



courtesy of Coral Reef Adventure, MacGillivray Freeman Films

A review of the first five years of Reef Check indicates that a program based on coral reef education, monitoring, and management works well. Participation in Reef Check is often the first step towards sustainable management of reefs. Yet many challenges still remain. In this concluding chapter, the goals of Reef Check will be revisited and progress evaluated.

The fundamental goal of Reef Check is to reverse the coral reef crisis and to facilitate the rehabilitation of reefs worldwide. The ingredients required for success include:

- International cooperation to unite regional and global efforts
- A national government legal framework for reef management in every coral reef country
- Increased public understanding and support for management initiatives
- Partnerships among governments, private sector, academia and NGOs to carry out monitoring and management programs
- Funding and trained personnel willing to carry out the work

Some 350 million people depend directly upon coral reefs on a daily basis for food and other resources. Unfortunately, most of these people and their reefs are located in developing countries that have a relatively small voice on the global political stage. Even in developed countries with large coral reef resources, such as France and the United States, most citizens are not aware of these assets, let alone realize that their reefs are facing a crisis.

Ultimately, solving the coral reef crisis will require a global environmental campaign to raise public awareness, similar to those that have focused attention on the plight of the rainforests, tigers, panda bears and whales. Only when everyday people throughout the world become aware of the coral reef crisis and why it may affect them personally, will it be possible to successfully garner the political and economic support needed to implement government management programs.

International programs alone cannot solve the coral reef crisis because they lack the legal mandate to manage resources within countries. Strong national coral reef initiatives are required to form the framework for reef management at the local level. Both ICRI and GCRMN can, and have been addressing these needs through meetings and workshops, but far more work is needed to push national governments to set up reef management groups. The Philippines has developed a set of laws that give control of coastal reefs to local governments, thus resolving the "tragedy of the commons" situation by allowing the establishment of municipal MPAs and fishing grounds. The US Coral Reef Task Force may provide a useful model for a national government inter-agency management group specifically formed to address coral reef issues.

Reef Check has been contributing to the above tasks in the following four areas: monitoring and reef science, education and training, public awareness, and management.

MONITORING AND REEF SCIENCE

Anyone who has flown over the Caribbean or Micronesia can attest to the size of the problem facing those wishing to implement a country or region-wide monitoring and management program for coral reefs. Even from an airplane, the reefs appear endless. The reality is that there are a large number of coral reefs spread over an immense area. Attempting to monitor even a small fraction of the world's reefs is a huge challenge.

To meet this challenge, it is necessary to revisit the rationale for monitoring in the first place and answer the following questions. What types of data and/or information are really needed? Who needs them? Is a standard method really needed at this scale?

A sensible approach is to establish a broad brush, inexpensive, and rapid method so that the maximum number of sample sites can be monitored to gain a geographically widespread dataset from a given country. As the technical teams gain more skills and funding, they can expand their monitoring through addition of indicators or more taxonomic specificity as needed. With this basic "early warning system" design, if a problem is detected, a more highly trained scientific team can be dispatched to investigate in detail.

Sadly, what has often occurred is that funds are spent only on intensive, detailed protocols such that the costs are high and only a few sites can be monitored for a short time. Allowing scientists to control the design of a monitoring program in the absence of input from managers and stakeholders is not wise.

Attempts to cross compare Reef Check data with, for example, the AIMS monitoring program COTS numbers or the *Diadema* results from early surveys in the Caribbean are problematic due to issues with timing and scale. Density estimates based on different scales of sampling often are not comparable. If there is a good reason to want to track changes at a national, regional or global level, then a standard sampling method is required.

A summary evaluation of Reef Check monitoring is given below.

Successes	Challenges
<ol style="list-style-type: none"> 1. Global network established 2. Standard field methods 3. Results useful for both science and managers 4. Multiple languages 	<ol style="list-style-type: none"> 1. Add new countries 2. Find and implement sustainability mechanisms 3. Increase sample size within each country 4. Provide training on analysis and interpretation 5. Create interactive website 6. Turn-key training 7. Repeatability

Table 8.1: Successes and future challenges for Reef Check monitoring.

On the success side, the worldwide network is well established and standard field methods have been distributed in many languages. The results of the monitoring have been disseminated to the general public via the media and to scientists through scientific publications.

On the challenge side, there is a need to expand into new countries, particularly in Africa, Central America and South Asia, and to increase the sample size of sites within each country. Finding sustainable funding mechanisms is a major constraint on the program. New training modules are needed for rapid socioeconomic assessment (currently being developed), data analysis and interpretation. An interactive website to be produced this year will provide a new level of data analysis and support for teams in the field. In general, all training and monitoring should be "turn-key" i.e. should be standardized and replicable.

EDUCATION AND TRAINING

There is a fundamental need to give communities a complete set of tools and training so that they can monitor and manage their own reefs. Progress towards making Reef Check available through existing coastal management and coral reef programs has been rapid, but far more work is needed to expand the network and provide the training needed to use the tools.

"Many of our members have been involved in the Reef Check/CAFNEC community based coral reef monitoring project and found it educational and rewarding. We have learned a great deal about marine ecology and applied it directly to the reefs we visit. The education and practice of observation and monitoring have ensured that we now see far more of what is there than before the training and education. We have become more alert to and considerate of the reef and take greater care in diving." - Nautilus Scuba Club, Cairns, Australia

Guidelines on necessary additions of spatial and temporal replicates for long-term monitoring are available (Hodgson and Stepath, 1999). Temporal replication is especially important for monitoring mobile fish populations. The second step is to make use of existing projects and programs to spread Reef Check to communities around the world.

Successes	Challenges
<ol style="list-style-type: none"> 1. Regional training workshops 2. Support from international and national groups 3. Brazil kids education center 	<ol style="list-style-type: none"> 1. Find and implement sustainability mechanisms 2. Create video training material 3. Develop K-12 education materials 4. Create interactive website 5. Turn-key training

Table 8.2: Successes and future challenges for Reef Check education and training.

PUBLIC AWARENESS

The public awareness campaign has been highly effective despite limited resources. The initial monitoring was a "first" and so was of interest to the press. The global crisis and the bleaching event were news stories that were covered by major news media. The current partnerships with Quiksilver and MacGillivray Freeman Films are just starting to inject major funding and expertise into the public awareness campaign. Educational materials are also being developed as part of this campaign.

In addition, major celebrities have volunteered time and energy to help with the public awareness campaign. There are also many other potential collaborations that can be developed with corporations.

Successes	Challenges
<ol style="list-style-type: none"> 1. Media coverage of crises 2. Partnerships starting 3. Coral Reef Adventure 4. The Crossing 	<ol style="list-style-type: none"> 1. Find a high profile spokesperson for reefs 2. Develop more corporate partners in relevant industries 3. Documentary of Reef Check

Table 8.3 Successes and future challenges for Reef Check public awareness.

