

# Introduction



## *The 9th International Coral Reef Symposium in Bali, Indonesia*

**T**HE Ninth International Coral Reef Symposium (9th ICRS) was organized by the International Society for Reef Studies (ISRS), an organization with a membership of approximately 1000-1100 members from more than 50-60 countries that is devoted to the scientific understanding and conservation of the world's coral reefs. The Indonesian State Ministry for the Environment hosted the Symposium in Bali, Indonesia, October 23-27, 2000. Approximately 1500 participants shared information and ideas regarding the science, conservation, management, and future of the world's coral reefs.

The meeting had major regional and global impact at a critical time in the policy efforts of coral reef countries. Through personal commitment and the generous support of numerous sponsors, there was wide representation of participants – particularly students, scientists, conservationists, and managers – from developing countries. Ten excellent plenary speakers drawn from science, policy, conservation, and management inspired the audience to build bridges across different scientific disciplines, as well as outside the scientific community. ISRS fundraising efforts also facilitated integration of a large contingent of journalists and media into the program, ensuring that the ideas and science relevant to conservation were communicated to a large audience including the press, decision-makers, and the public.

The ICRS has been held every four years since 1969 and has steadily grown to become the premier forum for discussions of the science, conservation, and management of global coral reefs. The proceedings of these 8 symposia are key references to the development of coral reef science, management, and conservation and to the dynamism and trends of global coral reefs over the past 30 years. The ICRS is also a critical global venue to initiate actions to support coral reefs and the human societies that depend upon them.

The theme of the 9th ICRS was *World Coral Reefs in the New Millennium: Bridging Research and Management for Sustainable Development*, and discussions were arranged under five broad themes:

1. State of Knowledge: What coral reefs are; how they have developed; what inhabits them; and how they function in natural and stressed environments.
2. Resource Management: Approaches to sustainable utilization of coral reef resources while achieving conservation goals; managing risk and uncertainty; performance indicators.

3. Socio-economic Values: What are they and are we using them wisely? What are the best incentives for good environmental practice; public awareness.
4. Assessment, Monitoring and Rehabilitation: The what, where, how, and how much of assessment, monitoring, and rehabilitation; ecological goals and performance indicators.
5. The Future of Coral Reefs: International Coral Reef Initiative's (ICRI)

Framework for Action and its implementation; global climate change and adaptation in coral reefs; implications for people.

In addition to the formal sessions, many strong lessons were exchanged and alliances forged. The shared passion for the understanding and preservation of coral reefs was greatly strengthened, important new actions identified, and existing actions progressed, notably through the International Coral Reef Initiative (ICRI). ICRI was established in 1995 at a major international meeting in Dumaguete, Philippines and led successively by secretariats in the United States, Australia, France, and currently, The Philippines, in partnership with Sweden.

Further information about the 9th ICRS can be found at: [www.nova.edu/ocean/9icrs/](http://www.nova.edu/ocean/9icrs/), including a detailed listing of speakers and presentation titles under "Program Schedule."



View from the Great Barrier Reef, Australia

Photo: Great Barrier Reef Marine Park Authority

# Organizers of the 9th International Coral Reef Symposium

## The International Society for Reef Studies (ISRS)

The International Society for Reef Studies—composed of scientists, managers, and conservationists—was formed in 1980 and currently has a membership of approximately 1000-1100 members from more than 50-60 countries. According to its constitution, the principle objective of the Society is: “promoting the production and dissemination of scientific knowledge and understanding of coral reefs, both living and fossil.” To achieve its objective, the Society holds regular meetings and co-sponsors other gatherings, publishes in cooperation with Springer-Verlag (Berlin) the quarterly international scientific journal, *Coral Reefs*, and internally publishes a biannual newsletter, *Reef Encounter*. In recent years, with the rising concern about the fate of coral reefs, the membership of the ISRS has grown to include many resource managers and conservationists.



The ISRS is entirely a voluntary organization governed by a constitution, a 12-member council, and five officers. At the time of the Symposium, officers and their affiliations were: Dr. Terence J. Done, President, Australian Institute of Marine Science, Australia; Professor Barbara Brown, Vice President, University of Newcastle, United Kingdom; Dr. Daphne Fautin, Treasurer, Kansas Geological Survey, USA; Dr. Richard Aronson, Corresponding Secretary, Dauphin Island Sea Lab, Alabama, USA; Dr. Steven Miller, Recording Secretary, University of North Carolina, Wilmington, USA. Further details may be found on the Society Web site: ([www.uncwil.edu/ISRS](http://www.uncwil.edu/ISRS)).

## State Ministry for the Environment of the Republic of Indonesia



The State Ministry for the Environment, as lead agency for the Government of Indonesia, was represented by Mr. Sudarsono on the local organizing committee as an ‘in kind’ contribution to the symposium. Mr. Sudarsono is Executive Secretary for the State Ministry of Environment.

