

# Global Coral Reef PORTFOLIO

**Edited by Kristin L. Sherwood**

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**IUCN – The World Conservation Union strives to achieve significant improvement in the conservation of marine biodiversity and sustainable use of natural resources in marine and coastal ecosystems throughout the world. Coral reefs are among the most biologically diverse ecosystems on the planet and provide sustenance and income to millions of people. Globally, coral reef habitats and associated species are in serious decline and IUCN works to achieve tangible, positive and measurable effects on the health of these ecosystems and the well-being of the communities that depend on them.**



## INTRODUCTION

# ■ How is IUCN Helping to Sustain Coral Reefs and Reef Resources?

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Coral reefs are some of the most valuable, species-diverse and spectacular places on earth. Covering roughly 300,000km<sup>2</sup> – only 0.09 percent of the total area of the world's oceans – tropical coral ecosystems rival tropical rainforests in their biodiversity.

Approximately 100,000 coral reef and reef-associated species have been described to date, but experts have barely begun to catalogue the total number of species inhabiting the world's reefs and some estimate that there could be 2 million species or more. Reefs protect coastlines from storm damage and reduce beach erosion; they provide homes, breeding areas, nurseries and food for many economically important marine species; and they form an important link in cycling nutrients from land to the open ocean. From a human perspective, coral reefs represent a critical resource. Much of the world's poor, most of whom live in the coastal zones of developing countries, depend directly on coral reefs and associated species for protein. According to one estimate, reefs provide fish and seafood for one billion people in Asia alone. Reef-based activities, principally fishing and tourism, provide economic livelihoods for millions of others; in the Caribbean for example, countries derive half of their Gross Domestic Product from coastal tourism.

Currently, however, coral reefs are being depleted rapidly around the world, primarily due to anthropogenic impacts. Fifty-eight percent of the world's reefs are potentially threatened by human activity, ranging from increased sedimentation and eutrophication to over-harvesting of fish and other reef resources and pollution. In addition, coral bleaching, invasive species, and coral disease appear to have become more frequent and more severe, posing a major threat to coral reefs worldwide.

IUCN – The World Conservation Union is taking action to halt and reverse these negative trends. For more than a quarter of a century, IUCN has worked at international, regional and national levels to provide governments, government agencies and non-governmental organizations (NGOs) with new and innovative approaches to conserving coral reef species and ecosystems, and enabling local communities to benefit from those resources in a sustainable way.

**At the international level**, IUCN works to strengthen and improve the numerous global agreements that are relevant to the conservation and sustainable use of coral reefs and coral reef-associated species. IUCN provided technical and financial support to the Convention on Biological Diversity's (CBD) development of goals for marine and coastal protected areas and contributed to the development of the CBD's Work Plan on Coral Bleaching. In addition, IUCN was an important contributor to the development of the CBD's programme of action called the Jakarta Mandate on Marine and Coastal Biological Diversity (1995) which focuses on integrated marine and coastal area management, the sustainable use of living resources, protected areas, mariculture and alien species. IUCN assisted in the development of the five-year Marine Strategy under the World Heritage Convention which was released at the World Parks Congress in Durban, South Africa in September 2003. The Ramsar Convention includes coral

reef ecosystems within its definition of a valuable wetland, and IUCN has a collaborative programme with Ramsar and houses its Secretariat at IUCN Headquarters (see *Mesoamerica article*, page 7). The joint IUCN/World Wildlife Fund wildlife trade monitoring programme, TRAFFIC, provides advice to deliberations on coral reef species under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (see *TRAFFIC article*, page 19). IUCN was also actively involved with the development of the World Summit on Sustainable Development (WSSD) Plan of Implementation, which promotes marine issues and adds urgency to the plight of the coral reefs and the communities they support.

IUCN is a key partner in several international initiatives that are focused on coral reef conservation. The Union has been a partner in the International Coral Reef Initiative (ICRI) since its inception in 1994, and helped develop several of its operational networks, including the Global Coral Reef Monitoring Network (GCRMN) in 1995 (see *GCRMN article*, page 10), and the Coral Reef Degradation in the Indian Ocean (CORDIO) initiative in 1998 (see *CORDIO article*, page 13). These initiatives have expanded beyond their original biological focus, and currently also address the pressing social and economic issues that are facing coral reef resources (see *Socio-economic monitoring article*, page 11). Today, IUCN remains deeply engaged in all of these efforts, both in terms of overall global management as well as with regional implementation.

**At regional and national levels**, IUCN places a priority on developing networks of Marine Protected Areas (MPAs) that are rich in biodiversity, naturally resilient to large-scale threats like climate change and support sustainable coastal human communities. For example, in Southeast Asia and in Oceania, IUCN and its local partners, through Global Environment Facility assistance, have developed models for MPA development (*Aleipata and Safata MPAs in Samoa*, see page 5 and *Nha Trang Bay MPA in Vietnam*, see page 4). In Eastern Africa, IUCN has been a leader in coral reef conservation and MPA development since the mid-1980s. Seminal work has been done on community-based management and MPA design throughout the region (see *Eastern Africa article*, page 3). In the Caribbean, IUCN has a growing role working with the Specially Protected Areas and Wildlife Protocol (SPAW), which aids the development of a representative network of marine and coastal protected areas existing in the Caribbean (see *Caribbean article*, page 5).

IUCN is focused on increasing the impact of its coral reef conservation work through developing strategic **partnerships** with governmental and non-governmental partners and members. For example, growing global partnership between IUCN, The Nature Conservancy, the US National Oceanic and Atmospheric Administration (NOAA) and the Wildlife Conservation Society is helping to transform coral reef conservation by providing tools and training for building resilience into coral reef resource management and conservation (see *Resilience article*, page 14). Through the IUCN-World Commission on

Protected Areas (WCPA), NOAA and WWF partnership, several innovative and practical tools for coral reef conservation have been developed, including *How is your MPA doing?*, a guidebook that assists MPA managers in evaluating the effectiveness of their management of coral reefs and associated species and related ecosystems (see *Management effectiveness article*, page 9).

IUCN's **commissions** also play a key role in promoting the conservation of coral reefs, particularly the WCPA and the Species Survival Commission (SSC). The WCPA-Marine seeks to help MPA system planners, MPA practitioners and stakeholders achieve the CBD's goal to establish comprehensive, effectively managed, and ecologically representative national and regional systems of protected areas by 2012. Several of the Specialist Groups of the SSC have also been very active in promoting better management of coral reefs, particularly in relation to fisheries such as the live food trade and the aquarium and curio trades. IUCN-wide coordination, together with the Society for the Conservation of Reef Fish Aggregations, resulted in a call for complete or managed protection of tropical fish spawning aggregations at the ICRI International Tropical Marine Management Symposium. The SSC Shark, Grouper and Wrasse, Turtle and Coral Reef Fishes Specialist Groups are working with their scientific networks to assess and monitor the status of species affected by these fisheries, and with government agencies, NGOs and fishers to develop and implement strategies to better manage these fisheries (see pages 15-19). The SSC Wildlife Trade Programme and TRAFFIC work closely with SSC networks in providing advice to CITES, noted above (see *TRAFFIC article*, page 19).

This combination of field-and policy-oriented activities working at a range of global and local levels distinguishes IUCN and greatly increases the conservation impact of our work. This brochure is intended to serve as both a source of information and as a tool for identifying synergies and partnerships. Efficient and coordinated work between organizations and government agencies is essential to secure a future for coral reefs and the people that depend on them. This brochure can contribute to that process.