In conclusion, one of the most important results of the first five years of monitoring is the demonstration that MPAs in developing countries are starting to work. This provides a glimmer of hope that it is still possible to stop the coral reef crisis and allow coral reefs to recover and flourish.

Appendix SUCCESS STORIES

REEF CHECK IN EUROPE

BY GEORG HEISS, RC EUROPE



Reef Check activities in Europe started in the International Year of the Reef (1997) in Germany, France, Switzerland, and the UK, and were primarily aimed at raising public awareness among Europeans regarding the threats to coral reefs worldwide. Scientists from several European countries organized Reef Check surveys in the Red Sea and the Indian Ocean. They found support from research institutions, corporate sponsors and the diving industry in Europe, and also from authorities and the tourism sector in the countries where surveys were conducted.

Reef Check Europe was founded in 2000 to expand education and public relations activities in Europe. Field activities are primarily focused in the Red Sea. However, scientists from Europe, in conjunction with local groups, also carried out Reef Check surveys in the Comoro Islands, La Réunion, Maldives, Mauritius, Myanmar, Thailand, Seychelles, and the Philippines. A dedicated website (www.reefcheck.de) was set up, and in 2001 Reef Check was founded as a non-for-profit organization under German law. The long-term goal of Reef Check Europe is to unite together marine scientists and sport divers, as well as funding agencies and the tourism industry, both from European and coral reef countries, in a sustainable effort to continue and expand Reef Check surveys and accompanying public awareness campaigns.

Reef Check Europe represents the Reef Check organization at scientific conferences and public events. The organization also works together with other coral reef NGOs and serves as a regional coordinator of the global Reef Check network, which brings together interested volunteers and scientists, and offers assistance in setting up of Reef Check surveys and training workshops.



Divers wave before descending underwater to survey the reefs of the Soufriere Marine Management Area in St. Lucia.
Photo by Gregor Hodgson

BARBADOS

Barbados is the easternmost island in the Caribbean, located south of St. Lucia and just east of St. Vincent. The island covers 430 sq km (166 sq mi) and is the second most densely populated island in the world with over 250,000 people who depend on the island's coastal resources, primarily for tourism. In the geological past, Barbados was comprised of two islands that merged later into one. Today, Barbados is a low island featuring numerous beautiful white sand beaches. Along the North coast, coral and sandstone cliffs rise straight out of the sea for several hundred feet.

RC coordinator Andre Miller explains to a new volunteer how to use a PVC pipe to measure distances underwater. Photo courtesy of RC Barbados.



RC Barbados has been active since it was kicked off by the Coral Court Hotel Team of Barbados Marine Trust in 1997. Since then, it has become part of the Barbados Coastal Management Unit's coral monitoring program and has established solid partnerships with other organizations such as Mauby Divers, and PADI project AWARE. These various groups have come together to work hard on achieving their common goal – to ensure that Barbados' coral reefs are healthy and sustainable. Other local hotels such as Casuarina, Royal Pavilion/Glitter Bay, and Treasure Beach have also become involved with helping to protect Barbados' coastal ecosystem through joint beach cleanups and community education efforts.

Last Earth Day (2001), RC Barbados, led by Loreto Duffy Meyers and Renata Goodridge, together with their partner organizations, surveyed four sites on the west coast and Carlisle Bay. They were overwhelmed with volunteers who were eager to participate in the event. Results from these surveys showed a general improvement in reef health since 1997.

The mean percentage of dead coral cover decreased from $31 \pm 17\%$ to $0.2 \pm 0.07\%$. There was no significant change over time in the hard coral cover, which averaged $16 \pm 9\%$ across all

years. Abundance of almost all indicator organisms increased from 1997 to 2001, with the notable exception of *Diadema* and parrotfish. The mean number of *Diadema* per 100 m² reef decreased from 103 ± 136 in 1997 to 7.25 ± 12.5 in 2001 and the mean number of parrotfish decreased from 5.25 ± 6.2 per 100 m² reef in 1997 to 1.75 ± 1.76 per 100 m² reef in 2001.

Overall, the twelve reefs in Barbados surveyed by Reef Check were primarily composed of sand ($17.9 \pm 3.0\%$) followed by hard coral ($16.9 \pm 2.6\%$).

BRAZIL

One of our newest teams, Reef Check Brazil, was started in 2001 by Dr. Beatrice Padovani Ferreira, Departamento de Oceanografia, Universidade Federal de Pernambuco in Recife. In the past year, Beatrice has recruited 65 volunteers, including divers, students, researchers, fishermen, and members of the local community. The group's activities have included surveys in five different reefs of Tamandaré in the Coral Coast MPA. A team of land-based volunteers has also joined Reef Check and has been running beach cleanups. During Earth Day 2001, the group removed 15 bags of garbage from a local beach.

RC Brazil has received funding from PROBIO, a division of the Brazilian Ministry of Environment, to monitor the 3,000 km of reef along the Northeastern coast. Four pilot locations have been selected: Abrolhos Reef, Fernando de Noronha Archipelago, the Coral Coast MPA and the Maracajaú Reefs. Monitoring has started in the southernmost of the four sites, the Abrolhos complex, which has the largest and most diverse coral formations in the area, including seven endemic species of coral. The Abrolhos complex has been part of a marine park since 1983 and is a popular tourist destination. In addition to surveying the reefs and

collecting valuable data, Beatrice and her colleagues have built a remarkable Reef Check team by recruiting local dive operators, park rangers, and environmental managers from around the area.



Another exciting project founded by RC Brazil is the Reef Check Center for Kids, a project helping to educate Brazilian children about coral reef biology and solutions to the impacts threatening Brazil's coral reefs. During 2001, with funds from the Boticario Foundation, the Center pioneered an environmental education program that educated 600 school children about ornamental fish, which are over-fished in the region.

Beatrice and her team would like to thank the Brazilian Institute of Environment, Aratur turismo and all the volunteers who have been helping them. RC Brazil has also received support from the Project Coastal Reefs, an integrated coastal management project executed by the Federal University of Pernambuco, Center of Research and Fishing Extension of the Northeast, Ibama, Foundation Sea Mammals and Interamerican Development Bank.

COCOS KEELING ISLANDS

Cocos (Keeling) is a remote coral atoll made up of 27 islands surrounding a central turquoise-colored lagoon. These reefs are some of the most remote in the world, situated in the Indian Ocean 2,950 km northwest of Perth, Australia and 900 km southwest of Christmas Island.

Through my investigations of many different types of reef monitoring techniques, I have found that Reef Check provides a statistically viable survey technique that is not too complex and can be undertaken by non-scientists and involves all reef lovers. It is fun to dive our reefs and search for all the indicator organisms while conducting our surveys."

