

GOOD DIVERS ARE ALWAYS LEARNING

Dive Training™

JANUARY 2008

THE MONTHLY MAGAZINE FOR NEW DIVERS & THEIR INSTRUCTORS®

The **AMPHIBIAN** Adventure:

A **Dive**
Vacation Is
More
Than **Just**
a Vacation

**The History of Sharks and Humans, Part Two:
The Risky Relationship of Predator vs. Prey**

*Reef Check: Enlisting Divers
to Monitor the World's Coral Reefs*

**Backup Plans: Adapting Your Diving
to Avoid Aggravating Your Back**

\$4.95 US./CANADA/INT'L





The Amphibian Adventure: A Dive Vacation Is More Than Just a Vacation

Although the primary focus of an amphibian vacation is diving, a dive vacation can be as structured and action-packed or as flexible and laid-back as one desires. The first question to answer is, "Do I want a vacation with diving or a dive vacation?" The first involves going on vacation and diving; the latter is going on a vacation to dive. Often it's the diving that attracts amphibian adventurers to a specific destination.

BY LYNN LAYMON

Reef Check: Enlisting Divers to Monitor the World's Coral Reefs

It's often been said that coral reefs are the rain forests of the ocean. Their value to the marine environment is immeasurable but, sadly, their future is uncertain. Now, with the help of volunteer divers, scientists are finding ways to better monitor the condition of the reefs, gaining a better understanding of the role reefs play in the environment, and providing hope that man can do something about coral reefs before it's too late.

BY ALEX BRYLSKE



The History of Sharks and Humans, Part Two: The Risky Relationship of Predator vs. Prey

In last month's article, "The History of Sharks and Humans, Part One: From Fear and Loathing to Fascination," we examined the relationship of man and sharks, starting from man's earliest written accounts of fearful shark encounters to the modern-day popularity of shark diving and the current controversy surrounding shark feeding. In this installment we'll examine the very risky relationship of predator vs. prey and how it's evolved over time.

BY ERIC HANAUER

The Covers

BY BARRY AND RUTH GUIMBELLOT



Turning a "vacation with diving" into a "dive vacation" can take little effort yet produce an ocean of difference. In this month's cover feature, "The Amphibian Adventure: A Dive Vacation Is More Than Just a Vacation," author Lynn Laymon explains the differences between the two concepts and the rewards for making diving the central part of your next adventure.

A school of yellow and black striped butterflyfish swimming over a coral reef in clear blue water. The fish have bright yellow bodies with black vertical stripes and a white patch on their heads. They are swimming in various directions, some towards the camera and others away. The coral reef below is diverse, with various shapes and colors of coral. In the upper right corner, a diver is partially visible, wearing a mask and a tank, looking towards the fish. The overall scene is vibrant and colorful, capturing the beauty of an underwater ecosystem.