Wolcott Henry

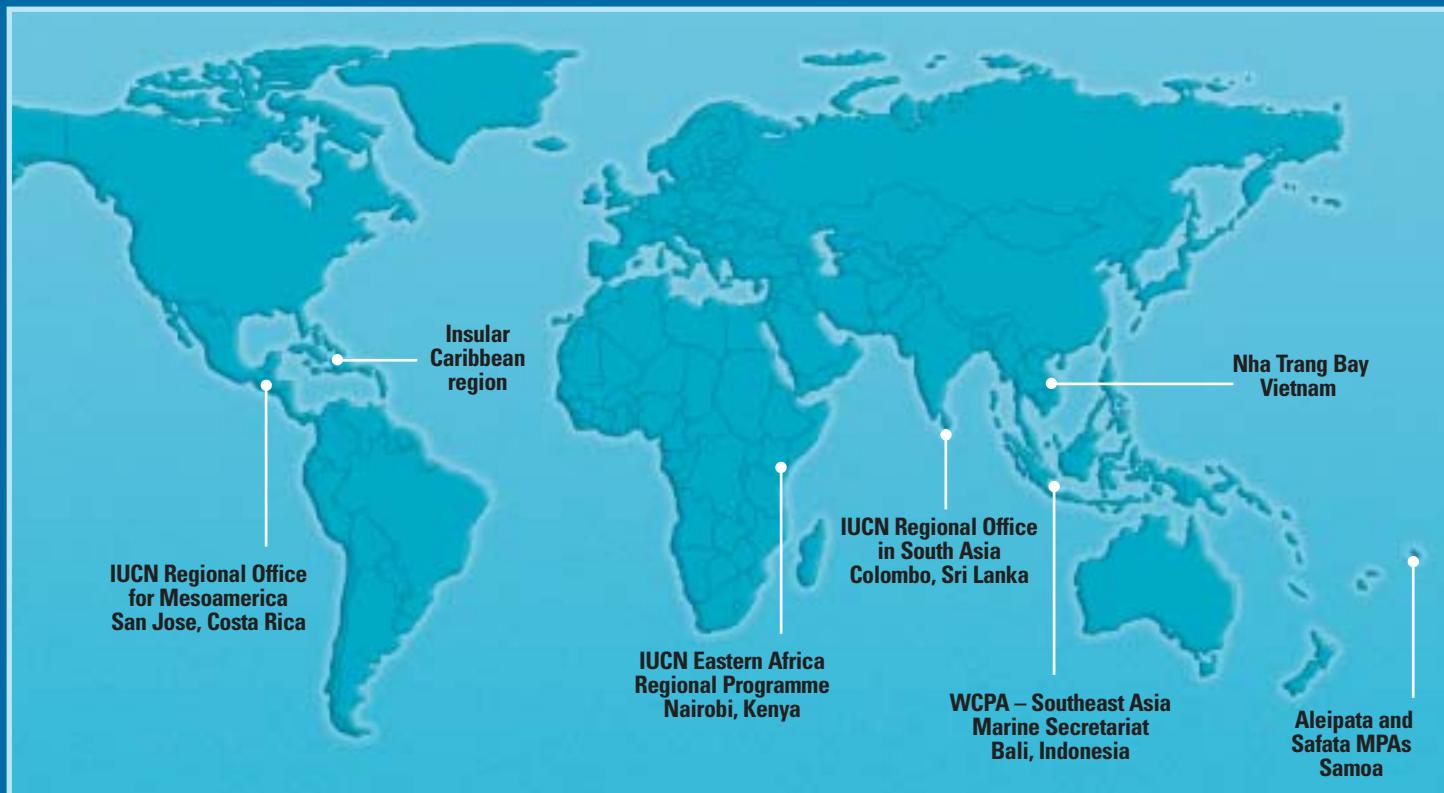
Orange cup coral (*Tubastraea* sp.)

## SECTION 1

# ■ Regional Coral Reef Initiatives

**IUCN has active coral reef projects on the coasts and islands of Asia, Africa, Oceania and the Caribbean Sea.** In each region, IUCN coral reef experts have developed innovative approaches to conserve coral reef biodiversity by adapting to regional circumstances and needs. The IUCN team in Eastern Africa are using scientific surveys and monitoring techniques to focus management initiatives on areas and species most in need of protection. A developing marine programme in the Caribbean is working to strengthen conservation-minded policy initiatives to produce effective management of Marine Protected Areas (MPAs) networks. In East Asia, IUCN and its partners are focused on balancing coral reef conservation with poverty issues and the sustainable livelihoods of reef-dependent communities. In other countries, such as Samoa and Vietnam, IUCN is committed to strategic, site-based MPA development and management which will form the basis for national MPA networks. Together, these national and regional initiatives form a growing caucus of scientific, political and socio-economic expertise with a wide array of knowledge and experience in coral reef conservation.

IUCN scientists and conservationists work to protect and preserve coral reef habitats and species around the world. Regional initiatives are highlighted here and in the following eight articles.



# Eastern Africa: Applying marine science to coral reef management

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Melita Samoilys

Coral reef monitoring by fishers in Tanga, Tanzania

The Eastern Africa Regional Programme (EARP) of IUCN is currently focusing its activities on the mainland coasts of Kenya, Tanzania and Mozambique, and in the offshore island states of Comores and Seychelles. These areas contain a diversity of ecosystems, including extensive coral reef systems, as well as estuaries, mangroves and seagrass beds. IUCN's strategies to alleviate threats to coral reefs in Eastern Africa include: community-based management, especially for coastal fisheries; capacity building; multiple-use zoning within Marine Parks; effective management of MPAs; integrated coastal zone management; long-term monitoring and biodiversity assessments; strengthening international conventions, and developing strategies to combat alien invasives.

## Several examples relevant to coral reef conservation, management and research are illustrated below:

### Mnazi Bay – Ruvuma Estuary Marine Park,

**Tanzania:** IUCN-EARP is working with the Marine Parks and Reserve Unit in Tanzania to establish and prepare a strategy for this recently gazetted Marine Park that borders Mozambique. The Park spans around 200km<sup>2</sup> of sea, and has 30,000 people living within its boundaries. We are identifying areas with high biodiversity, threatened or endemic species, and areas in need of recovery from dynamite and/or coral bleaching damage, as well as sites that support reef fish spawning aggregations, and this information will be incorporated in the general management plan.

**Tanga, northern Tanzania:** A community-based fisheries management approach has resulted in a series of multiple use reserves, known as Collaborative Management Areas. There are now six CMAs in operation, covering a total of 1,604km<sup>2</sup> of the coastal waters of the Tanga Region, each with its own management plan. Participating villages have voluntarily closed certain reefs to allow fish stock replenishment and reef recovery. As a result, coral cover and fish densities are increasing, though this recovery has been tempered by the coral bleaching event in 1998.

## Other regional projects:

- The first Western Indian Ocean fisheries database (largely for artisanal coral reef fisheries) has been developed with the aim of encouraging countries to monitor coastal fisheries that are vital to local livelihoods ([www.wiofish.org](http://www.wiofish.org)).
- A Toolkit for MPA Managers in the Western Indian Ocean is due for release in 2004.
- Research on spawning aggregations of reef fishes has been recently initiated in Kenya, Tanzania and Mozambique; new information will be used to contribute to MPA network design.
- A review of sustainable alternative livelihoods for coastal communities has been implemented to reduce pressure on coastal resources.

Proposed collaboration between IUCN-EARP, CORDIO and national scientific institutions in the region will address long-term monitoring of coral reefs in terms of data management and regular monitoring of key sites.

There are additional proposals to implement MPAs in the Red Sea, build capacity in the Protected Areas Board in Zanzibar, and identify threatened reef fishes of the Western Indian Ocean region for IUCN's Specialist Groups.



Anthony King

Consultative meeting with stakeholders in Mnazi Bay, Tanzania

# Vietnam: A collaborative approach to MPA development

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On the south-central coast of Vietnam, beaches and islands make Nha Trang Bay a top tourist destination in Southeast Asia. During the last century, however, the Bay's coral reef fish have become scarce and the waters have become soiled by runoff. In 2001, in response to these impacts, Nha Trang Bay was declared the first MPA in Vietnam. The Nha Trang Bay MPA covers an area of 160km<sup>2</sup>, and includes Hon Mun Island as well as eight other islands. The majority of the resident population of 5,300 people rely upon fishing and related coastal activities as their primary livelihood source.

Since 2001, IUCN has been assisting the Government of Vietnam establish the Nha Trang Bay MPA as the pilot demonstration of MPA management in Vietnam.

Over the last three years the "Hon Mun Marine Protected Area Pilot Project" (Hon Mun Island being the "core zone" of the MPA), implemented by IUCN with support from the Global Environment Facility (GEF)/World Bank and the Royal Government of Denmark, has made significant progress in the protection and management of Nha Trang Bay. This has included the establishment of a temporary zoning system incorporating a number of "no-fishing" areas within the MPA, development of enforcement activities in collaboration with local communities, and the installation of mooring buoys to prevent anchor damage in sensitive coral reef areas. A comprehensive "Plan of Management" is being prepared for longer-term management of the area.



Local people diving for their livelihoods in Nha Trang Bay, Vietnam

Bernard O'Callaghan

An important focus of IUCN's activities has also been the development of a collaborative approach to management. Village advisory committees have been established in each village in Nha Trang Bay and regular meetings provide the opportunity to discuss approaches to management. In cases where access to fishing grounds has been compromised, initiatives to help families generate additional income have included training in aquaculture, handicraft activities and the provision of small investment loans to over 60 families.

As the first comprehensive MPA in Vietnam, Nha Trang Bay MPA has been readily accepted as the model for MPA development as the country embarks on the establishment of a national MPA system. The system currently proposes 14 additional MPAs that will help ensure the protection and management of Vietnam's coastal biodiversity for both current and future generations.