## Research and Development Agency for Oceanology: Indonesian Institute of Sciences



The Institute is the premier scientific body in Indonesia and has central responsibility for studies and activities related to management of the coral reefs of the Indonesian archipelago. Its Deputy Director, Dr. Anugerah Nontji, was Chair of the local organizing committee. The Institute was also represented on the local organizing committee by Dr. Suharsono, who is also on the Council and Scientific Program Committee of ISRS, and Professor Kasim Moosa, who is Editor-in-Chief for the Symposium Proceedings.

# *The International Coral Reef Initiative*

At the Small Island Developing States conference in 1994, the Governments of the United States, Australia, France, Jamaica, Japan, The Philippines, Sweden, and the United Kingdom, along with international organizations such as the World Bank and the United Nations Environment Program, initiated a global partnership to stop and reverse the global degradation of coral reefs. The International Coral Reef Initiative (ICRI) is a unique environmental partnership among nations and organizations seeking to implement Chapter 17 of Agenda 21, and other international Conventions for the benefit of coral reefs and related ecosystems. ICRI is an informal mechanism that allows representatives of developing countries with coral reefs to sit in equal partnership with major donor countries and development banks, international environmental and development agencies, scientific associations, the private sector and non-governmental organizations (NGOs) to promote the best strategies to conserve the world's coral reef resources. ICRI does not develop and fund proposals, but ensures that the needs of the developing world concerning their coral reefs are conveyed to operational and funding organizations.

Thus, ICRI is unique and its strength lies in the fact that it is a voluntary body with basic operational objectives. There are no plans to form a permanent structure with permanent staff, and funds spent on meetings are kept to a minimum. The agenda for ICRI has been set by over 80 countries and states with coral reefs expressed at 2 ICRI International Workshops (1995 and 1998) and 7 ICRI Regional Workshops.

ICRI voluntary partnership of developing countries, donor countries, development banks, international environmental and development agencies, scientific associations, the private sector and NGOs are linked by a global Secretariat, run and funded by the Government of one country for two years, but often with assistance of others.

The Global Secretariat is deliberately kept small and temporary. To date, coordination staff have performed the ICRI tasks in addition to their other responsibilities in Government. The ICRI Secretariat is advised by the Coordination and Planning Committee (CPC), which meets once or twice per year, often opportunistically to coincide with other international meetings. In turn, CPC



Fish and Coral on the Great Barrier Reef, Australia

Photo: Great Barrier Reef Marine Park Authority

members are requested to facilitate the objectives and projects of ICRI.

The first Secretariat was hosted by the U.S. Department of State of the U.S. Government (1994 to September 1996). The second Secretariat was hosted by the Great Barrier Reef Marine Park Authority of the Australian Government (September 1996 to December 1998). The third Secretariat was hosted by the Ministry of the Environment of the Government of France (January 1999 until December 2000). It is now co-chaired by the Philippines and Sweden, and is based in the Department of Natural Resources in Manila.

## **ICRI Program of Actions**

The ICRI Action Agenda is based on the *Call to Action* and *Framework for Action*, which listed achievable objectives for Governments, donors and funding agencies, development organizations, NGOs, the research community, and the private sector to work together for sustainable development of coral reef resources.

In November 1998, the International Tropical Marine Ecosystems Management Symposium formulated a *Renewed Call to Action* that added a series of urgent tasks to ICRI and the ICRI Secretariat. Thus, ICRI will continue to focus the world's attention on the need for action to protect and manage coral reefs. This must be done at local, national and international levels. The success of the Initiative will be measured in the ability to turn this



Photo: Roger Steene

*Tridacna* clam on the reef in Raja Ampat, Indonesia

international momentum into concrete action at all levels and in all regions.

During 1998-2000, ICRI made progress on the following key objectives:

- Mobilize the international community at the highest levels on the declining status of the world's coral reefs and promote actions that must be implemented immediately to reverse this decline
- Establish operational ICRI networks at international and regional scales to coordinate the key objectives of implementing integrated coastal management, building capacity, conducting effective research and monitoring, promoting awareness amongst all stakeholders, and involving the private sector – especially the tourism industry
- Catalyze funding of programs and projects through these networks that will allow partners of ICRI to cooperate in the conservation and sustainable development of coral reefs and related ecosystems; a data bank of funded projects has been set up

### *The Philippines-Sweden Joint Secretariat*

In January 2001, the ICRI Secretariat was assumed by The Philippines in partnership with Sweden. As part of their work agenda, ICRI will be holding a series of regional workshops in East Asia, East Africa, and the Caribbean, as well as the Second International Tropical Marine Ecosystem Management Symposium (ITMEMS2) in 2002. Details on all these events can be found on the ICRI Web site at: [www.icriforum.org](http://www.icriforum.org).

### *The ICRI Forum Web site*

In conjunction with the World Bank, ICRI has established a Web site on coral reef ecosystem issues that is intended to serve as a major link to any organization that is an ICRI partner. The Web site will also host ICRI discussion groups on selected topics. Organizations and ICRI partners are invited to participate in the Forum and establish a kiosk to represent their partnership within ICRI on the Web site at: [www.icriforum.org](http://www.icriforum.org).

