a three-year period. N=4 20m transects at each of two depths (4 m and 12 m); Mean± SD of percent cover by each substrate type

Substrate	1998	1999	2000
Hard coral (HC)	61.3% ± 23%	42.5% ± 17.9%	35.3% ± 17.8%
Recently-killed Coral (RKC)	14.4% ± 10.1%	28.8% ± 12.8%	10.32% ± 6.3%
Coral rubble (RB)	1.3% ± 1.9%	4.4% ± 2.3%	4.4% ± 5%

Living hard coral has continued to decline over the three-year period, with the sharpest decline occurring after the bleaching event. Concurrently, the amount of recently killed coral sharply increased the year after bleaching, and subsequently declined over the

next year. The amount of coral rubble increased slightly, probably a consequence of the increased amount of dead coral and heavy grazing activity by abundant corallivorous fish. The effects of these changes on reef community structure will be visible with future surveys, but current data suggest a rather slow recovery from the bleaching event.

An independent survey accomplished in November 2000 attempted to quantify these patterns. It revealed that 65% of the *G. fascicularis* colonies contained less than 25% living tissue, and while new colonies had begun to recruit onto these dead patches, much bare substrate still remained uncolonized two years after the bleaching event (Raymundo and Maypa in prep). Therefore, it is likely that the reef community is being significantly altered as a result. The importance of continuing monitoring efforts such as this cannot be understated. Current understanding of reef recovery and responses to catastrophic events is minimal and future bleaching episodes and severe storms are predicted to increase in both intensity and frequency (Hoegh-Guldberg 1999). Reef Check is in position to document these events and their impacts, provided monitoring can continue uninterrupted and can be expanded to include additional sites. Impacts of future bleaching episodes, catastrophic storms and other such events can be preceded by an existing data set on reef condition prior to the stressful event on sites annually monitored by Reef Check. Such data sets can be used to establish long-term patterns of responses to impacts, to monitor recovery processes, and to develop approaches to mitigating severe effects.

The Apo reserve is one of the few well-documented examples of sustained management of a “no-take” zone by the community using the reef (20 years; Russ and Alcala 1999). However, many target species are consistently rare in RC surveys (Table 3), and anchor damage from dive boats still regularly occurs. Representatives of the Apo community participating in RC speculate that tourism may be the culprit, though the decline in coral cover as a result of bleaching may also be contributing. The number of

divers has grown significantly over the past several years (Cadiz and Calumpong 2000), and not all dive operators are committed to the conservation practices enforced by the community. Failing to use the anchor buoy and opportunistic harvesting by tourist divers is difficult to control or monitor, unless the dive operators and guides themselves are educated. Because of these observations, the Apo community is currently attempting to restrict the number of tourists allowed on the reef daily, in hopes that some of these fish and invertebrate populations will increase, and diver-related damage to the reef will decrease.

**Table 3.** Total numbers of selected target organisms observed along Reef Check permanent transects during three years of surveys within Apo Island Marine Reserve. N=4 transects at each of two depths: 4 m and 12 m.

Target invertebrate	1998	1999	2000
Giant clam	0	0	1
Lobster	0	0	0
Triton	0	3	0
Grouper >30 cm length	4	1	0
Humphead wrasse	2	6	0
Bumphead parrotfish	15	30	0

Participation in Reef Check surveys has provided a means of promoting ecotourism and environmental conservation for both the Apo Island community and that of the city of Dumaguete. The data provided to the Apo community continues to be one of their major sources of information for making management decisions. The major dive shop in Dumaguete has sent representatives to training sessions and surveys since 1998, and supports the surveys by donating the use SCUBA tanks and dive boats. Additional dive shops have also expressed interest in participating in this year's surveys.

Members of the local press, college students, Peace Corps workers, dive guides, staff of the Department of Environment and Natural Resources, and recreational divers also continue their involvement. Due to the enthusiastic response from divers and research personnel willing to devote their time, SUML is planning an expansion of RC to include an additional three reefs in its annual survey. In addition, two SUML personnel and trained RC divers who are leaving the laboratory will begin RC surveys in the areas to which they will be moving by 2002. One will start a survey in the Zambales area, western Luzon, and the other will begin one in the Panguil Bay area, southern Mindanao. Personnel from SUML will provide the initial training and support for these surveys. In this way, the geographical spread of sites annually surveyed by Reef Check will cover a more representative portion of the country and will help to build long-term data sets on reef health and responses to management and global climate change.

### **Cost-effectiveness of the Reef Check Monitoring Program**

Reef Check continues to be one of the most cost-effective methods of monitoring reefs currently available, primarily because of the emphasis on volunteerism and sponsorship, and a simple methodology requiring minimal equipment. At a time when reef degradation continues to accelerate, but lay activism and interest in conservation steadily increases, this is an important point to consider. Numerous conservation programs fail because of a lack of continued support. Cost-efficient programs which can potentially provide long-term data sets should be given priority when considering funding allotments. Despite an emphasis on volunteerism, RC surveys are not cost-free; transportation, documentation and equipment expenses are annually incurred. While donations and sponsorship are always encouraged, it is not possible to rely on these on an annual basis to cover all survey-associated costs.

A typical survey to a reef reasonably close to a training center, using between 10 and 18 divers, may require a minimum of P6,000 (approximately \$125), if most of the equipment and supplies are either donated or were previously purchased. The initial cost of materials and supplies may require up to P50,000 (approximately \$1,000) if a camera, transect lines, and other one-time purchases are needed. In addition, initial training sessions require the most time and expense, whereas volunteers participating in annual resurveys only require an annual “brush-up” session on the methodology, with information given on improvements or additions to the methods. Therefore, the most cost-effective approach is to encourage groups to continue a sustained involvement in annual resurveys of the same reefs. This requires sustained funding, though the support required is much lower than is usually budgeted for such work. The usefulness of accumulating long-term data sets as a result of sustained Reef Check monitoring far outweighs the costs involved and justifies funding such efforts. Furthermore, the continued involvement of scientific personnel provides a means of “quality control” necessary to ensure the data are reliable.

## **Conclusions**

Reef Check, now in its fourth year, continues to provide a valuable data set on the status of the world’s most undisturbed reefs. The data reveal some alarming trends: rare target species continue to decline in numbers, even on protected reefs; “pristine” reefs are rarely so; some reefs severely affected by the 1997-98 bleaching event are recovering very slowly. Reef Check as a monitoring tool has an active role in the Philippines as a means of documenting and quantifying these trends. In addition, RC has proven to be a useful tool to empower and involve local communities in monitoring their own resources. It is hoped that the increased awareness by local divers, dive operators and guides who participate in surveys will benefit reef condition, by reducing

certain types of damage such as shell harvesting and anchor damage. The cost-effectiveness of RC surveys should be emphasized to potential funding sources seeking ways to invest limited funds in reef conservation and community-based coastal management.

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