Extensive beds of *Montipora* and *Acropora* corals in Nha Trang Bay, Vietnam

Lyndon DeVantier

# Samoa: Managing multiple-use MPAs

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The two major islands of Samoa, Savai'i and Upolu, are circled with diverse fringing coral reefs, mangrove forests and seagrass beds. The Samoan people depend on marine resources, but over-fishing and destructive fishing have compromised reef health and fish stocks throughout the island group. A group of partners, including IUCN, the GEF, the World Bank, AusAID, the Government of Samoa and local communities, started working together in 1997 to establish two community-based, multiple-use MPAs on the island of Upolu.



Chiefs discussing no-take zone boundaries – Aleipata MPA

The IUCN Programme on Protected Areas, working closely with the WCPA-Marine, led the MPA design process for this project, and has supported implementation and management of the MPAs by providing an IUCN Project Manager for the IUCN/Samoa project team. The principal objectives of the project were to protect biodiversity using a community-based management approach and to contribute to the sustainable use of marine living resources. The project focused on capacity development in order to facilitate the establishment of community-owned MPA management plans, elimination of destructive fishing practices, development of alternative income activities, sustainable financing and regular community meetings.

The MPA development approach has been both bottom-up and top-down. The project has brought together eleven villages from Aleipata and nine villages from Safata to work together in district-level environmental management. Women's groups and youth groups have worked hand in hand with the District Committees, which are comprised of village decision makers (*matai*) who represent each village.

The project has been initially successful in changing community behaviour, securing long-term commitment to protecting critical areas of biodiversity and promoting the sustainable use of the living resources in the MPAs. The project has been described by a village elder as "a divine wind". There have been only a couple of instances of district people breaking the zoning and management rules for self gain, and these infractions have been monitored and controlled by villagers. The project also has been considered by the GEF as "best practice" in relation to community-managed MPAs.

Experience from the Aleipata and Safata MPA project has confirmed and strengthened the "lessons learned" from many MPAs around the world. Similar to the Hon Mun MPA in Vietnam, this project was designed to be a pilot project, and the results are considered an important contribution for further development of the representative system of MPAs in the region and around the world, as part of the global representative system of MPAs to which IUCN is formally committed as a contribution to WSSD and CBD targets for marine biodiversity conservation.

# Caribbean: Strengthening regional MPA networks

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As island populations and coastal development expand, and fishing, tourism and industrial activities grow in the Caribbean region, effectively managed MPAs become more imperative for biodiversity conservation and sustainable development. The insular Caribbean contains over 300 MPAs and these areas form the foundation of national and regional networks of protected areas.

Additional MPAs are planned. Cuba, for example, has proposed a network of 11 important coral reef, mangrove and seagrass protected areas as a new World Heritage Site. In addition, the Government of the Bahamas declared in 2002 a national goal to protect 20% of the Bahamas marine ecosystem for the purposes of fisheries replenishment.

IUCN's programme for Caribbean island environments aims to support the region's conservation initiatives and works to ensure that protected areas are nested within whole island development strategies supported by a high level of public participation and support.



Nassau Grouper (*Epinephelus striatus*) in the Bahamas

**Specially Protected Areas and Wildlife Protocol (SPAW):** A focal activity for IUCN and WCPA is supporting the implementation of the SPAW Protocol in the Wider Caribbean region. This Protocol is the only region-wide environmental treaty that protects critical marine and coastal ecosystems, while promoting regional cooperation and sustainable development. IUCN is focused on helping to develop and promote a list of SPAW protected areas, which will constitute a representative network of exemplary protected areas existing in the Caribbean and aims to build collaboration within the region.

**MPA Managers Network:** In order to strengthen the effectiveness of MPAs in the Caribbean, IUCN is working in partnership with UNEP-Caribbean Environment Programme and a number of other partners, to promote an active network of MPA practitioners in the region (Caribbean Marine Protected Area Managers Network – CaMPAM). This active network facilitates information exchange, experience sharing, problem solving and training to address Caribbean-wide MPA management challenges.

**No-Take Areas:** IUCN/WCPA is also working locally in the Caribbean to help advance the understanding and application of marine reserves (no-take areas) for biodiversity conservation and sustainable fisheries management. The newly developed Marine Reserves Regional Enhancement Plan for the Wider Caribbean will assist marine reserve practitioners in the region to identify and address priority activities that will improve the effectiveness of existing and proposed marine reserves in the Caribbean region, and solicit funding for the portfolio of projects that address those issues.

Chuck Saylor

# South Asia: Integrating marine resource management and poverty alleviation

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Coral reef ecosystems border nearly 21% of the South Asian coastline. Rapid economic growth and coastal development in South Asia is placing serious pressure on these and other ecosystems and thereby on impoverished coastal communities who depend on them for their livelihood. Although coastal and marine degradation is caused by the cumulative actions of a wide range of users and sectors, it is the poorest and most vulnerable groups who are affected most significantly and have the least ability to respond.



Emma Whittingham

Cleaning crab nets in Mannar, India

IUCN Regional Office in South Asia works to address two complementary goals: to secure and improve the livelihoods of South Asia's poor and to safeguard marine and coastal biodiversity. In order to address these goals, IUCN has developed, in collaboration with government and NGO partners in the region, a Regional Strategic Plan: "Towards Integrated and Pro-Poor Approaches to the Management of South Asia's Coastal and Marine Environments". The plan considers three dimensions to the development and promotion of a pro-poor integrated management plan: assets (including material, financial and natural, as well as social and cultural assets), power (rights – access to and control over resources, including decision-making and gender relations), and security/vulnerability (to natural disasters, economic shocks, violence and unrest). The plan aims to develop and pilot integrated and pro-poor approaches to sustainable coastal and marine resource management, and foster commitment to these approaches at local, national and regional levels.

To strengthen this work, IUCN South Asia and the IUCN Global Marine Programme have recently expanded their partnership with CORDIO and GCRMN in South Asia and their activities in coral reef research, monitoring, management and policy development. The partnership will build on and integrate the on-going work of the three organizations. A joint regional coordinator will work from the IUCN South Asia Regional Office in Sri Lanka to facilitate a strengthened regional effort towards sustainable and equitable coral reef management and policy development.

## World Heritage and coral reefs

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The World Heritage Convention (1972) is among the oldest and most well known environmental conventions. World Heritage nomination brings several benefits to sites: increased national and international attention for the conservation of the site, increased opportunities for funding, raised national awareness, as well as facilitating improved management.

Among the 754 sites on the World Heritage List, 19 contain coral reefs but only half of these were inscribed because of their coral reef values. Among these are Australia's Great Barrier Reef, the Belize Barrier Reef, Aldabra Atoll (Seychelles) and Tubbataha Reef (Philippines). In order to address the gap in coral reef sites, the UNESCO World Heritage Centre and IUCN organized an expert workshop in Hanoi, Vietnam in 2002 to identify potential marine World Heritage areas in the tropics. Since then, the World Heritage Centre and partners have initiated three pilot projects to test transboundary approaches. Each of these areas include coral reefs and they are: the Southern Caribbean Islands between Venezuela and the Netherlands Antilles; the Central Pacific Islands and Atolls including US territories, Kiribati, Cook Islands, French Polynesia; and Eastern Pacific Tropical Seascape between Ecuador, Colombia, Panama and Costa Rica.

[whc.unesco.org/](http://whc.unesco.org/)



Flagfin or Three-Spot Angelfish (*Apolemichthys trimaculatus*)

Wolcott Henry

# Southeast Asia: building resilience into MPA networks

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Southeast Asia harbours the global epicentre of marine species diversity. It contains more than one third of all the world's coral reefs and houses 600 of the world's 800 plus reef-building coral species.

To investigate the MPA status and needs for the Southeast Asia region, the WCPA-Southeast Asia Marine Working Group (WCPA-SEA Marine) was established in 2000. The WCPA-SEA coordinated the development of a Regional Action Plan (RAP) for a MPA network in Southeast Asia, which envisions a region with an effective, resilient and representative network of MPAs, sustaining biodiversity and human uses, designed to adapt to local and global environmental change, and managed by an empowered, responsible citizenry.