– Robert (Greenie) Thorn, Parks Australia

The 27 islands are formed on two small, isolated mid-oceanic atolls. One solitary island 24 km to the north of the main atoll is North Keeling, now known as Pulu Keeling National Park. A population of only 600 Malay and 100 government servants from Australia inhabits two of the 27 islands. The 26 islands that make up the southern atoll cover a total landmass of just 14 km². The islands have been a focus of coral atoll research since Charles Darwin visited in April 1836. On his voyage home after a three-year journey aboard the *HMS Beagle*, Darwin stayed on Cocos for ten days and recorded evidence to support his theory of coral atoll formation.

Robert (Greenie) Thorn has been the volunteer Reef Check coordinator on Cocos since it started in 1997. Greenie is a horticulturalist and conservationist who works for Parks Australia. With the help of volunteer Wendy Murray, Greenie organizes a yearly Clean Up Australia Day with activities on land and underwater around Cocos and assist the Cocos school with environmental activities such as surveying fish nursery areas and leading discussions on endangered species. Additional Reef Check activities in Cocos include working with various clubs, private businesses and other government and non-government agencies to install mooring buoys around the islands for commercial dive operations. The program has installed 23 public moorings at nine locations around Cocos. During Reef Check

surveys, only four incidences of coral damage from anchors were observed on all reefs, an indication that the mooring program has been effective.

Reef Check teams have been conducting yearly surveys of Cabbage Patch reef since 1997. Numbers of organisms have remained consistent over time. The site has been devoid of snapper, barramundi cod, bumphead parrotfish and lobster for five years. Historically, Indonesians fished the area. However, giant clams are abundant and have been found each year, with a mean of 16.0 ± 12.9 per 100 m² reef. Similarly, sea cucumbers have been found each year, with a mean of 5.8 ± 6.9 per 100 m² reef.

COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS (SAIPAN AND ROTA)

The Commonwealth of the Northern Mariana Islands (CNMI) is a chain of 15 islands, with most of the population centered on Saipan, Rota, and Tinian. All islands have well-developed fringing reefs, and feature 254 species of hard coral. The reefs are affected by sedimentation and nutrient enrichment in coastal waters and net fishermen walking on shallow reefs. In 1999, the Rota high school marine science club, led by teacher Lisa Skilag and then University of Guam marine scientist Dr. Sandra Romano, conducted the first Reef Check surveys in CNMI, off Teteto beach. The group used Reef Check to help educate the students about their local resources and what they could do to help conserve and protect coral reefs. The next year the Reef Check program expanded to Saipan where Peter Houck, marine biologist with the Division of Environmental Quality, and John Starmer, Coastal Resources Management, led surveys at Obyan beach. The program has continued to grow to include volunteers from the Northern Marianas Divers Association (NMDA).

In 2001, in conjunction with the GCRMN/MAREPAC coordinators meeting, Reef Check Saipan hosted an international Reef Check training. Led by RC Program Manager Jennifer Liebeler and RC Saipan Coordinator John Starmer, the training involved 22

participants, including government officials and scientists from Chuuk (FSM), Kosrae (FSM), Pohnpei (FSM), the Republic of the Marshall Islands, Guam, Palau, Rota (CNMI) and Saipan (CNMI). Also attending the training were thirteen volunteers from the NMDA. The participants from NMDA have since received training materials translated into Japanese, courtesy of RC Japan, and are training Japanese visitors in Reef Check methods with support from several dive shops in Saipan, including Blue Horizon Divers, Coral Diver, Squall Divers, Big Dog Divers, and Sea Shore Diving. As a result of the training, Reef Check teams are now being set up in Chuuk (Federated States of Micronesia) and the Republic of the Marshall Islands.



The Northern Marianas Divers Association, with members from local dive shops, joined by Carol Emmarois and Francis Matsutaro, from PICRC, pose after a successful Reef Check training at Obyan Beach in Saipan. Photo by Jennifer Liebeler.

CUBA

Cuba, with approximately 2400 miles of almost continuous reef, has some of the best reefs in the Caribbean. However, due in part to sewage, oil-related pollution, and mining and industrial discharges, Cuba's reefs and reef fisheries are deteriorating. RC Cuba and their extensive volunteer network are doing their part to save Cuba's reefs. RC Cuba coordinator Susel Castellanos Iglesias and her team conducted a local workshop in the summer of 2001 in the Rincon de Guanabo area.

"Our group has found Reef Check to be a good methodology to involve all shore communities in the conservation of Cuba's coral reefs." - Susel Castellanos Iglesias, RC Cuba coordinator

The trainees were from Flora Y Fauna, a management center responsible for protecting habitat in Cuba and the Sibarimar Dive Club. RC Cuba has been successfully involving coastal communities in coral reef conservation. This is no easy task; RC Cuba members often conduct surveys without the use of a boat, and swim up to one kilometer to some of their survey sites. The team's hard work has also contributed to conservation efforts around Latin America. Thanks to Susel and volunteers Mario González Martín, Enrique Genes Dueñas, and Mario Oscar Alvarez, the Reef Check training material is now available in Spanish.

EGYPT

BY DR. MOSHIRA HASSAN

Reef Check got off to a spectacular start in the Red Sea during the International Year of the Reef, 1997. Started mainly as a public awareness campaign, the Egyptian and European (German) team jointly used Reef Check to promote active reef conservation within the tourist sector in both regions. Since then, the program has achieved this goal and grown to include a much larger aim and more sites have been added since then.

During the summer of 1997, over forty sites were surveyed throughout the Egyptian Red Sea, involving more than 200 tourist

volunteers from Egypt and foreign countries. This impressive start was achieved through coordinated efforts between dive shops and scientists. Two scientists, Moshira Hassan and Gert Woerheide, coordinated the surveys and recruited 13 scientists from Australia, Germany, Egypt, Netherlands, and the UK to travel to Egypt for a period of two to three weeks each. This merging of science and the tourism industry proved to be the perfect way to increase public awareness.

Reef Check groups in Egypt and Germany also involved the media and corporate sponsors to enlarge the reach of the conservation message. German and Swiss TV documented a number of the surveys and broadcasted films on Reef Check in the Red Sea throughout Europe. Articles have been featured in a number of politically based, as well as environmentally based, magazines in the Middle East and in Europe. Corporate sponsorship included reduced rates for flights from a number of airlines, free accommodation through local hotels, donated T-shirts, underwater writing slates, certificates of participation, and other Reef Check materials from local businesses. Together, these groups are working to preserve the corals of the Red Sea while supporting sustainable businesses. Dive centers and hotels continue to be added to the list of sponsors.

Since 1997, Reef Check has become a permanent and supported part of the European diving community, as well as the local Egyptian tourism industry. Moshira Hassan and Georg Heiss continued to coordinate Reef Check in the Red Sea after its spectacular beginning.