Reef Check



Enlisting Divers to Monitor the World's Coral Reefs

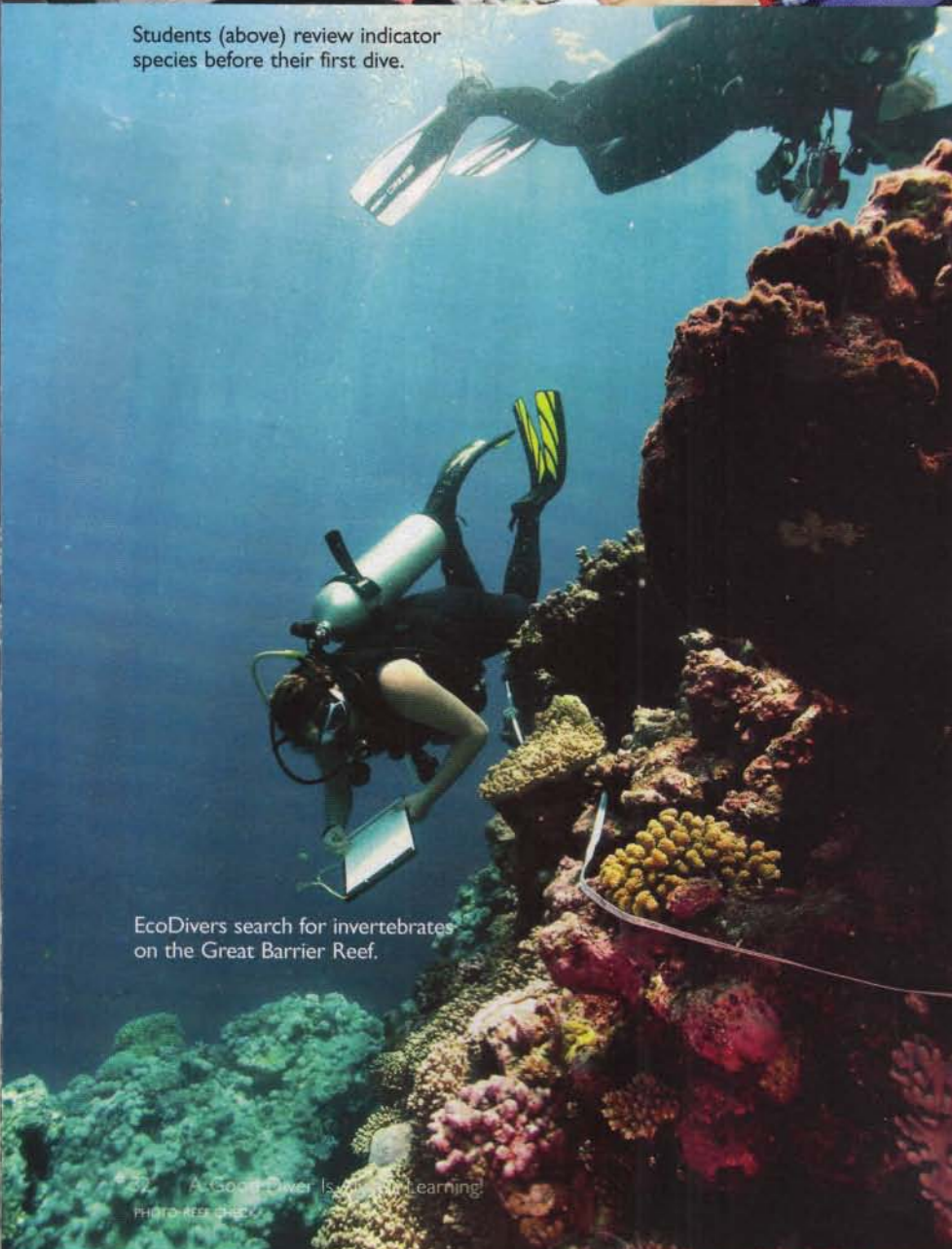
If you're a diver even remotely familiar with the subject, the grim statistics are all too familiar. Twenty percent of them are gone with no chance of recovery. Nearly two-thirds are under threat from both land-based and ocean-based sources. But this doesn't even take into account the effect of global warming, which could spell their demise regardless of what we try to do to curtail pollution, overfishing and coastal development. The topic I'm referring to, of course, is the world's coral reefs.

Certainly, if coral reefs disappear it would be tragic for divers, but it also would be disastrous for everyone else on the planet as well. As the most biologically diverse ecosystems on Earth, they're home to almost a quarter of all marine creatures. They also protect more than a sixth of the world's coastlines, and contain substances that could cure countless human diseases. Reefs even absorb some of the carbon dioxide that's

By Alex Brylske



Students (above) review indicator species before their first dive.



EcoDivers search for invertebrates on the Great Barrier Reef.

largely responsible for human-induced global warming. However, what makes the coral reef situation especially perilous is that there are precious few of them to begin with. They occur over a mere 0.07 percent of the seafloor, yet are home to nearly one in four of all known marine species. Strikingly, in total area, if you somehow squeezed together every living coral reef on the planet to within a contiguous space, you'd have an area only about the size of the state of Arizona. So, when it comes to the importance of coral reefs, Winston Churchill said it best in describing the Battle of Britain: "Never have so many owed so much to so few."

Another problem with coral reefs is that, compared with other ecosystems, we really don't know very much about them. Coral reef science really only took off in earnest after World War II, and much of what we know about reefs today has come to light in just the past two decades or so. In fact, until recently scientists couldn't even answer the most fundamental question: How healthy are coral reefs?