Kristin Sherwood

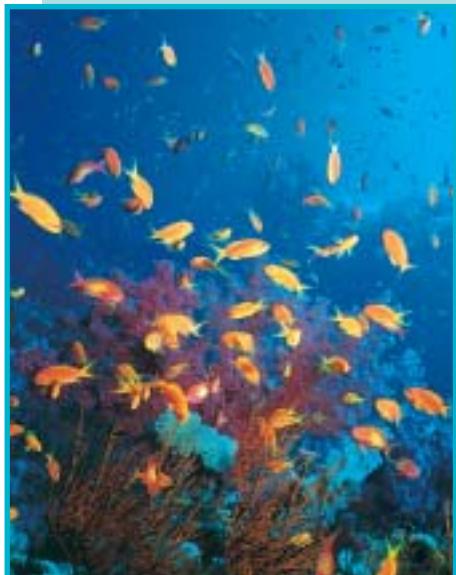
MPA development in Negros Occidental, Philippines has led to increasing fish catch

Five high priority issues for action in the management of MPAs were identified in the RAP:

- 1. Planning and design;**
- 2. Adaptive management;**
- 3. Coordination and enforcement;**
- 4. Community awareness and development;**
- 5. Sustainable financing.**

The WCPA-SEA Marine Secretariat is based at The Nature Conservancy's South East Asia Centre for MPAs, located in Bali, Indonesia. The Secretariat is mandated to provide information and professional advice, co-ordinate activities, and facilitate networking and the implementation of the RAP. It will assist governments, experts and other stakeholders in building capacity for this purpose.

[www.iucn.org/themes/wcpa/biome/marine/seasia/seasia.html](http://www.iucn.org/themes/wcpa/biome/marine/seasia/seasia.html)



## Mesoamerica: Protecting the coastal zone

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The IUCN Regional Office for Mesoamerica (ORMA) has been working in the field of wetland conservation since 1989 and with marine ecosystems since 1992. Work relating to coral reefs has focused on the sustainable use and conservation of Hol Chan Marine Reserve in the Belize Barrier Reef, and on the management of Parque Nacional Marino Isla Bastimentos in Panama.

Responding to international agreements such as the Ramsar Convention (1971), which acts to protect wetlands of international importance, IUCN-ORMA is helping to protect reef systems through conservation of coastal habitats such as marshes, mangroves and lagoons that are often important fish nurseries for coral reefs, and can mitigate problems of terrestrial pollutant and sediment runoff which can degrade reef health. IUCN-ORMA is also promoting awareness and implementation of regional agreements, such as the Cartagena Convention and the Tulum Declaration on the Mesoamerican Caribbean Reef System (Belize, Guatemala and Honduras agreed to manage the entire reef cooperatively as a single ecosystem). Finally, joint cooperation between IUCN and the Central American Commission on Environment and Development has brought forth the Central American Policy for Conservation and Wise Use of Wetlands (2002), thus providing a legal framework in support of priority wetlands such as the Mesoamerican Barrier Reef System and regional implementation of the Ramsar Convention.

[www.uicnhumedales.org](http://www.uicnhumedales.org)



National Oceanic and Atmospheric Administration/Department of Commerce

Central America has 6,603km of coast, including some 567,000ha of mangroves and 1,600km of coral reef

## SECTION 2

# ■ Improving Coral Reef Management and Monitoring

**Monitoring and assessment are critical to provide resource managers with the information they need to make informed decisions for coral reef conservation and management. IUCN has played a key role in responding to this need. IUCN, together with IOC/UNESCO, UNEP and the World Bank, catalysed the formation of the Global Coral Reef Monitoring Network (GCRMN) in 1995 and has acted as a co-sponsor since GCRMN's inception. IUCN, through its World Commission on Protected Areas and other partners, has developed numerous practical tools and guidelines that provide assistance to coral reef managers, including guidelines to assess the actual success of management strategies, and tools for understanding the social and economic context within which management techniques must be integrated. Since there are too few scientists available to monitor the world's coral reefs, IUCN has provided encouragement and training so that monitoring and assessment can be conducted by local governments, institutions, communities and volunteers.**





## MPA Management Effectiveness Initiative

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With many of the world's coral reefs under potential threat, high expectations are being placed on MPAs to guard against harmful impacts to these systems. To meet these challenges, managers must be well equipped, informed and trained. They must also be able to measure the effectiveness of their work so that they can adapt and improve their techniques.

To help MPA managers and staff measure their work, IUCN's WCPA-Marine joined forces with WWF in the MPA Management Effectiveness Initiative. This group developed a methodology to assist MPA managers in evaluating management effectiveness, titled *How is your MPA doing?* (Pomeroy *et al.*, 2004). The initiative builds on the IUCN Management Effectiveness Framework (Hockings *et al.*, 2002) developed by the WCPA Management Effectiveness Task Force.

Indicators are an integral part of an effectiveness evaluation to determine whether the goals and objectives of the MPA are achieved. This publication provides step-by-step guidance to managers and practitioners in selecting indicators for a particular MPA, developing a process for planning for and implementing this evaluation, and using the evaluation results to inform and adaptively manage the MPA.



Tubbataha Marine Park

One of the objectives of the Tubbataha Reef National Marine Park is to stabilize the condition of the coral reef system within the park.



Tubbataha Marine Park

Another objective of the Tubbataha Reef National Marine Park is to maintain the natural habitat of seabirds found within the park. The north and south islets of Tubbataha are important rookeries of sea birds, some of which are globally threatened.

## Tubbataha Reef National Marine Park:

### A Case Study of Evaluating Management Effectiveness

Tubbataha Reef National Marine Park in the Philippines is one of 21 sites that reviewed the working draft guidebook and field-tested the methodology from November 2002 to March 2003. As required at the participating sites, the evaluation team reviewed the park goals and objectives, selected indicators most appropriate to the site, developed an evaluation workplan, and implemented the workplan. Based on the park's objectives, 19 indicators were selected from the draft guidebook to measure the effectiveness of park management, for example, water quality, local resource use patterns, and degree of stakeholder participation in the management of the MPA.

This initial review allowed MPA managers in the Philippines to determine if the guidelines would meet their needs and if monitoring management effectiveness would fit into their day-to-day management activities. It became clear that there were a limited set of indicators that were feasible to measure at this site, given the cost and physical distance of the sites from the base station of park management. As a result, park managers were able to define its monitoring protocol using fewer, less expensive and less time-consuming indicators to measure park management effectiveness.

# The Global Coral Reef Monitoring Network – GCRMN

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Monitoring an ecosystem, and how people use that system, is critical for conservation and sustainable management. Unfortunately, effective monitoring information is often not sufficiently included in marine management planning and this can undermine many of the subsequent efforts and strategies. Successful environmental monitoring is the aim behind the partnership between the GCRMN, Reef Check, ReefBase and CORDIO. These partners are also active participants in the International Coral Reef Action Network that seeks to mobilize resources to conserve coral reefs around the world. The GCRMN, Reef Check, ReefBase and CORDIO partnership has two principal objectives: to provide data and information on the status and trends in coral reefs and their use; and to raise awareness amongst all stakeholders of the need for conservation management of these valuable resources.

In partnership with IUCN and The Nature Conservancy, the GCRMN highlighted several reasons for monitoring in the 2003 publication *Monitoring Coral Reef Marine Protected Areas*:

- **Assessing and mapping resources;**
- **Determining status and long-term trends in resources and user groups;**
- **Assessing the impacts of large-scale disturbances and human activities;**
- **Conducting performance evaluation of and for management;**
- **Educating and raising awareness in all stakeholders;**
- **Building resilience into MPAs; and**
- **Assisting in global programmes and networks.**



Paul Marshall, GBRMPA

Diver collecting monitoring data on the Great Barrier Reef in Australia



Australian Institute of Marine Science

Training course in GCRMN coral reef monitoring methodology

[www.gcrmn.org](http://www.gcrmn.org)

## GCRMN South Asia

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In India, Maldives and Sri Lanka, the GCRMN has developed into a regional information network of skilled people and institutions to support sustainable and equitable coral reef management. With dedicated funding and technical assistance from the United Kingdom Department for International Development and IOC/UNESCO respectively, GCRMN South Asia has equipped regional researchers and managers with the expertise and tools to collect, integrate and use the ecological and socio-economic information that is required to effectively inform and influence management planning and decision making. Socio-economic assessments, at sites where ecological

monitoring is ongoing, have provided new insight into the complex relationships between reef dependent communities and sustainable reef use. A regional information dissemination system is in development, and GCRMN South Asia, recognising the importance of long-term institutional partnerships and capacity enhancement, has supported the Indian Ministry of Environment and Forestry in establishing an Indian Coral Reef Monitoring Network, and formed nation-wide Coral Reef Fora in Sri Lanka and Maldives, bringing together key national stakeholders to collectively address sustainable and equitable coral management and policy development.

[www.ioc.unesco.org/gcrmn](http://www.ioc.unesco.org/gcrmn)

# Global Socio-Economic Monitoring Initiative

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As sources of fish protein, storm protection, and tourism attractions, coral reefs are key components of economic development of tropical coastal communities worldwide. Understanding the socio-economic conditions of the surrounding communities and incorporating this information into reef management decisions is, therefore, critical to the conservation and sustainable use of these fragile resources.