Reef Check has also been adopted as a standard survey protocol by a number of scientific groups in Egypt during 2002. For example, Dr. Mohammed Kotb, at the University of Ismailia, has used Reef Check to train rangers of the Egyptian Environmental Affairs Agency as well as the Park Authority in Egypt, who will continue to survey the reefs under his direct supervision. There are also plans to train students at the Suez Canal University in Ismailia and at the American University in Cairo in the Reef Check survey methods and to incorporate Reef Check in the syllabi of marine biology courses.

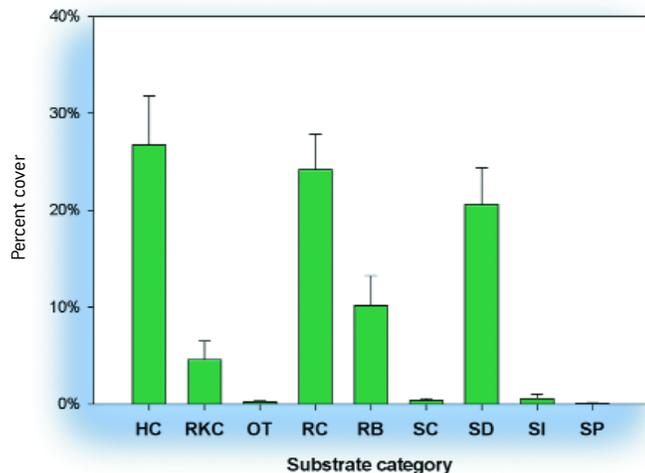
In general, Reef Check surveys have found the reefs in Egypt to be in much better condition than expected, especially in the regions of Sharm el Sheikh, Hurghada and Safaga, considering the high diving pressure and construction activities. The management efforts of the National Parks and NGOs appear to be actively helping to preserve and protect the reefs. For example, the installation of mooring buoys has resulted in less broken corals at areas where anchoring was damaging the reefs.

Reef Check in other areas of the Red Sea

Reef Check has also extended its reach in the Red Sea. Surveys of the region include Eritrea, Israel, Saudi Arabia and Yemen. Two new coordinators have recently been recruited: Malek Abdal-Aziz in Yemen and Dr. Nabil Mohammed in Djibouti. Both are extremely enthusiastic and will continue to expand Reef Check effort in their countries in 2002.

HAWAII

The island of Kauai in the Hawaiian Islands was the site of the world's first volunteer Reef Check survey on June 14th, 1997.



Hawaii substrate results



Dave Raney (right), RC coordinator explains Reef Check methodology to Jeff Kuwabara (left), Hanalei Bay education coordinator, and another volunteer during a training in Waikiki. Photo by Jennifer Liebler

Organized by former Hawaii Coordinator Carl Stepath, team scientists included Jim Maragos, Alan Friedlander, Rick Grigg and Cindy Hunter. The first survey was held in conjunction with the CleanOceans '97 conference, organized by Robert Kennedy Jr., senior attorney for the Natural Resources Defense Council. Since that time, Reef Check Hawaii has been growing steadily.

After receiving funding from US NOAA and the State of Hawaii Coastal Zone Management Program, Reef Check Hawaii has expanded under the guidance of RC Coordinator Dave Raney and many others, and now includes all the major Hawaiian Islands. Activities on Oahu include bi-monthly surveys of reefs around the island and educational activities held in conjunction with the Waikiki Aquarium.

The threshold for having a sufficient number of surveys to assess individual islands and reefs has recently been reached. Taken together, the results show that the Hawaiian reefs surveyed have live coral cover [26.7 ± 2.1%] just below the Indo-pacific regional average and recently killed coral is relatively low [4.5 ± 7.7%]. The highest hard coral cover recorded was 42%, from a survey done in 2001 at Palauea Beach in Maui.

INDONESIA

The world's largest archipelago, Indonesia consists of more than 30,000 islands and is located at the center of the world's coral reef diversity with some 75,000 km² of reefs, approximately one-eighth of the world's total.

Reef Check Indonesia began in 1997, and since that time, Reef Check Indonesia has had a hugely successful partnership with the WWF Wallacea Program based in Bali. With funding from the Macarthur Foundation and from the USAID East Asia Pacific Environment Initiative, a network of training centers has been developed in 13 islands around Indonesia. A series of training events has taken place with dozens of trainees from the private sector, fisheries department, and other NGOs. To facilitate training of local community members, training materials and indicator organism underwater identification cards were translated into Bahasa Indonesia.

Since 1997, over 270 volunteers have been trained in Reef Check methods and educated about coral reef conservation and management. Reef Check training workshops and surveys have been conducted in 14 of 29 provinces: Sumatra Barat, Lampung, Jakarta, Banten, Jawa Barat, Jawa Tengah, Jawa Timur, Bali, Nusa Tenggara Barat, Nusa Tenggara Timur, Kalimantan Timur, Sulawesi Utara, Sulawesi Selatan, and Sulawesi Tenggara.



Reef Check team proudly displays their banners.

The data collected have been used to compile comprehensive reports in Bahasa Indonesia, which were circulated at the highest levels of Indonesian government. In fact, one Minister participated directly in a RC survey. RC Indonesia is planning to increase the number of Reef Check locations to an additional ten provinces and gain more volunteers in 2002 in preparation for the establishment of the Reef Check Indonesia Center in Bali, 2003.

With the help of Operation Wallacea, Reef Check is being used to help monitor and manage the Wakatobi Marine Park in the Tukang Besi Islands. These islands are an area of rich biological diversity and provide livelihoods for thousands of coastal people. In 2000, Reef Check was used to survey a range of 19 reefs across the archipelago and baseline assessments of coral reefs were conducted concentrating on benthic condition, reef fish families and invertebrate indicators of stress as designed by the Reef Check program. In the 2001 season Operation Wallacea teams again took part in Reef Check and visited a total of 37 sites during the survey period June – October.

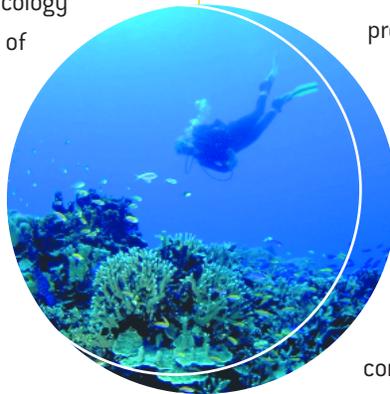
Reef Check Indonesia has been very successful in using the media to educate Indonesians about threats to coral reefs and what Reef Check is doing to protect corals. Reef Check has been publicized by SCTV, Bali Sun, TVRI Lampung, Indosair Jakarta Post, Nusa Newspaper, Radio News 68H, Paradise FM, Top FM, Pinguin FM, and other local radio stations and newspapers in Indonesia.