Answering the Question

Today scientists believe that they have a reasonably accurate handle on the scope of coral reef decline; otherwise they could never make the numerical estimates described in the introduction. They even have a pretty good idea of what's plaguing them. But as late as the early 1990s, speculation about the health of the world's coral reefs was backed up by very little real data. Back then what science knew about the worldwide status of coral reefs was really a best-guess estimate of the relatively few experts who studied them. Though the decline of coral reefs had been widely reported by divers for many years, exactly what contribution human-induced factors such as climate change, destructive fishing practices, pollution, sedimentation or tourist damage had on the overall picture of coral reef health was highly uncertain. But what was becoming abundantly clear was how widespread and serious these deleterious effects were.

A turning point occurred in our understanding of coral reefs in 1993 when eminent coral reef geologist Dr. Robert



Reef Check EcoAction Program Components

'Reef Check Adventures'

This children's book is designed to introduce kids to coral reefs through education and fun experiments. It familiarizes them with multiple aspects of coral reefs, from organisms and life on the reef to human impacts and conservation.



'The Underwater Reef Guide: Pacific'

A waterproof identification guide is designed to aid in identifying common tropical Pacific fish, invertebrates and algae.

This multifaceted guide also includes brief backgrounds on important species, highlighting their roles in coral reef health, as well as a waterproof slate to record the organisms observed.

'The Underwater Reef Guide: Caribbean'

Like the Pacific version, this waterproof identification guide is designed to aid in identifying common Caribbean fish, invertebrates and algae. This multifaceted guide also includes brief backgrounds on important species, highlighting their roles in coral reef health, as well as a waterproof slate to record the organisms observed.



Discover Reef Check

A half-day course, which includes an EcoMonitoring kit, is an introduction for individuals who want to learn the basic principles of coral reef monitoring using the globally standardized Reef Check monitoring methods. The focus is to provide insight on how these scientific techniques and equipment are applied in the field. It includes both classroom and field work. The EcoMonitoring kit includes membership to Reef Check and a certificate of participation. As part of the experience, instructors often include a guided snorkel or dive using The Underwater Reef Guides.

Reef Check EcoDiver

This is an intensive three-day certification course designed to teach individuals everything that's needed to conduct Reef Check monitoring surveys. It includes background in Reef Check methodology as well as identification training for fish, invertebrates and substrates for generalized geographic locations. It has both classroom and field components and includes the Reef Check EcoMonitoring kit. A photo ID Reef Check EcoDiver certification card is issued. The completion of this training allows the individual to apply for a specialty certification card through both PADI and NAUI (certification fee is extra).

Reef Check EcoExpeditions

Reef Check works with dive shops and resorts to send divers and snorkelers to unique destinations with Reef Check scientists to study coral reef ecology, local culture and help design and carry out reef rescue plans. This unique program helps divers bond with specific destinations through the monitoring process. Many return frequently to see how "their" reefs are doing. With teams in more than 90 countries, Reef Check can support travel just about anywhere there are coral reefs.

Ginsburg organized the first Colloquium on Global Aspects of Coral Reefs, which brought together most of the world's leading coral reef scientists. Though it's hard to believe now, then nearly half of the 250 scientists who attended the symposium believed that coral reefs were in fine condition. The other half felt, based on recent field experience, that reefs were in serious trouble. But the one thing they all agreed on was that before any true picture of coral reef health was possible, a lot more data was needed. They cited several knowledge gaps including too few coral reef scientists spending too little time on reefs; too few study sites comparing the global distribution of reefs; too few long-term studies; research continuing to emphasize basic science rather than reef health; and — very importantly — the lack of comparability of one reef to another due to different survey methods. So, the real answer to the question of worldwide coral reef health was a resounding, "We just don't know."

Answering the question required a two-fold response. First, the issue of how reefs are monitored had to be addressed. Methods of surveying coral reefs — sometimes termed "monitoring protocols" — had long existed but they reflected two shortcomings. One was that there was no standardized method enabling the comparison of reefs from different regions. The second was that the methodology used to monitor reefs was primarily designed to investigate their ecology, not their health. In other words, what scientists were used to looking for was how a reef functioned, not whether it was being damaged. What was needed was a more specific survey method focused on the human effects on coral reef health.