In particular, socio-economic information is useful for:

- Determining how coral reef management is contributing to community development, including poverty alleviation and equitable sharing of benefits;
- Valuing marine resources in terms of cultural and economic significance, which is critical to lobbying for public and political support;
- Facilitating stakeholder involvement by gaining a greater understanding of community perceptions and needs; and
- Tailoring management to the local situation, such as developing education programmes based on community members' understanding of resource conditions and threats.

Although there is a widely acknowledged need for more socio-economic information on coral reef communities, little exists in comparison with biophysical information. Moreover, there is a relatively limited understanding of how to develop a socio-economic monitoring programme. Recognising this need, the IUCN's WCPA-Marine, in collaboration with GCRMN and NOAA, is coordinating a Global Socio-Economic Monitoring Initiative for Coral Reef Management. The goal of this initiative is to establish socio-economic monitoring programmes around the world. The initiative is currently focused in the Caribbean and Southeast Asia through partnerships with the University of West Indies and World Fish Centre, respectively. The major accomplishments include:

- Publication of the *Socioeconomic Manual for Coral Reef Management* (November 2000), a tool to help coral reef managers better assess and manage the human communities that use and depend on coral reefs by providing step-by-step detailed guidelines on how to conduct socio-economic assessments.
- Publication of *SocMon Caribbean* (October 2003) and *SocMon Southeast Asia* (March 2003), which provide region-specific, standardized guidelines for socio-economic monitoring, including a prioritized list of indicators, interview guides and analysis sheets.
- Regional and national training workshops in East Africa, South Asia, the Caribbean and Southeast Asia to increase over 200 coral reef managers' socio-economic monitoring capacity.
- Site monitoring by sites around the world, including incorporating results into management actions. To date support has been provided to sites in Belize, Colombia, Nicaragua, Tobago, Guatemala, Indonesia, Philippines, Vietnam, Malaysia and Thailand.

Future activities include partnering with networks of sites through such organizations as The Nature Conservancy, International Coral Reef Action Network, and the World Heritage Centre to better institutionalize socio-economics into coral reef management programmes. Plans are also underway to translate *SocMon Caribbean* into Spanish and conduct a Spanish-speaking training workshop in the Caribbean. In addition, a subset of socio-economic indicators is being identified for inclusion in the Reef Check protocol. Future activities also include expanding into the Pacific region with similar publications and training.

[ipo.nos.noaa.gov/socioeconomic/](http://ipo.nos.noaa.gov/socioeconomic/)



Kristin Sheword

Socio-economic surveys taking place in Negros Occidental, Philippines to assess local support for a newly developed MPA

## SECTION 3

### ■ Planning for and Responding to Emerging Threats

Global warming and increased shipping and travel have engendered new and different threats to coral reefs. During the 1980s and 90s mass coral reef bleaching was observed repeatedly throughout the Atlantic, Pacific and Indian Oceans, and in the Caribbean Sea. Invasive species and coral diseases have emerged as additional threats, adding to the growing environmental stress facing coral reef communities. These combined threats have the potential to degrade large areas of coral reef on a global scale. IUCN, with a range of government and non-governmental partners, is continuing to identify, monitor and mitigate emerging threats to coral reefs and to develop new management tools that respond to these threats. Furthermore, IUCN is working to influence regional and international policy to articulate the need and value of managing coral reefs for these emerging threats.



# Coral Reef Degradation in the Indian Ocean – CORDIO

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In the 1997/98 El Niño event the Western Indian Ocean suffered the most severe coral bleaching event in its recorded history, losing an estimated 30% of corals regionally, and up to 90% of corals in the most highly affected sites (e.g. Maldives lost 95% of its coral cover at monitored reefs). With countries of the Western Indian Ocean highly dependent on reef- and beach-based tourism, and their coastal populations dependent on small-scale and commercial fisheries, it was suddenly a high priority to understand the impacts of coral bleaching and reef loss on human societies. To build technical capacity within the region to study and mitigate these impacts of coral bleaching and other more localized threats, the CORDIO programme was initiated in 1999 through support from the Swedish government and the World Bank.

CORDIO operates in East Africa, the Indian Ocean islands and South Asia, with coordination offices in each subregion, thus overlapping with IUCN's regional offices in Eastern Africa and South Asia. CORDIO, IUCN and GCRMN have established a joint position at the IUCN Regional Office in South Asia in Colombo, Sri Lanka. In East Africa, CORDIO and IUCN are working together in promoting monitoring to support improved management effectiveness of MPAs and other projects, streamlining coral reef data management and reporting to regional levels and developing vulnerability assessment and mitigation strategies for coral reefs with respect to climate change.



Pocillopora sp. corals attached to wire mesh to facilitate recovery on a rubble field in the Seychelles

## SOUTH ASIA:

### Tuticorin, India

Islands along the Tuticorin coast in the Gulf of Mannar, India have been seriously affected by illegal coral mining and destructive fishing, resulting in a declining fish catch. Since early 2002, CORDIO has supported a reef restoration project, which focuses on coral transplantation carried out by local fishing communities. In addition, alternative livelihood activities are under development: women from the local fishing communities have been encouraged to engage in crab and lobster fattening projects; and farming has improved by teaching compost techniques. By 2003, approximately 20 fisher families were gaining significant financial benefits from these activities.

## INDIAN OCEAN:

### The Seychelles

The Marine National Parks of the Seychelles were badly affected by the 1998 coral bleaching event, with coral mortality as high as 90% on many reefs. Reefs in this area are important to the tourism economy, therefore it is imperative to speed the recovery of damaged reefs by minimizing ongoing threats. CORDIO is helping to supporting collaborative research projects run by the Seychelles Centre for Marine Research and Technology-Marine Parks Authority that investigate coral recovery and propose recommendations for improved management of marine parks.

## EAST AFRICA:

CORDIO's Socio-Economic Monitoring Programme was set up in East Africa to respond to the need for practical and affordable socio-economic monitoring as a tool for coastal and fisheries resource management.

[www.cordio.org](http://www.cordio.org)



CORDIO – East Africa

# Building coral reef resilience to global change

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Against a backdrop of more conventional threats like pollution and destructive fishing, coral bleaching and other climate-related impacts have emerged to increase uncertainty about the future of reefs. In many regions, coral reefs have already experienced extensive mortality as a result of coral bleaching. Climate-related impacts, including coral bleaching, are predicted to worsen in coming decades, posing a daunting challenge for coral reef management. Unlike locally-mediated threats such as anchor damage or over-fishing, at first climate change seems to lie well beyond a manager's control.

However, over the last five years, reef managers and scientists have focused increasing attention on understanding the impacts of climate change and have developed strategies to help reefs survive global climate change. Many of these ideas were documented when IUCN published *Management of Bleached and Severely Damaged Coral Reefs* (Westmacott *et al.*, 2000) and have since resulted in the development of new, proactive measures to maximize a coral reef's resistance to disturbance and boost resilience for maximum recovery.

MPAs have been highlighted as a key element in rebuilding and supporting the natural resilience of a coral reef system to events like bleaching. By identifying and strategically protecting areas which appear naturally resistant to threats such as climate change, and areas which are important sources of larvae and juveniles (such as fish spawning aggregations), MPAs may be able to enhance recovery of damaged ecosystems and so mitigate the impact of emerging global impacts. Efforts are already underway internationally to implement the idea of incorporating resilience into MPA networks, including in Palau, the British Virgin Islands, Belize, the Seychelles, Yemen and the Maldives.

A team of organizations, including IUCN, The Nature Conservancy, NOAA, Wildlife Conservation Society and the Great Barrier Reef Marine Park Authority are building a collaborative partnership that focuses on incorporating resilience in the face of chronic, large-scale threats such as climate change into MPA selection, design and management, as well as into broader-scale coastal management strategies. Two new tools, *The Reef Resilience (R2) Toolkit* and *The Reef Manager's Guide to Coral Bleaching*, have been developed to help coral reef and MPA managers, trainers and policy makers incorporate resilience principles into planning and management strategies for their coral reefs. The partnership is planning a programme of in-depth training and field-testing of these resilience toolkits, as well as learning exchanges among countries and MPAs to stimulate the rapid application of resilience principles. The first training session will be held in the Caribbean in mid to late 2004, and following sessions are planned for the Pacific and Southeast Asia.



Douglas Seifert

A spawning aggregation of dog snappers (*Lutjanus jocu*) off the coast of Belize

## Coral reefs and invasive species

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Invasive species in the terrestrial environment have received much attention; however marine introductions, particularly in coral reef environments, remain scarcely studied. Although invasion of reef communities by alien species is one of the least understood threats to coral reefs, it is an issue that will become increasingly important due to rising levels of commercial shipping and recreational boating, activities that can potentially introduce exotic species to these ecosystems. The damage caused by invasive species can be devastating due to competition with indigenous species, alteration of ecosystem dynamics, and reduction of the complexity and resilience of the local ecosystem. Invasive species are more likely to become established in disturbed or degraded habitats which may compound the consequences of anthropogenic impacts such as over-harvest or physical damage.