Perhaps the most rewarding media effort came when Reef Check/WWF helped Nugie, a popular singer, write his hit song 'Hingga ke Terumbu Karang' (Up To the Reef), which promotes coral reef conservation and relates the impacts of poorly planned development on land to the impacts on downstream coral reefs. Nugie sang his song at Bali Hardrock Café Hotel to help celebrate "Ocean Day" on June 14th 2001. Attendees from the Bali "Kids club" sang along and learned about their reefs. The song was spotlighted on MTV Asia and has helped raise awareness and knowledge among the younger generation.



"If I were a fish". Artist and contest winner: Angela K. Winna, St. Yoseph's elementary school.

In another successful educational program, Reef Check and Friends of the Reef, an NGO dedicated to coral reef conservation, held a drawing competition among elementary school children in Bali. The children were taught about coral reef ecology and conservation and asked to draw pictures of themselves as fish. Hundreds of beautiful drawings were sent by talented children and have included one winning entry is shown here. Reef Check has used these wonderful works of art on promotional materials in Indonesia and elsewhere to raise awareness about coral reef conservation.



A diver descends onto a pristine and highly diverse coral reef community to find an appropriate area to set up permanent transect line for future monitoring surveys. Photo courtesy of Reef Check Kosrae.

KOSRAE

Kosrae is one of the jewels of the Federated States of Micronesia, a tiny (43 square mile) and mountainous island in the Central Tropical Pacific just five degrees north of the equator. Due to its unique location, the island has some of the most diverse and healthiest corals in the world. The local fringing reef has provided sustenance to the islanders for centuries and as a result, the Kosraeans are very committed to the protection and continued good health of their reefs.

Katrina Adams at Kosrae Village Resort established Reef Check Kosrae in 1999. She recruited volunteer sport divers who were

visiting the region and willing to donate their vacation time to a worthwhile cause. Over the past five years, Katrina and Kosrae Village have continued to host RC Kosrae and have teamed up with the Kosrae State Fisheries and Marine Resources and the Kosrae Conservation and Safety Organization to expand conservation projects on the island.

Early efforts by RC Kosrae have grown to include an annual month-long training for all 9th grade students on the island in reef ecology and monitoring techniques. This program, run in collaboration with the Marine Resources Department, also teaches the students to analyze the data gathered, thereby strengthening their math skills. Marine Resources has also added a monthly monitoring session that is carried out by local volunteers and staff year-round. The collaboration between RC Kosrae and the Kosrae State Department of Fisheries and Marine Resources works well, with RC Kosrae and Kosrae Village providing the manpower and equipment and Marine Resources providing direction and supervising data collection.

Other conservation projects on Kosrae include the Kosrae Reef Protection Project, which was established in 1996 and has since involved the community in the installation of 56 mooring buoys around the island at the most popular dive and fishing spots. The buoys protect the reefs by providing anchorage to anyone using the ocean: fishermen, divers, swimmers and snorkelers. These mooring buoys also serve as permanent markers for the 20 coral monitoring sites established by RC Kosrae over the past three years.

Results of surveys conducted on these buoys reveal the highest hard coral cover of any Kosrae survey. The mean hard coral cover was $57.0\% \pm 58\%$, with a range from 28 to 78% hard coral cover. Dead coral cover was consistently low on all reefs, a mean of $2\% \pm 2\%$. The consistently high hard coral cover is likely due to the relatively low levels of anthropogenic impacts on the reef and the location of Kosrae, south of the typhoon track. Reef Check

surveys have also been used to track damage to corals from anchors. Incidence of damage to corals at the monitoring buoys fell from an average of 1.2 broken corals per reef in 2000 to 0.36 broken corals per reef in 2001, an indication that the mooring buoys are effective in preventing anchor damage.

"The Reef Check protocol makes coral monitoring and reef preservation accessible to the community. Since the advent of the coral monitoring project on Kosrae we have seen a tremendous increase in awareness amongst the Kosraean community. We plan to continue building our programs to develop community based marine protected areas and other conservation projects." – Katrina Adams, Reef Check Kosrae

The abundance of indicator organisms is also relatively high. Kosraean reefs had an average of 4.01 ± 4.2 parrotfish per 100 m² reef, four times the regional average, with a maximum of 16.5 parrotfish per 100 m² reef. On Kosrae, 64% of reefs surveyed contained at least one parrotfish. Grouper were also relatively abundant, with 69% of all reefs surveyed recording at least one grouper, and with an mean of 1.05 ± 1.04 grouper per 100 m² recorded, about double the average for the Indo-pacific region. Similarly, snapper were relatively abundant, with at least one snapper found on 73% of all reefs, with an average on all reefs of 3.65 ± 2.39 snapper per 100 m².

Sea cucumbers were relatively rare, with a mean of 0.25 ± 0.26 sea cucumbers per 100 m² reef, and 82% of all reefs reporting zero sea cucumbers. Although sea cucumbers are not eaten in Kosrae, they have been collected for export sales in the past. This practice is currently banned, however it remains to be seen if the cucumber population will rebound.

REEF CHECK CEBU (PHILIPPINES)

BY MIKE ROSS, REEF CHECK COORDINATOR

The island province of Cebu is centrally located in the Philippine archipelago. The fringing coral reefs of Cebu, together with those of the adjacent island provinces of Bohol and Negros, are noted for their high biodiversity and sheer beauty. Once a major magnet to divers from around the world, these reefs have lost their attraction in recent years due to the decline in coral quality and marine life as a result of overfishing, poison fishing, and blast fishing.

Mike and Nora Ross, who coordinate Reef Check operations through their dive shop, Tropical Island Adventures (www.cebudive.com) established Reef Check Cebu in 1998. Today, Reef Check is successfully addressing the problems facing Cebu's reefs by involving key stakeholders, including local resorts, dive operators, dive instructors, and other concerned divers in monitoring and management projects. RC Cebu has been instrumental in mobilizing the active support and resources of key stakeholders within the dive and resort community.

The local fishermen and coastal community members of Cebu often do not directly benefit from many popular reef uses, such as recreational diving and tourism and view these activities as impinging upon their fishing grounds. As a result, many of these individuals have negative attitudes towards recreational divers, tourism and related reef conservation activities. Dive-based tourism, which is a major attraction in the Cebu area, is often viewed as a luxury sport operated by "outsiders" providing local communities limited economic benefits or sources of livelihood. Most reef surveys and studies have also historically been conducted by outside scientists and managers who use the resulting data either offsite or to regulate fishing. There is often little communication between managers and locals, leading to distrust and disinterest.

To help overcome this lack of community involvement Reef Check Cebu sponsors free or highly discounted PADI scuba certification courses and Reef Check training to selected community members. These community members become directly involved

in Reef Check surveys and conservation activities after successfully completing their training courses. In addition, introductory PADI "Discover SCUBA Diving" courses have been provided to key decision makers, such as local mayors and a vice-governor, to further educate them about their underwater resources.