Another shortcoming in understanding the state of coral reefs was the issue of scale. Coral reefs are distributed around the globe to such an extent that assessing their health was an impossible task if left solely to the scientific community. There are just too many reefs and too few coral reef researchers to do the job. So, any truly global assessment would have to enlist the help of nonscientists. And, as no other community on earth spends

more time on coral reefs, the logical place to look for volunteers was among recreational divers. The challenge was how to marshal the commitment and enthusiasm of divers in a way that could produce results that the scientific community would consider valid. Plus, it was also no small challenge to recruit the number of volunteers needed to do enough surveys to make possible a synoptic picture of the world's reefs.

Fast-forward four years when a group of scientists, led once again by Ginsburg, helped to have 1997 declared the International Year of the Reef — IYOR — by the United Nations. (By the way, 2008 has been declared the next International Year of the Reef.) As one IYOR activity, a coral reef scientist with an extensive background in environmental assessments and survey techniques, Dr. Gregor Hodgson, was asked to craft a coral reef survey protocol easy enough to learn and set up that it could be carried out by recreational

divers anywhere. But some important caveats were attached: The protocol had to be applicable anywhere in the world; it was to be simple and rapid but robust enough to provide a holistic picture of reef health (rather than focus on just fish or coral); it had to provide maximum data from key indicator species; and all teams must be trained and supervised by a marine scientist. A tall order, indeed.

Hodgson drafted and tested a protocol, which was subsequently circulated on the Internet and peer-reviewed by reef scientists all over the world. He published the final survey methodology, dubbing it Reef Check, and created a Web site to disseminate the program. Later that year, he invited scientists to volunteer as Reef Check Trainers, and the first-ever global survey of coral reef health was carried out by more than 100 volunteer teams in 31 countries. When the dust settled, the Reef Check assessment confirmed, as no one had before, that coral reefs were facing a

major crisis on a global scale. The survey results also caused scientists to reconsider some of their most basic assumptions. Until then, for example, many experts thought that the major threats to coral reefs were primarily pollution and sedimentation. But the work done by Reef Check volunteers demonstrated for the first time that a major threat to coral reefs everywhere was overfishing.

Given the success of the effort, there was a general call to repeat Reef Check monitoring annually as part of the newly established Global Coral Reef Monitoring Network (GCRMN) and International Coral Reef Initiative (ICRI). The need for urgency was emphasized by the 1997-98 global coral bleaching event, which alone had killed about 10 percent of the world's reefs.

From Protocol to Program

The goals of Reef Check were ambitious but vital. One was to raise public

THE PEARLS OF THE PACIFIC! Palau-Yap, Micronesia



FREE NITROX

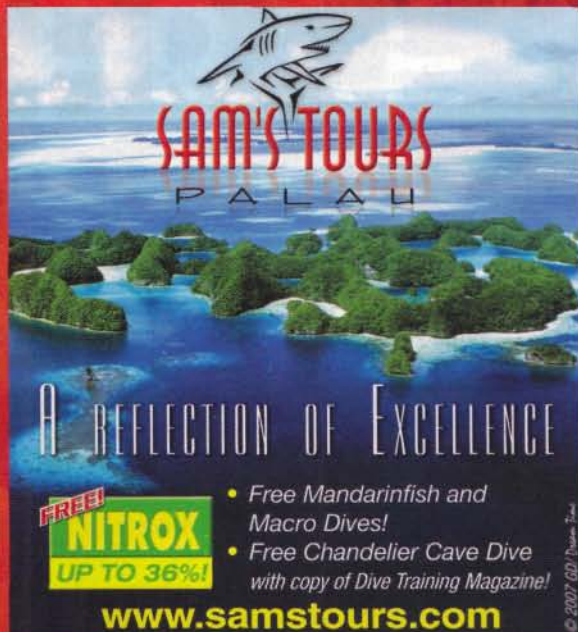
Manta Ray Bay HOTEL & Yap Divers

World-famous for Manta Ray diving plus walls, caverns, macro, shark encounters & Mandarin fish.