Simon Wilson

Invasive algae on coral reefs in the Gulf of Oman

Research and monitoring efforts are essential to provide early detection and warning of the arrival of alien species, and in order to equip managers with a better understanding of the impacts of alien species on coral reef ecosystems. This understanding must be complemented with on-site action plans for managers to stem the introduction and expansion of alien species in coral reefs and related ecosystems.

Responding to this emerging need, IUCN is initiating a programme of monitoring and investigation of invasive species on the coral reefs of the Indian Ocean. This project aims to:

- build on and improve existing coral reef monitoring programmes by the addition of protocols for detecting and monitoring alien species;
- enhance capacity of staff and institutions involved in monitoring; and
- improve awareness of local communities to the threats posed by these introduced organisms and the possible impacts they may have on local economies.

One of the outputs of the project will be a standardized methodology for survey of alien species in coral reefs that will allow comparison of data within and between countries. This will provide reef managers with an easy and cost-effective tool to monitor the health of the reefs and a set of options to develop an early-warning system. In addition IUCN will produce a guide to management measures for the prevention, detection and mitigation of invasive species on coral reefs.

This project will initially be implemented in Mahe Island in the Seychelles in collaboration with CORDIO, GCRMN and the Seychelles Ministry of Environment and Natural Resources. Experience from this case study will be replicated on a regional level, and lessons learned will be disseminated to other islands and coastal countries in the Indian Ocean and beyond.

## SECTION 4

# ■ Ensuring the Survival of Coral Reef Associated Species

As fisheries and other pressures increase their impact on marine species and habitats, the IUCN Species Survival Commission (SSC) is accelerating its efforts to identify those that are threatened with extinction. The SSC has been active in recent years in developing both its network of marine experts and a marine programme of work, a good deal of which relates to coral reef ecosystems. Currently, the coral reef-related SSC Specialist groups focus on marine turtles, sharks, groupers and wrasses, and coral reef and Caribbean fishes. Threatened marine species, identified by these and additional SSC experts, are included in the *IUCN Red List of Threatened Species™*, the world's most authoritative and comprehensive list of species at risk of extinction. There is an urgent need to expand this work not only to identify those species in need of conservation action but also to elucidate the current and potential future impact of coral bleaching events and other stressors on coral reef species and ecosystems.



# Extinction vulnerability in coral reef fishes

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Longnose hawkfish (*Oxycirrhitus typus*, family Cirrhitidae)

Robert F. Myers



Cocos-Keeling Angelfish (*Centropyge calini*, family Pomacanthidae)

Robert F. Myers

Coral reef fish species that are exploited for food or trade are vulnerable to population depletion and may be vulnerable to extinction. However, the concept that species of diverse and abundant fish faunas found on typical reef systems are vulnerable to local or global extinction has not been widely accepted by resource managers, user groups or the general public. The IUCN SSC has recognised the urgent need to heighten awareness and concern about the real survival risks that many coral reef fishes face – and to translate that concern into proactive management.

Many reef fish species exhibit specific biological traits that render them susceptible to extinction from over-exploitation, habitat loss or other negative impacts. These include:

- **limited geographical distributions (including micro-endemism); broad distributions with low abundances; or disjunct distributions or isolated populations;**
- **long life spans and late age at sexual maturity;**
- **hermaphroditism (sex change);**
- **limited dispersal potential; and**
- **specialized habitat or micro-habitat requirements.**

It is estimated that 80-90% of all coral reef fish species exhibit one or more of these characteristics. It is critical to determine how many species meet more than one of these criteria so as to identify those species most in need of conservation action. These determinations will be made through the Red List assessment process and will come from comparative studies of life-history patterns using predictive methods, including a Susceptibility Matrix currently under development by the SSC that will screen potentially vulnerable species for more in-depth analysis.

The SSC Coral Reef Fishes Specialist Group (CRFSG) focuses on coral reef fish species, and those living in associated habitats. The CRFSG is currently developing a collaborative, multi-institutional project, the Global Assessment of Reef Fishes (GARF), to determine the IUCN Red List, or threatened, status of several thousand species. This project will include the creation, maintenance and use of a database on life history, ecological and behavioural characteristics, exploitation levels and threats, and other variables for use in making assessments. This database will be built using existing data sets, and newly acquired data from recent or current field studies conducted by Group members and their colleagues. The GARF will also map species distributions (in concert with other fish specialist groups), which will be essential for making Red List assessments.

Through CRFSG members at the University of East Anglia (UK), the CRFSG is creating a web site to provide information about the CRFSG's activities and findings.



The Guam damselfish (*Pomacentrus guamensis*, family Pomacentridae) is a species endemic to Mariana and Ogasawara Islands

Robert F. Myers



Yves Lefèvre, Fondation Mapelo

School of silky sharks (*Carcharhinus falciformis*), often encountered over deepwater reefs

## Sharks and coral reefs

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In response to growing concern about the impact of fisheries on shark and ray populations, the IUCN SSC established the Shark Specialist Group (SSG) in 1991. Sharks generally have little capacity to recover from population depletions due to their conservative life history traits: slow growth, late maturity, low fecundity and low natural mortality. Many are under pressure from over-fishing and habitat damage, and some are considered threatened with extinction. The SSG interacts with international conventions (e.g. CITES) and organizations (e.g. Food and Agriculture Organization of the United Nations) to provide leadership for the conservation and management of sharks by undertaking Red List assessments and providing technical, scientific and policy advice. For example, a major issue of concern is shark finning and the SSG is working to promote regional and international cooperation to regulate this practice.

Reef sharks have become an important focus for the SSG, being vital not only as top predators maintaining the healthy balance of reef ecosystems but also for ecotourism. Through Red List workshops the SSG has listed, for example, the Papuan epaulette shark (*Hemiscyllium hallstromi*) and hooded carpet shark (*H. strahani*) as Vulnerable due to the increasing pressure they face as a result of loss of reef habitat caused by pollution and destructive fishing. The SSG has also been able to illustrate that MPAs work to protect sharks. For example, the tasselled wobbegong (*Eucrossorhinus dasypogon*) is classified as Least Concern in Australia since a considerable amount of its habitat is protected in the Great Barrier Reef Marine Park; however, significant population declines are predicted to continue in other parts of the world where this species is unprotected. More research and monitoring are needed to improve the knowledge of status, critical habitats and threats to reef sharks.

### Examples of areas where SSG members have been active include:



Sandra Bessudo, Fondation Mapelo

#### Maldives:

The reef shark fishery suffered declining catch rates, and the numbers of sharks at popular dive sites decreased. Recognising the economic importance of shark-watching, SSG members played a key role in research leading up to the government banning of shark fishing within the tourism zone. However, given enforcement limitations, it remains to be seen whether the shark populations will recover.



Dave Wachenfeld, Triggerfish Images

#### Osprey Reef, Coral Sea, Australia:

A long-term study at this isolated coral atoll, supported by several SSG members, is providing valuable information on biology, critical habitats and movements, and showing the reef sharks to be highly site-attached, with implications for management in the region. The study has shown that each live shark seen by divers is worth AUD\$80,000 per animal compared to the once-only dead value of approximately AUD\$50.



Rachel T. Graham

#### Gladden Spit, Belize:

Highly migratory species of sharks can also benefit from coral reef reserves. Whale sharks (*Rhincodon typus*), studied here by an SSG member, seasonally congregate in a protected area within the Mesoamerican Barrier Reef, designated to protect them while they feed on the spawn of aggregating snappers. This has formed the basis for a lucrative ecotourism industry, locally worth 39 times more than the fishery for the reef fish spawning aggregations.

# Groupers and Wrasses – valuable and vulnerable reef fishes

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Coral reef fishes benefit from very little management or conservation attention globally, yet they represent 10% of global fisheries in landed value, and in many places, their populations have been seriously reduced and their habitat degraded. Since the mid-1990s, there has been growing concern for the status of some species, including many groupers and some wrasses.

In 1998, the IUCN Specialist Group for Groupers and Wrasses (GWSG) was established to focus on these two families of particularly vulnerable and economically valuable reef fishes (approximately 1,000 species in total). Many are long-lived, and exhibit late sexual maturation and other life history characteristics, such as aggregation-spawning and hermaphroditism, that make them very susceptible to over-fishing and vulnerable to local, commercial or biological extinction. More than twenty species are considered to be threatened, and GWSG members are active in species assessments and in conducting biological studies on the more vulnerable species.