In the process, Reef Check Cebu is proud to have helped to develop several "champions" of reef surveys and conservation from the nearby island communities. Examples of these "Reef Check Champions" include "Nong Tuti" Menguito and "Jun" Ochea, who was selected to participant in Reef Check trainers' training held in Phuket, Thailand in November 2001 [See "Reef Check Champions"].

Although Cebu is surrounded by coral reefs; the public and private schools of the area offer very little formal education on reef ecology and awareness. This lack of general awareness is reflected in the common name for corals in the Cebu dialect, *bato sa dagat*, a term literally translated as "sea rocks". Many local residents simply do not know that corals are sensitive, living animals. Reef Check Cebu, assisted by local partners, has developed and is conducting simple yet exciting educational programs on reef ecology and conservation. These reef awareness and education programs have proved particularly popular with young students from the coastal communities of Mactan and Olango Islands.

The Cebu International School (CIS) has expanded this program to include various PADI scuba certification courses, orientation on the Reef Check program, and community-based management of MPAs. This on-going program proved equally interesting to the parents, many of whom are influential business leaders and resort owners in the area.

An increasing number of success stories and local "Reef Check Champions" are providing renewed inspiration for improving reef conservation in the Cebu area and beyond through the Reef Check program.

Recently, Mike and Nora founded the Coastal Dynamics Foundation to further support their Reef Check and reef

conservation activities. The foundation directly involves a growing cross-section of concerned local individuals and Reef Check teams. In recognition of innovative efforts to help establish and monitor marine protected areas (MPAs) using the Reef Check program, the foundation has been awarded two grants by the PADI Foundation. A larger project funded by the US National Oceanic and Atmospheric Administration (NOAA) will help introduce socio-economic assessment approaches. A primary focus of these project activities will be the islands of Mactan and Olango, which may represent some of the most accessible, high diversity reefs in the world due to their proximity to Cebu City, the second largest urban area in the Philippines.

REEF CHECK CHAMPIONS
BY MIKE ROSS

Jun Ochea is a unique individual who has worked with RC Cebu (Philippines) for five years and now serves as lead boat operator, dive guide and all around great guy. Jun is from Olango Island from a community called Talima. Talima is infamous for being a home base to *pala-ut*, or long-distance fishermen who, as a result of the degraded/depleted conditions of their own reefs, venture each year all over the Philippines. Paid by their catch (which is determined by whatever the trips "sponsor" has ordered, such as marine aquarium species, dried sea cucumbers, shells and the like) they dive these outer reefs for months, either free diving or using improvised "hookah" compressors consisting of an old paint compressor and typically a beer keg as a reserve tank. This is highly dangerous work, which claims many young lives each year and pillages many reefs. For more information on Olango and this type of fishing, please visit www.oneocean.org.

Jun has become a well-qualified Reef Checker, and has participated in a dozen surveys and presented the results at the recent Reef Check regional training in Phuket, Thailand. As a former fisherman, Jun has been able to communicate with other fishermen on his island and to educate them on the importance of reef conservation efforts.

Nong Tuti Menguito

The Gilutongan Marine Sanctuary is very effectively managed and monitored by a Reef Check Champion" – Nong Tuti Menguito. Following his PADI diver training, Nong Tutu was trained in Reef Check methods and has actively lead the survey and data

analysis teams for the last four years, using dive equipment and support services provided through Reef Check Cebu. Highlighting his unique character and accomplishments, Nong Tuti was recently featured in a Reader's Digest article. His beloved sanctuary has now become a popular site for other communities and scientists to visit, study and learn more about this exciting success story and new model for conserving reefs and enhancing economic benefits to local communities by using Reef Check.

TONGA
BY SEIJI NAKAYA

The Kingdom of Tonga is located approximately two-thirds of the way from Hawaii to New Zealand. The 171 islands that make up Tonga stretch 1000 km from Minerva Reef in the south to the island of Niuafu'ou in the north and spread over 700,000 square kilometers of the South Pacific.

The first Reef Check survey in Tonga was conducted in January 2002 on the northern reef of Pangaimotu Island, about 4km northeast of Tongan Capital, Nuku'alofa by a team from the Department of the Environment (DoE). The team is a perfect example of the international cooperation that often surrounds Reef Check. The team was led by Asipeli Palaki, marine conservation officer with the DoE and Seiji Nakaya, an advisor for marine park management from the Japan International Cooperation Agency who had previously led Reef Check surveys in Japan. Other DoE staff and US Peace Corps volunteers joined the leaders. Preliminary results show the reefs were relatively healthy, with no obvious signs of damage from anchors, sedimentation, or dynamite fishing. Although the density of fish was relatively low, the average hard coral cover was 40.5%. This is about 10% above the regional Indo-pacific average.

The reef surrounding Pangaimotu Island is one of five MPAs in Tonga. Although it has been in existence since the 1970's, it is the closest to the capital and the most heavily visited. Unfortunately, due to budget shortfalls, enforcement is lacking and fishing is common throughout the no-take MPAs. DoE has now drafted a management plan of the MPAs and is about to start implementation of the management. Reef Check will be an important part of the monitoring and awareness components of the management plan.

REEF CHECK IN THE VIRGIN ISLANDS
BY LENA MAUN, REEF CHECK ASSISTANT
PROGRAM MANAGER

In May 2002, Reef Check led its first public education monitoring expedition to St John, in the US Virgin Islands. Ten participants ranging in age from 17 to 65 joined Reef Check staff members and UCLA graduate students, Lena Maun and Craig Shuman on the trip to the Eastern Caribbean. The proximity of St. John to the continental United States, beautiful beaches, coral reefs and a distinct culture attract over one million tourists annually. Although the island is two-thirds US National Park (including Park protected waters), the island's marine system is affected by anthropogenic impacts from both land (sedimentation) and sea (fishing and dive impacts). Because St. John and the other surrounding US and British Virgin Islands depend on tourism for the majority of their local economies, however, there is an incentive to protect the natural resources.

The Reef Check expedition team, made up of people from the United States and United Kingdom, spent ten days in the field learning about coral reef ecology and monitoring, and human impacts on the Virgin Island's marine system. The trip was organized through the University of California's University Research Expeditions Program (UREP) and served as a successful test of implementing such trips as a regular feature of Reef Check. The group worked with local Reef Check coordinators, scientists from the Virgin Islands National Park (VINPS), the University of the Virgin Islands (UVI) and the Division of Fish and Wildlife, local dive shop owners from both the US and British Virgin Islands, and local US and British NGO's to develop a plan to integrate Reef Check into the larger coral reef management and eco-tourism picture. Reef Check and other programs that provide the public with a way to learn about natural resources in a low impact manner will help provide sustainable eco-tourism options to areas such as the Virgin Islands.