The only dive resort with its very own microbrewery and unique restaurant aboard a South-Seas schooner!

Best Group Deals in Diving
7 night packages start at \$1,229.00

www.mantaray.com



SAM'S TOURS PALAU

A REFLECTION OF EXCELLENCE

FREE NITROX UP TO 36%!

- Free Mandarinfish and Macro Dives!
- Free Chandelier Cave Dive with copy of Dive Training Magazine!

www.samstours.com

© 2007 G.D. Divers, Inc.



1-800-328-2288

sales@caradonna.com



1-800-463-4846

mail@worldofdiving.com



1-800-737-3483

udive@ultimatedivetravel.com

awareness of the value of coral reefs, the health problems they face and solutions required to change course. This was a challenging goal requiring activities ranging from publicity events and press conferences, plus training and education at all levels among government, nongovernmental organizations and the private sector. The second goal was to obtain high-quality, global-scale scientific data on reef health. Response to Reef Check was so positive that in 1999 the program added a third goal when it became clear that there was a large and growing demand to use the results more broadly than taking an annual "snapshot" of reef health. Communities needed a complete set of tools and training so they could manage their own reefs. Thus, Reef Check worked to become part of existing coral reef management programs, and expand its network to provide the training needed to use the information and tools it could provide managers. It was also recognized by then that scuba divers were, in fact, major stakeholders in coral reef protection, and that they could serve a major role in not only surveying reefs but in advocating for their conservation.

In 2000, what was initially only a monitoring protocol morphed into a formal organization when Reef Check became a nonprofit foundation under the leadership of the scientist who gave birth to the program, Dr. Gregor Hodgson. Soon after a staff was hired to manage both the survey data and a growing number of projects around the world devoted to coral reef conservation. Although now based in Los Angeles, Reef Check has offices in Hawaii, the Philippines, Indonesia, the Dominican Republic, Guatemala and Australia with survey teams in more than 90 countries and territories.

In the intervening years Reef Check has established many partners, but places special effort in establishing long-term relationships with businesses in the tourism sector, especially in diving and surfing. One example is Reef Check's partnership with the lifestyle company Quiksilver®, which enabled surveys of remote reefs during the com-

pany's five-year-long global surf-quest expedition, the "Crossing."

In another industry partnership, Reef Check is collaborating in a major conservation initiative with the Marine Aquarium Council. As the aquarium trade provides a valuable financial incentive to manage coral reefs, Reef Check works with MAC to help certify the trade, and establish marine protected areas to rehabilitate coral reefs in Indonesia, the Philippines and other countries. In 2002, Reef Check designed a special protocol called "MAQTRAC" to monitor the effects of the marine aquarium trade on coral reefs.

Coral reefs are distributed around the globe to such an extent that assessing their health was an impossible task if left solely to the scientific community.

Confirming a Global Coral Reef Crisis

Though Reef Check initiated many worthwhile projects, the event that brought them into the spotlight of international conservation was the World Summit on Sustainable Development held in Johannesburg, South Africa, in September 2002. At the Summit, results of Reef Check's first five years of monitoring were presented in a report, "The Global Coral Reef Crisis: Trends and Solutions," which summarized surveys of more than 1,500 reefs from around the world. Analyzing changes in both the abundance of key indicator species and other human factors, the report documented the continuing global decline in reef health. The key findings were the following:

- On a global scale, zero spiny lobster were recorded at 83 percent of shallow reefs, indicating severe overfishing. There was a significant decline in lobster abundance in the Atlantic.

- The mean abundance of *Diadema* sea urchins decreased significantly in the Indo-Pacific from 1998 to 2000, approaching levels similar to those found in the Atlantic and possibly indicating ecological destabilization. (For more information on the demise of *Diadema* in the Atlantic, see "Pin Cushions in Paradise," *Dive Training*, September 2004.)

- A total of only 101 live triton shells were recorded, indicating severe overfishing for the curio market (tritons are one of the few known predators of crown of thorns starfish).

- Globally, there was a significant decrease in the abundance of butterflyfish from 1997 to 2001.