Juvenile humphead wrasses in a cooled aquarium ready for restaurant sale. The species is listed as vulnerable and is disappearing from many fishing grounds

**Some examples of GWSG activities are given below:**

**The live reef food fish trade:** In Southeast Asia, there is a large and lucrative market in live reef fish for food. This market, centred in Hong Kong, exploits a range of groupers and other reef fishes, including the threatened humphead, or Napoleon, wrasse (*Cheilinus undulatus*) for the luxury restaurant trade. Retail prices are high, but management of associated fisheries and trade is lacking. The GWSG has been running an awareness campaign for the humphead wrasse and participated in an advisory capacity in the development of Standards of Good Practice for the trade. These voluntary standards include a commitment not to exploit threatened species or to target spawning aggregations. Interest in protecting this species has increased considerably in the past few years, and the SG is currently collaborating with WWF-HK on a consumer-awareness campaign in Hong Kong, to reduce consumption of threatened species (the project was launched in June 2004).

**Reef fish and their spawning aggregations:** The GWSG is working with the Society for the Conservation of Reef Fish Aggregations (SCRFA) because many groupers and wrasses aggregate to spawn. These reproductive gatherings are increasingly exploited by fishers. This has driven some species, among them the Nassau grouper (*Epinephelus striatus*), of the tropical Atlantic, to the point where they have been classified as Endangered on the IUCN Red List. A major part of this collaborative work is to document the current status and exploitation history of aggregations in order to build a stronger case for the protection of aggregations and aggregating species. The alliance has successfully worked towards increasing awareness and promoting management and policy approaches to ensure that these important biological events, and dependent fisheries, persist. One recent example is the Call for Action to protect spawning aggregations adopted by the Second International Tropical Marine Ecosystems Management Symposium in Manila in March 2003.

[www.hku.hk/ecology/GroupersWrasses/iucnsg/](http://www.hku.hk/ecology/GroupersWrasses/iucnsg/)

[www.scrfa.org](http://www.scrfa.org)

## IUCN and cold water corals

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Some of the largest coral structures in the world are found in waters too deep to be reached by sunlight. The number and variety of these cold water coral species have only been discovered in recent years, and scientists estimate that as much as two thirds of all known coral species may be found in cold waters. The biological characteristics of most cold water coral reefs render them particularly sensitive to human disturbance and exploitation; large-scale commercial fishing is considered to be the main threat to deep sea coral habitats. IUCN, together with its scientific and academic partners, is helping to raise awareness of the concerns regarding cold water corals to a global level and to disseminate the latest scientific information on these habitats. Recent progress has been made through the Convention on Biological Diversity, where States called on the United Nations to address the serious threats to marine biodiversity in areas beyond national jurisdiction, with particular reference to cold water coral-related ecosystems. The aim is to achieve precautionary ecosystem-based management of fishing activities and to locate and research cold water coral reefs before unsustainable exploitation and habitat destruction render them obsolete.



Bubblegum coral (*Paragorgia* sp.) 2.5m high were observed at the crest of the Davidson Seamount (1,257m) during the Davidson Seamount exploration in May 2002

Southampton Oceanography Centre

# Marine turtles and coral reef ecosystems

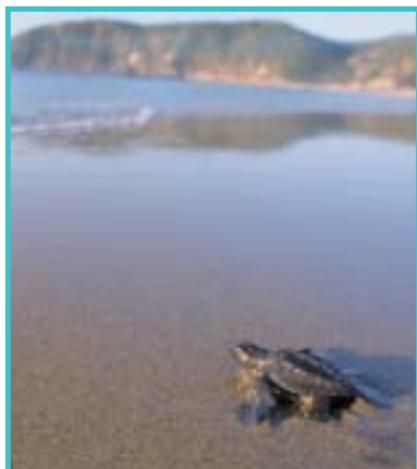
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Descendants of the planet's fauna for some 200 million years, and integral components of marine ecosystems, including coral reefs, marine turtles across the globe are today in danger of extinction. All marine turtle species are under continuous and unrelenting stress from human populations: marine turtles are harvested for their meat and oil, shells are taken for curio-making, eggs for food, and a number of body parts are falsely considered to be aphrodisiacs. Although protected by law in most range countries, loopholes in those laws, continued legal exploitation, and incidental mortality in industrial and artisanal fisheries account for a level of harvest far in excess of what can be supported by turtle populations. A long maturation period and low reproductive output, coupled with high mortality of the younger life stages, means that marine turtle populations can be depleted easily, but no signs of the decline will be noted for 30 to 50 years.



Roderic Mast

Olive ridley (*Lepidochelys olivacea*) hatchling



David Lee

Green turtle (*Chelonia mydas*) Galapagos yellow colour morph

The Marine Turtle Specialist Group (MTSG) of the IUCN-SSC was founded in 1966 in response to a growing recognition of the endangered status of marine turtles. The MTSG's activities have focused primarily on education and information transfer and the development of regional action plans. The MTSG's mission is to develop and support strategies, set priorities, and provide tools that promote and guide the conservation of marine turtles, their ecological roles and habitats. The MTSG helped develop Conservation Strategy and Action Plans for the Northern and Western Indian Ocean regions, based largely on the *Global Strategy for the Conservation of Marine Turtles*, developed by the MTSG in 1995. The MTSG also produced a comprehensive *Management and Research Techniques for the Conservation of Sea Turtles* manual in 1999, which is in use throughout the world. In the near future, the MTSG will be investigating the integration of sustainable use protocols into conservation activities, and determining recovery criteria for distinct populations.

MTSG members also carry out population status assessments and assist with the design and implementation of management and conservation activities, where possible relying on a mixture of traditional and current scientific knowledge and the latest technical advancements.

[www.iucn-mtsg.org/](http://www.iucn-mtsg.org/)

## Coral reef species trade: TRAFFIC

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Many coral reef species are in high demand in international trade and unregulated harvesting to meet this demand poses a key threat to coral reefs and the livelihoods of people that depend on them. TRAFFIC, a joint programme of WWF and IUCN, is the world's largest wildlife trade monitoring network, working to ensure that trade in wild plants and animals is not a threat to the conservation of nature. As part of its work TRAFFIC has researched and highlighted a range of issues relating to trade in coral reef resources.

TRAFFIC has published research into coral reef resources such as giant clams, corals, seahorses, live reef fish harvested for food such as humphead wrasse, sea cucumbers, pearl oysters, green snail and trochus, as well as sharks and marine turtles. This work has served to highlight the nature, extent and scope of trade in coral reef resources and inform decision makers and communities of ways to manage the impacts of this trade. More recently, TRAFFIC, in collaboration with Project Seahorse, has produced an identification manual on seahorses to support the enforcement of new international trade regulations for these threatened creatures. TRAFFIC is also engaged in assisting Pacific island countries to ensure that trade in their coral reef resources is not detrimental to their long-term sustainability.

[www.traffic.org](http://www.traffic.org)



Wolcott Henry 2001

Seahorses are exploited for medicines, aphrodisiacs, curios and aquarium fishes. Many exploited populations of seahorses are declining as a result of overfishing.

## ■ **Reviewers:**

Chip Barber, Amie Brautigam, Benjamin Catermoul, Doug Harper, Paul Marshall, Arthur Paterson, Yvonne Sadovy, Dan Salkeld, Kristian Teleki, Ole Vestergaard, Emma Whittingham.

## ■ **Publications cited in text:**

### ■ **Asian Development Bank and IUCN Regional Marine Programme Asia. (2003)**

*REGIONAL STRATEGIC PLAN: Towards Integrated and Pro-Poor Approaches to the Management of South Asia's Coastal and Marine Environments.*

[iczm-sa.org](http://iczm-sa.org)

### ■ **Bunce, L., Townsley, P., Pomeroy, R. and Pollnac, R. (2000)**

*Socioeconomic Manual for Coral Reef Management.*

Global Coral Reef Monitoring Network and Australian Institute of Marine Science.  
[ipo.nos.noaa.gov/socioeconomic/pdfs/GCRMN\\_Manual.pdf](http://ipo.nos.noaa.gov/socioeconomic/pdfs/GCRMN_Manual.pdf)

### ■ **Bunce, L. and Pomeroy, R. (2003)**

*Socioeconomic Monitoring Guidelines for Coastal Managers in Southeast Asia: SocMon SEA.*

IUCN World Commission on Protected Areas and Australian Institute of Marine Science.

[ipo.nos.noaa.gov/socioeconomic/pdfs/SocMonSEA.pdf](http://ipo.nos.noaa.gov/socioeconomic/pdfs/SocMonSEA.pdf)

### ■ **Bunce, L. and Pomeroy, R. (2003)**

*Socioeconomic Monitoring Guidelines for Coastal Managers in the Caribbean: SocMon Caribbean.*

IUCN World Commission on Protected Areas and Australian Institute of Marine Science.