### *ICRI Organizational Structure*

ICRI is composed of the following organizational units:

- ICRI Secretariat
- The Coordination and Planning Committee (CPC)
- The Global Coral Reef Monitoring Network (GCRMN)
- The International Coral Reef Information Network (ICRIN)
- The International Coral Reef Action Network (ICRAN)

## *A Primer on Coral Reefs*

**C**ORAL reefs are among the earth's most biologically diverse ecosystems and are an integral part of the tropical coastal systems—that include mangrove forests, seagrass meadows, and beaches—upon which people depend for livelihood, recreation, medicine, and other valuable goods and services. Coral reefs directly benefit people from extractive uses, such as fisheries for food, or from nonextractive uses, such as tourism. The indirect benefits from coral reefs include protection of shorelines from storms and the provision of natural breakwaters, which create harbors for many coastal communities.

Coral reefs are generally grouped into three types: atolls, barrier reefs, and fringing reefs. Fringing and barrier reefs are natural, self-repairing breakwaters that protect low-lying coastal areas from erosion and other destructive action by the sea. Fringing reefs are composed of a number of living communities. Most shores are sandy beaches, mangrove forests, and rocky cliffs or intertidal areas. Sloping gently away from this shore is a shelf-like, reef flat of variable width and depth. It usually consists of a combination of sand, mud, rocks, sea grass, algae, and scattered corals. At the outer edge of the reef flat is the reef crest, which is often the most diverse and productive zone being exposed to waves, currents, and clear and shallow water. Proper coral reef management depends on maintaining the reef and its associated ecosystems within tolerable ranges and in balance.

The primary productivity of coral reefs is quite high, and one reef may support as many as 3000 species. The high productivity of coral ecosystems results principally from water flowing over the reef, and the efficient biological recycling and high retention of nutrients. Although coral reefs may contain high species numbers, most reefs are characterized by many species with relatively low population numbers and many rare species. The low population numbers, tight nutrient recycling and complex food webs, make reefs especially vulnerable to overexploitation. Even though reefs are often referred to as “productive” ecosystems, experience has shown that coral reefs can be easily overexploited by the transport of organisms out of the system and must be carefully managed and monitored.

Coral reef communities are not closed systems but are complex systems that depend on many internal and



Mangroves and corals in Raja Ampat, Indonesia

Photo: Gerald R. Allen

external factors: nutrient flow, recycling, symbiosis, predator-prey relations, and specific environmental conditions. For example, coral reef communities may obtain their supplies of fixed or usable nitrogen, which is essential to phytoplankton and algae for photosynthesis, from algae on adjacent reef flats, and bacteria in reef sediments, sea grass beds and mangroves. Transport of mass and nutrients between seagrass meadows, mangrove forests and coral reefs often depend upon the active movement of animals, rather than transport by water flow, since tropical waters are relatively clear and nutrient poor. Thus, the destruction or alteration of other marine ecosystems can have a direct impact on the coral reef.

Reef building through the accumulation of calcium carbonate is a very slow process. Most existing reefs are the result of growth over the past 5000 years of relative sea



Photo: Coastal Resources Center, URI

Mangrove conservation project, Pat Nimat, Indonesia,

level stability. Unlike other marine systems, coral reefs are built up entirely by biological activity. Reefs are composed of large deposits of calcium carbonate that have been produced by corals (*phylum Cnidaria, order Scleractinia*) with major additions from calcareous algae and other organisms that secrete calcium carbonate. Reef growth also depends on a symbiotic relationship between the coral polyps and the algae that live in their tissues.

Reefs survive under relatively narrow ecological limits: water temperature usually stays between 18 and 30 degrees Celsius, with a few exceptions; salinity should be fairly constant at 30 to 36 parts per thousand; sedimentation must be low so that the water is clear; and there must be sufficient circulation of nutrient-limited and pollution-free water. Changes to these conditions will quickly damage or kill the coral animals and other organisms that live in the reef habitat. Thus, there are limits to the amount of human activity and impacts that coral reefs can stand before they are altered or destroyed.

The physical complexity of a reef contributes to its diversity and productivity. The great number of holes and crevices in a reef, primarily by the corals, provide abundant shelters for fish and invertebrates, and are important fish nurseries. The reef provides a solid bottom for many organisms to settle and grow. A number of highly specialized species have become dependent for their survival on the reef. Physical damage to the reef must be avoided in order to ensure the health of the ecosystem.

Coral reefs are threatened by both natural and human-made causes. Natural causes include storm or monsoon damage, changes in weather patterns such as “El Nino,” and predation on corals. Human-made causes include mining of coral products, destructive fishing practices, sedimentation due to poor land-use practices, overexploitation of reef resources, pollution, dumping of waste, tourism, and shorefront construction, among others.

The demand for coral reef resources is increasing, for both extractive and non-extractive uses, and it is becoming more difficult to address the causes of coral reef degradation and destruction. Unless appropriate and timely management is implemented, these valuable resources may be lost.

### Useful Reference

White, A. T. 1987. “Coral reefs: Valuable resources of Southeast Asia.” *ICLARM Education Series 1*. International Center for Living Aquatic Resources Management, Manila, Philippines.