- There were zero grouper larger than 12 inches (30 cm) recorded at 48 percent of reefs surveyed, indicating severe overfishing.

- Four species of fish were in critical condition: Nassau grouper were absent from 82 percent of shallow Caribbean reefs with only eight reefs having more than one fish observed. Barramundi cod, bumphead parrotfish and humphead wrasse were missing from 95, 89 and 88 percent of Indo-Pacific reefs respectively.

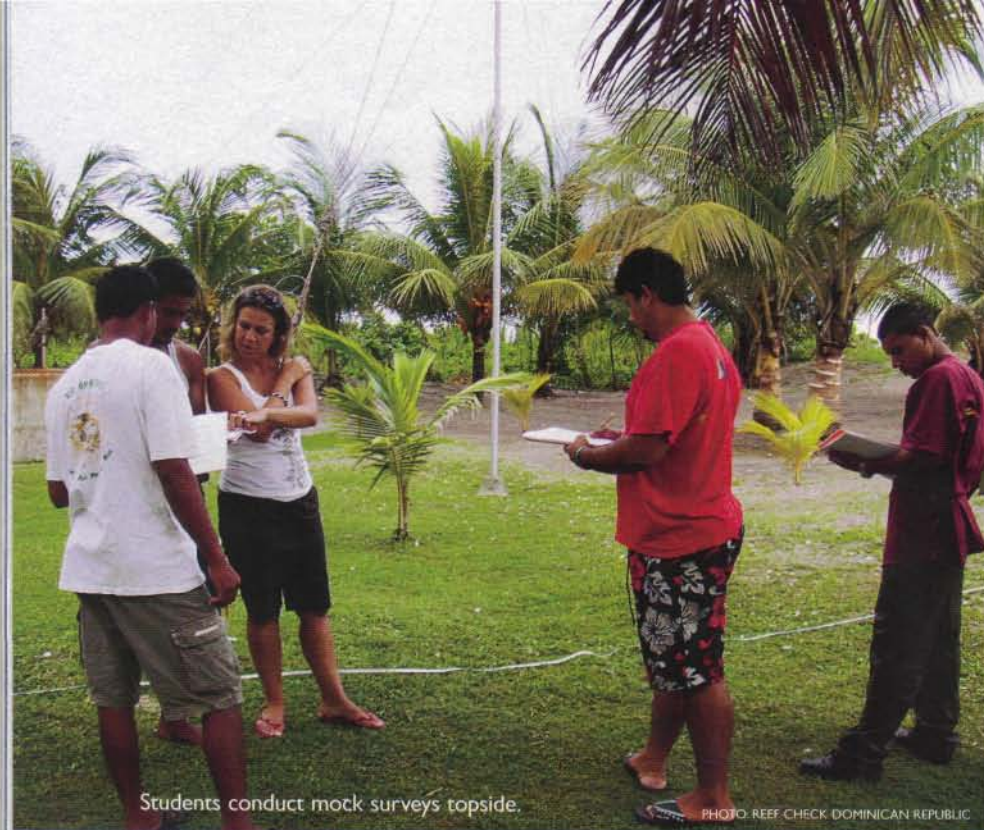
- Moray eels were not recorded on 81 percent of reefs, and in the Indo-Pacific, 55 percent of all reefs surveyed were devoid of parrotfish greater than 8 inches (20 cm).

- Globally, the mean hard coral cover was 32 percent. The percentage of hard coral cover was significantly higher on reefs having no human-induced impacts than on reefs with high levels of such impacts. Only 34 reefs had more than 70 percent hard coral cover and none had more than 85 percent cover.

- The 1997-98 El Niño coral bleaching event reduced live coral cover by 10 percent globally, indicating that coral reefs are a sensitive indicator of global warming.

The Reef Check Survey

From an idea inspired by the 1997 IYOR, Reef Check has become the



Students conduct mock surveys topside.