- Adams, T.J.H., J. Leqata, P. Ramohia, M. Amos, and P. Lokani. 1992. Pilot survey of the status of trochus and beche-de-mer resources in the Western Province of the Solomon Islands with options for management June/July 1992 IFRP UNPUBLISHED COUNTRY REPORT, South Pacific Commission. Inshore Fisheries Research Project assisting the Solomon Islands Government Fisheries Division.
- Adams, T. and P. Dalzell. 1993. Pacific Island Lobster Fisheries: Bonanza or Bankruptcy? Fisheries Newsletter of the South Pacific Commission Fisheries Programme - Number 67 (October-December 1993), pages 28-33. Inshore Fisheries Research Project South Pacific Commission New Caledonia.
- Beinssen, K. 1988. Boulton reef revisited. Reeflections 21: 8-9.
- Beinssen, K. 1989. Results of the Boulton Reef replenishment area study. Report to the Great Barrier Reef Marine Park Authority, Townsville, Australia.
- Birkeland, C. 1989. The Faustian Traits of the Crown-of-thorns Starfish. American Scientist 77: 155-63.
- Bohnsack, J.A. and S.P. Bannerot. 1986. A stationary visual census technique for quantitatively assessing community structure of coral reef fishes. NOAA Technical Report NMFS. 41:15.
- Bryant, D., L. Burke, J. McManus, and M. Spalding. 1998. Reefs at Risk: a map-based indicator of potential threats to the world's coral reefs. World Resources Institute, Washington, DC.
- Carson, R. 1950. The Sea Around Us. Oxford University Press, New York, USA.
- Chesher, R. 1988. Report to Great Barrier Reef Marine Park Authority. World Wide Web electronic publication. <http://www.omnicom.com.au/charonia/report88.htm>.
- Clarke, K.R. and R.M. Warwick. 2001. Change in Marine communities: an approach to statistical analysis and interpretation, 2nd edition. PRIMER-E. Plymouth, UK.
- Conand, C. 1998. Overexploitation in the present sea cucumber fisheries and perspectives in mariculture. In: R. Mooi and M. Telford (eds.) Echinoderms: San Francisco, Balkema: 449-454.
- Cousteau, J.Y. 1964. The Living Sea. Harper & Row, New York, USA.
- Craik, G.J.S. 1981. Recreational fishing on the Great Barrier Reef. Proc. 4th Int. Coral Reef Symp., Manila. 1: 47-52.
- Reece, E. and M.P. Crosby. 1996. A Manual for Monitoring Coral Reefs with Indicator Species: Butterflyfishes as Indicators of Change on Indo Pacific Reefs. Office of Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration, Silver Spring, MD. 45 pp.
- Darwin, C. 1851. The Structure and Distribution of Coral Reefs. California Library Reprint Series Edition (1976) University of California Press, Berkeley and Los Angeles, California, USA.
- Ebert, T.A. and R.F. Ford. 1986. Population ecology and fishery potential of the spiny lobster *Panulirus penicillatus* at Enewetak Atoll, Marshall Islands. Bull. Mar. Sci. 38 (1): 56-57.
- Edmunds, P.J. and R.C. Carpenter. 2001. Recovery of *Diadema antillarum* reduces microalgae cover and increases abundance of juvenile corals on a Caribbean reef. Proc. Nalt. Acad. Sci. 98:9 5067-71.
- Evans, C.R. and A.J. Evans. 1996. A practical field technique for the assessment of spiny lobster resources of tropical islands. Fisheries Research. 1996. 26(1-2): 149-69.
- FAO. 2002. FAO STAT. World Wide Web electronic publication. <http://apps.fao.org/fishery/fprod1-e.htm>
- Ferreira, B.P. and Russ, G.R. 1995. Population structure of the coral trout, *Plectropomus leopardus* on fished and unfished reefs off Townsville, central Great Barrier Reef, Australia. Fishery Bulletin 93: 629-642.
- Ginsburg, R.N. 1993. Global aspects of coral reefs; Health, Hazards and History. Case Histories, Miami: University of Miami. 385 pp.
- Gomez, E., A. Alcala, et al. 1981. Status of Philippine coral reefs - 1981. Proceedings of the 4th International Coral Reef Symposium, Manila.
- Green, R.H. 1979. Sampling Design and Statistical Methods for Environmental Biologists. John Wiley, New York.
- Grignard, J.C., P. Flamman, DJW Lane, and M. Jangoux. 1996. Distribution and abundance of the echinoid *Diadema setosum* (echinodermata) on sediment-stressed coral reefs in Singapore. Asian Marine Biology 13 (0): 123-32.
- Harris, M. 1999. Lament for an Ocean. McClelland and Stewart Inc, New York.
- Hawkins, J.P., C.M. Roberts, T. Van't Hof, K. De Meyer, J. Tatalos, and C. Aldam. 1999. Effects of Recreational SCUBA diving on Caribbean Coral and Fish Communities. Cons. Bio. 13 (4): 888-97.
- Heslinga, G.A. and T.C. Watson. 1985. Recent Advances in Giant Clam Mariculture. Proceedings of the Fifth International Coral Reef Congress. 5: 531-537.
- Hodgson, G. 1999. A global assessment of human effects on coral reefs. Mar. Pollut. Bull. 38: 345-355
- Hodgson, G. 2000. Coral Reef Monitoring and Management Using Reef Check. Integrated Coastal Zone Management. 1(1): 169-176.
- Hodgson, G. 2001. Reef Check: The first step in community-based management. Bull. Mar. Sci. 69(2): 861-868.
- Hodgson, G. and J.A. Dixon. 2000. El Nido Revisited: Ecotourism, Logging and Fisheries. Cesar, H. (Ed.) In: Collected Essays on the Economics of Coral Reefs, CORDIO, Kalmar University, Kalmar, Sweden.
- Hodgson, G. and C.M. Stepath. 1999. Using Reef Check for long-term coral reef monitoring in Hawaii. p. 173-184. In: Maragos JE, Grober-Dunsmore R (eds). Proceedings of the Hawaii Coral Reef Monitoring Workshop, June 8-11, 1998. Department of Land and Natural Resources and East-West Center for Development, Honolulu, HI, USA. 334 pages.
- Hughes, T.P. 1994. Catastrophes, Phase Shifts, and Large-Scale Degradation of a Caribbean Coral Reef. Science 265: 1547-1551.
- Hughes, T.P., D.C. Reed, and M.J. Boyle. 1987. Herbivory on coral reefs:

- community structure following mass mortalities of sea-urchins. *J. Exp. Mar. Biol. Ecol.* 113: 39-59.
- Jackson, J.B.C. 1997. Reefs since Columbus. *Proc 8th Int. Coral Reef Symp.* 1: 97-106.
- Jackson, J.B.C., et al. 2001. Historical overfishing and the recent collapse of coastal ecosystems. *Science.* 293: 629-637.
- Johannes, R.E. and M. Riepen. 1995. Environmental, economic, and social implications of the Live Reef Fish trade In Asia and the Western Pacific. Report to the south Pacific Commission and The Nature Conservancy, Honolulu, 81p.
- Koslow, J.A., F. Hanley, and R. Wicklund. 1988. Effects of fishing on reef fish communities at Pedro Bank and Port Royal cays, Jamaica. *Mar. Ecol. Prog. Ser.* 43: 201-212.
- Lau, P.P.F and R. Parry-Jones. 1999. The Hong Kong Trade in Live Reef Fish For Food. TRAFFIC East Asia and World Wide Fund For Nature Hong Kong, Hong Kong.
- Lessios, H.A. 1995. *Diadema antillarum* 10 years after mass mortality: still rare, despite help from a competitor. *Proc. R. Soc. Lond.* 259: 331-337.
- Lokani, P. 1992. Survey of Commercial Sea-cucumbers (Beche-de-mer) in the West New Britain Province, Papua New Guinea. PNG Department of Fisheries and Marine Resources.
- Ludwig, D. R. Hilborn and C. Walters. 1993. Uncertainty, resource exploitation and conservation: Lessons from history. *Science.* 260: 17 and 36.
- McElroy, S. 1990. Beche-de-mer species of commercial value - an update. South Pacific Commission Beche-de-mer Information Bulletin [2] 2-7.
- Miller, M.W, and C.L. Gerstner. Reefs of an uninhabited Caribbean Island: Fishes, benthic habitat, and opportunities to discern reef fishery impact. *Biological Conservation.* 2002 106 (1): 37-44.
- Munro, J.L. 1983. Caribbean Coral Reef Fishery Resources. *ICLARM Stud. Rev.* 7:1-276.
- Ogden, J.C. and R.C. Carpenter. 1987. Species profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (South Florida)--Long spined Black Sea Urchin. U.S. Fish and Wildlife Service Biol. Rep. 82(11.77) pp 17.
- Pielke, R.A. Jr. and R.A. Pielke, Sr. 1997. Hurricanes- their nature and impacts on society. Wiley, New York. 279pp.
- Prescott, J. 1980. Report on the South Pacific Commission lobster project in Solomon Islands. SPC Report 205/80, Noumea, New Caledonia.
- Roberts, C.M. 1995. Effects of fishing on the ecosystem structure of coral reefs. *Cons. Bio.* 9: 988-995.
- Roberts, C.M., et al. 2001. Effects of Marine Reserves on Adjacent Fisheries. *Science.* 294: 1920-1023.
- Russ, G. 1985. Effects of protective management on coral reef fishes in the central Philippines. *Proc. 5th Int. Coral Reef Congr.* 4: 219-224.
- Russ, G. and A.C. Alcala. 1989. Effects of intense fishing pressure on an assemblage of coral reef fishes. *Mar. Ecol. Prog. Ser.* 56: 13-27.
- Sadovy, Y. 1997. Problems of sustainability in grouper fisheries. *Proc. Fourth Asian Fisheries Forum, China Ocean Press, Beijing,* pp. 321-324.
- Sadovy, Y. 1999. The case of the disappearing grouper: *Epinephelus striatus*, the Nassau grouper, in the Caribbean and western Atlantic. *Proc. Gulf Carib. Fish. Inst.* 45: 5-22
- Sadovy, Y. and A. M. Eklund. 1999. Synopsis of biological information on *Epinephelus striatus* (Bloch, 1972), the Nassau grouper, and *E. itajara* (Lichtenstein, 1822) the jewfish. U. S., Dep. Commer., NOAA Tech. Rep. NMFS 146, and FAO Fisheries Synopsis 157, 65 p.
- Sap, J. 1999. What is natural? Oxford University Press, New York. 275 p.
- Saville-Kent, W. 1893. The Great Barrier Reef of Australia: Its Products and Potentialities. W.H. Allen and Co. London.
- Shang, Y.C., C. Tisdell, P.S. Leung. 1989. Report on a market survey of giant clam products in selected countries. Center for Tropical and Subtropical Aquaculture - Publication #107. University of Hawaii, Honolulu, HI.
- Sluka R., M. Chiappone, K.M. Sullivan, and R. Wright. 1997. The benefits of a marine fishery reserve for Nassau grouper (*Epinephelus striatus*) in the central Bahamas. Proceedings of the 8th International Coral Reef Symposium, Panama. 2: 1961-1964.
- Spalding, M.D., C. Ravilious, and E.P. Green. UNEP-WCMC World Atlas of Coral Reefs. University of California Press, Berkeley, California, USA.
- Tissot, B.N. and L.E. Hallacher. 1999. Impacts of aquarium collectors on coral reef fishes in Kona, Hawai'i. Report for Division of Aquatic Resources, State Of Hawaii.
- Trianni, M.S. 2002. SPC Beche-de-mer Information Bulletin #16. Summary of data collected from the sea cucumber fishery on Rota, Commonwealth of the Northern Mariana Islands. World Wide Web electronic publication. <http://www.spc.org.nc/coastfish/News/BDM/16/BDM16.htm>
- Vo, S.T. and G. Hodgson. 1997. Coral reefs of Vietnam: Recruitment limitation and physical forcing. In: H.A. Lessios [ed] *Proc. 8th Int'l Coral Reef Symposium.* pp. 477-281.
- Wantiez, L., et al. 1997. Effects of marine reserves on coral reef fish communities from five islands in New Caledonia. *Coral Reefs.* 16:215-224.
- Weng, K. and M. Guilbeaux (eds.). 2000. Marine Resources of Helen Reef in the Year 2000. Community Conservation Network, Honolulu, Hawaii. Page 6.
- Wilkinson, Clive [ed.]. 2000. Status of Coral Reefs of the World: 2000. Australian Institute of Marine Science, Townsville, Australia.
- Yeeting, B.M., P. Labrosse, and T.J.H Adams. 2001. The Live Reef Food Fish of Bua Province, Fiji Islands: A first assessment of the stock potential and guidelines for a management policy. Secretariat of the Pacific Community, NOUMEA. New Caledonia. (February).

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courtesy of Coral Reef Adventure, MacGillivray Freeman Films

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THIS REPORT IS DEDICATED TO LADAN MOHAJERANI
(NOVEMBER 14, 1973 – OCTOBER 31, 2000)
WHO WAS AN ENTHUSIASTIC FREE SPIRIT WITH A TRUE
LOVE OF THE OCEAN AND CORAL REEFS. SHE WILL
ALWAYS BE AN INSPIRATION TO THOSE WHOSE LIVES
SHE TOUCHED.