[ipo.nos.noaa.gov/socioeconomic/pdfs/SocMonCaribbean.pdf](http://ipo.nos.noaa.gov/socioeconomic/pdfs/SocMonCaribbean.pdf)

### ■ **Colin, P. L., Sadovy, Y. J. and Domeier, M. L. (2003)**

Manual for the Study and Conservation of Reef Fish Spawning Aggregations. *Society for the Conservation of Reef Fish Aggregations. Special Publication No. 1 (Version 1.0): 1–98.*

[www.scrfa.org](http://www.scrfa.org)

### ■ **Dulvy, N. K., Sadovy, Y. and Reynolds, J. D. (2003)**

Extinction vulnerability in marine populations. *Fish and Fisheries* 4:25–64.

### ■ **Eckert, K. L., Bjorndal, K. A., Abreu-Grobois, F. A. and Donnelly, M. (Editors). (1999)**

*Research and Management Techniques for the Conservation of Sea Turtles.*

IUCN/SSC Marine Turtle Specialist Group Publication No. 4.

[www.iucn-mtsg.org/publications/Tech\\_Manual/06\\_Pritchard&Mortimer.pdf](http://www.iucn-mtsg.org/publications/Tech_Manual/06_Pritchard&Mortimer.pdf)

### ■ **English, S., Wilkinson, C. and Baker, V. (1997)**

*Survey Manual for Tropical Marine Resources*, 2nd Edition. Australian Institute of Marine Science, Townsville.

[www.aims.gov.au/pages/facilities/](http://www.aims.gov.au/pages/facilities/)

[bookshop/survey-manual/bs-survey-manual01.html](http://bookshop/survey-manual/bs-survey-manual01.html)

### ■ **Fowler, S.L., Camhi, M., Burgess, G.H., Cailliet, G.M., Fordham, S.V., Cavanagh, R.D., Simpfendorfer, C.A. and Musick, J.A. [In press]**

*Sharks, rays and chimaeras: the status of the chondrichthyan fishes.*

IUCN SSC Shark Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK. Available from:

[info@books.iucn.org](mailto:info@books.iucn.org) or [www.iucn.org/bookstore](http://www.iucn.org/bookstore).

### ■ **Hocking, M., Stolton, S. and Dudley, N. (2000)**

*Evaluating Effectiveness: A Framework for Assessing the Management of Protected Areas.*

IUCN, Gland, Switzerland and Cambridge, UK.

[effectivempa.noaa.gov/docs/evaluating.pdf](http://effectivempa.noaa.gov/docs/evaluating.pdf)

### ■ **IUCN. (2004)**

*Managing Marine Protected Areas: A Toolkit for the Western Indian Ocean.* IUCN Eastern Africa Regional Programme, Nairobi, Kenya.

[www.wiomsa.org/mpatoolkit.htm](http://www.wiomsa.org/mpatoolkit.htm)

### ■ **IUCN/SSC Marine Turtle Specialist Group. (1995)**

*A Global Strategy for the Conservation of Marine Turtles.*

### ■ **IUCN World Commission of Protected Areas-Marine. (2003)**

*Marine Reserves Regional Enhancement Plan for the Wider Caribbean.* [ipo.nos.noaa.gov/mri/](http://ipo.nos.noaa.gov/mri/)

### ■ **Lourie, S.A. et al. (2004)**

*A Guide to the Identification of Seahorses. Project Seahorse and TRAFFIC North America.*

University of British Columbia and WWF, Washington DC.

### ■ **Marshall, P.A. and Schuttenberg, H.Z. (2004)**

*A Reef Manager's Guide to Coral Bleaching.*

Great Barrier Reef Marine Park Authority, Australia. Available from: [info@gbrmpa.gov.au](mailto:info@gbrmpa.gov.au) or [info@books.iucn.org](mailto:info@books.iucn.org)

### ■ **Pomeroy, R.S., Parks, J.E., and Watson, L.M. (2004)**

*How is your MPA doing? A Guidebook of Natural and Social Indicators for Evaluating Marine Protected Area Management Effectiveness.*

IUCN, Gland, Switzerland and Cambridge, UK. Available from:

[mei\\_contact@noaa.gov](mailto:mei_contact@noaa.gov)

### ■ **The Nature Conservancy. (2004)**

*R2 – Reef Resilience Toolkit. Version II.*

Available from: Elizabeth McLeod

[emcleod@tnc.org](mailto:emcleod@tnc.org)

### ■ **Westmacott, S., Teleki, K., Wells, S. and West, J.M. (2000)**

*Management of Bleached and Severely Damaged Coral Reefs.*

Published jointly by IUCN (US and EARO), WWF (Sweden and Tanzania Programme Office), and Convention on Biological Diversity Secretariat.

Available in English, Spanish, Portuguese, Bahasa Indonesia, and Kiswahili from:

[info@books.iucn.org](mailto:info@books.iucn.org)

### ■ **Wilkinson, C., Green, A., Almany, J. and Dionne, S. (2003)**

*Monitoring Coral Reef Marine Protected Areas.*

Australian Institute of Marine Science and IUCN Global Marine Programme.

[www.aims.gov.au/pages/reflib/mcrmpa/pdf/mcrmpa-v1.pdf](http://www.aims.gov.au/pages/reflib/mcrmpa/pdf/mcrmpa-v1.pdf)

### ■ **Wilkinson, C. (2002)**

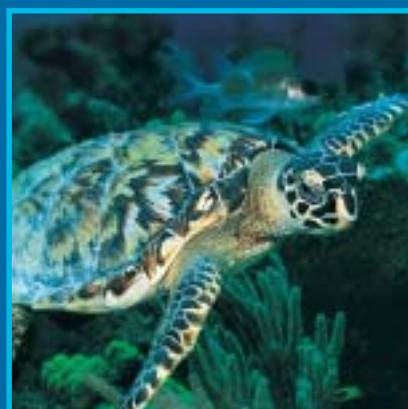
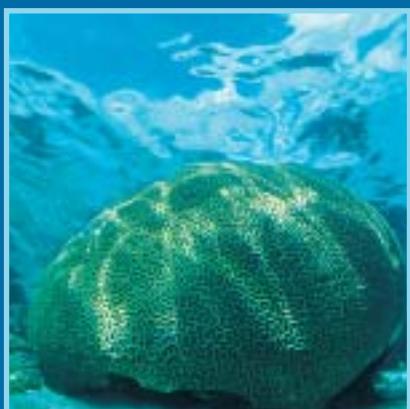
*Status of Coral Reefs of the World: 2002.*

Global Coral Reef Monitoring Network and Australian Institute of Marine Science, Townsville. (Previous reports in 2000 and 1998).

[www.gcrmn.org/gcrmn-06.html](http://www.gcrmn.org/gcrmn-06.html)

<b>CDB</b>	<b>Convention on Biological Diversity</b>
<b>CITES</b>	<b>Convention on International Trade in Endangered Species of Wild Fauna and Flora</b>
<b>CORDIO</b>	<b>Coral Reef Degradation in the Indian Ocean</b>
<b>EARP</b>	<b>IUCN Eastern Africa Regional Programme</b>
<b>GBRMPA</b>	<b>Great Barrier Reef Marine Park Authority</b>
<b>GCRMN</b>	<b>Global Coral Reef Monitoring Network</b>
<b>GEF</b>	<b>Global Environment Facility</b>
<b>ICRI</b>	<b>International Coral Reef Initiative</b>
<b>IOC</b>	<b>Intergovernmental Oceanographic Commission</b>
<b>IUCN</b>	<b>The World Conservation Union</b>
<b>MPA</b>	<b>Marine Protected Area</b>
<b>NGO</b>	<b>non-governmental organization</b>
<b>NOAA</b>	<b>US National Oceanic and Atmospheric Administration</b>
<b>ORMA</b>	<b>IUCN Oficina Regional para Mesoamérica (IUCN Regional Office for Mesoamerica)</b>
<b>RAP</b>	<b>Regional Action Plan</b>
<b>SEA</b>	<b>Southeast Asia</b>
<b>SPAW</b>	<b>Specially Protected Areas and Wildlife Protocol</b>
<b>SSC</b>	<b>IUCN Species Survival Commission</b>
<b>TNC</b>	<b>The Nature Conservancy</b>
<b>UNESCO</b>	<b>United Nations Educational, Scientific and Cultural Organization</b>
<b>UNEP</b>	<b>United Nations Environment Programme</b>
<b>WCPA</b>	<b>IUCN World Commission on Protected Areas</b>
<b>WSSD</b>	<b>World Summit on Sustainable Development</b>
<b>WWF</b>	<b>World Wide Fund for Nature (World Wildlife Fund in North America)</b>





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