PHOTO: REEF CHECK DOMINICAN REPUBLIC

How many did you count?
Divers finish up fish transect in Kosrae.



most widely used reef monitoring protocol in the world. Its success is owed largely to the fact that the survey techniques are simple to learn yet the data are scientifically robust. One reason for this, as mentioned previously, is that Reef Check's approach is quite different from other monitoring protocols in that its function is to assess the health of coral reefs, not their ecology. To do that, Reef Check focuses on the abundance of particular organisms that best reflect the condition of the ecosystem, and that are easily recognizable to the general public. The protocol measures reef health based on what are termed "indicator organisms," and the criteria for their selection is multifaceted.

Indicator organisms are selected, first and foremost, because they're easy to identify. Second, they're of high demand either for food or by the curio and aquarium trade (thus an indicator's absence indicates a high likelihood of human impact). A third selection criterion is that the organisms have a wide distribution so that they can be a useful global indicator. Next, some organisms are chosen because of their key ecological importance, such as the herbivorous sea urchins that devour the algae that compete with corals for space. And finally, indicators are selected based on the simple question, "Can we fix it?" In other words, if this indicator changes, can something be done to get the reef back to where it should be? For example, two indicators typically included in traditional ecological studies are the common alga *Halimeda* and various forms of coralline algae. But these are not included in Reef Check surveys because it's unclear what large changes in their abundance would mean, and it's equally uncertain what management actions to take to reverse such changes. Yet another aspect of Reef Check that sets it apart from standard ecological surveys is its inclusion of socio-economic data such as the type and amount of use the reef receives.

In all, there are 16 global and eight regional indicator organisms that serve as measures of human effects on coral reefs.

These indicators include a spectrum of fishes, invertebrates and plants that indicate activities such as fishing, collection or pollution. Some Reef Check categories are individual species. For example, the humphead wrasse (*Cheilinus undulatus*) is the most sought-after fish in the live food fish trade, whereas the banded coral shrimp (*Stenopus hispidus*) is collected for the aquarium trade. Both species are very distinctive organisms and excellent indicators of human predation. So, on reefs where these organisms are heavily exploited, their numbers are expected to be low compared with their abundance on unexploited reefs. In other cases indicator organisms comprise an entire family, such as in the case of the essential lawn mowers of the coral reef, the parrotfishes.

Typically, a Reef Check survey involves two to four buddy teams (four to eight divers) who collect four types of data. The survey begins before even entering the water by recoding 30 different

environmental factors, socio-economic conditions and evidence of human impacts. Then, underwater, one buddy team swims along a deployed tape measure — termed a “transect line,” in scientific parlance — for a distance of 20 meters (66 feet). (Remember, this is science, so the Imperial measuring system isn’t used.) The transect swim involves identifying the type of substrate covering the seabed such as algae, live or dead coral. Another team swims the transect counting the invertebrate class of indicator organisms, while a third team conducts a fish count recording all the indicator species or families. Importantly, the fish count is not a random procedure, but done by swimming exactly 5 meters (16.5 feet) above the bottom. (Fish counters wait at least 15 minutes after other teams are finished so that fish will return to the sampling site.) The protocol requires that divers proceed at a pace of 5 meters per minute and record only those fish swim-

ming within the water column defined by a 2.5-meter (8.25 feet) sector on either side of the transect. To make the procedure more efficient, one diver observes one side of the transect line while his or her buddy observes the other. (Care must be taken not to count the same fish twice as it swims from one side of the transect line to the other.) For adequate sampling, each team swims four separate 20-meter transects for a total of 80 meters (264 feet). Transects can be laid either in one continuous 100-meter (330-foot) line (with 5-meter spacing between transects) or in four separate 20-meter lines.

The entire process is conducted twice; once at a shallow depth and one deeper. However, as with all diving operations, safety is the primary concern. So, Reef Check surveys are not done at depths exceeding 40 feet (12 m), or under any conditions in which decompression might be necessary.

DIVING
St. Kitts
EXPLORE · FEEL · LOVE · REMEMBER

Delta Air Lines introduces **non-stop** service **Atlanta to St. Kitts** starting February 16, 2008.

Blessed by nature and rich in history, St. Kitts offers a distinctive island experience both above and below the water. Appropriate for divers of all skill levels, the island boasts a variety of dive sites ranging from shoals, hot water vents and swim-throughs, to pristine coral reefs and the wrecks of 17th century warships.

Visitors can also hike in the rainforest, explore the historic Brimstone Hill Fortress, ride the Caribbean's only scenic railway, or simply relax on one of the island's numerous sandy beaches. A dive destination unlike any other, St. Kitts is an experience just waiting to be explored.

Log on to our website for details on diving packages
www.stkittstourism.kn

CARIBBEAN


The EcoAction Program

Recognizing that the lack of sustainable funding has spelled doom for probably 95 percent of all coral reef monitoring programs around the world, a new program called EcoAction was introduced by Reef Check in 2006. EcoAction is a multilevel educational program designed to increase knowledge and awareness of coral reef conservation, while at the same time providing financial resources to maintain Reef Check teams. "Structured properly," says Reef Check's training director Chris Knight, "EcoAction can be a win-

winning situation where local businesses can make a profit selling conservation education, while local Reef Check teams can generate the funds needed to support their efforts." Indeed, the model does make a great deal of sense. For dive operators, EcoAction is a way to justify greater involvement in conservation by

providing both a financial incentive and giving operators a whole new range of education programs for their customers. For divers, EcoAction is a way of both learning a great deal about coral reefs and helping to conserve them. And for the world's coral reefs, EcoAction is a way to continue documenting their health while raising public awareness. Even dive centers thousands of miles from the nearest coral reef are getting into the act. Some are conducting EcoAction training — including simulated field surveys in a swimming pool — and completing the open-water train-

world, Reef Check has received national and international environmental awards for its efforts in raising public understanding of the global coral reef crisis. By involving local people in community-based monitoring, Reef Check serves as the first step in attracting participation in coral reef management activities. In several cases, this has resulted in concrete, positive actions such as the creation of well-managed "Marine Protected Areas." Today, Reef Check serves as the community-based component of the Global Coral Reef Monitoring Network (GCRMN) and collaborates on their periodic "State of the Reefs" report. Reef Check is also a member of the International Coral Reef Initiative (ICRI), International Coral Reef Action Network (ICRAN) and provides both data and technical assistance to the global database of coral reef information, ReefBase. But what's most notable of all is that, aside from a very small core of paid staff, Reef Check does all of this with volunteers, most of whom are divers like you.

Back in 1997 I had the privilege of being among the first divers in Florida to participate in the inaugural Reef Check training program. A few months ago, I attended an EcoAction Instructor Training course. So, I've had the opportunity to watch the program grow and prosper. It's exceedingly clear that Reef Check is a shining success story in marine conservation and what many now term "citizen science." But perhaps the most important thing that I've learned from my experience is how well divers come to understand coral reefs by participating in Reef Check surveys. It's amazing to me what a difference Reef Check training can make in a diver's understanding and appreciation of coral reefs. In a matter of days or hours you can easily gain as much insight as would take others hundreds of dives to acquire. As one student in my most recent course put it, "Sure, Reef Check taught me far more than I ever expected to learn about coral reefs, but what's even more important is that it taught me a whole new way of looking at them ... Thanks to Reef Check my diving will never be the same." 



Volunteers are briefed on the correct procedures for documenting flora and fauna on one of St. Kitts' reefs before entering the water to start a reef survey.

BARRY GUIMBELLOT PHOTO

winning situation where local businesses can make a profit selling conservation education, while local Reef Check teams can generate the funds needed to support their efforts." Indeed, the model does make a great deal of sense. For dive operators, EcoAction is a way to justify greater involvement in conservation by

ing requirements as part of a trip to a coral reef destination.

In total, EcoAction training requires about eight hours of intensive classroom work coupled with two days of in-water training and practice. But for those who'd like a taste before hopping on for the full ride, a simple half-day Discover EcoAction experience is also available. (See the sidebar for additional details of the various EcoAction program components.) Already more than 220 EcoAction instructors have been qualified from 22 countries. Contact information on where you can find training is available from Reef Check's Web site at reefcheck.org.

In addition to collecting a wealth of valuable data from coral reefs around the

Reef Check California

The need for monitoring isn't something confined to coral reefs. In 2005, Reef Check launched its first temperate reef monitoring program, Reef Check California. More information can be found at the program's homepage, reefcheck.org/rcca/rcca_home.php