Coral Reef
Targeted Research & Capacity Building for Management

Over one-half
of the world's population lives
within **100 kilometres**
of the sea.

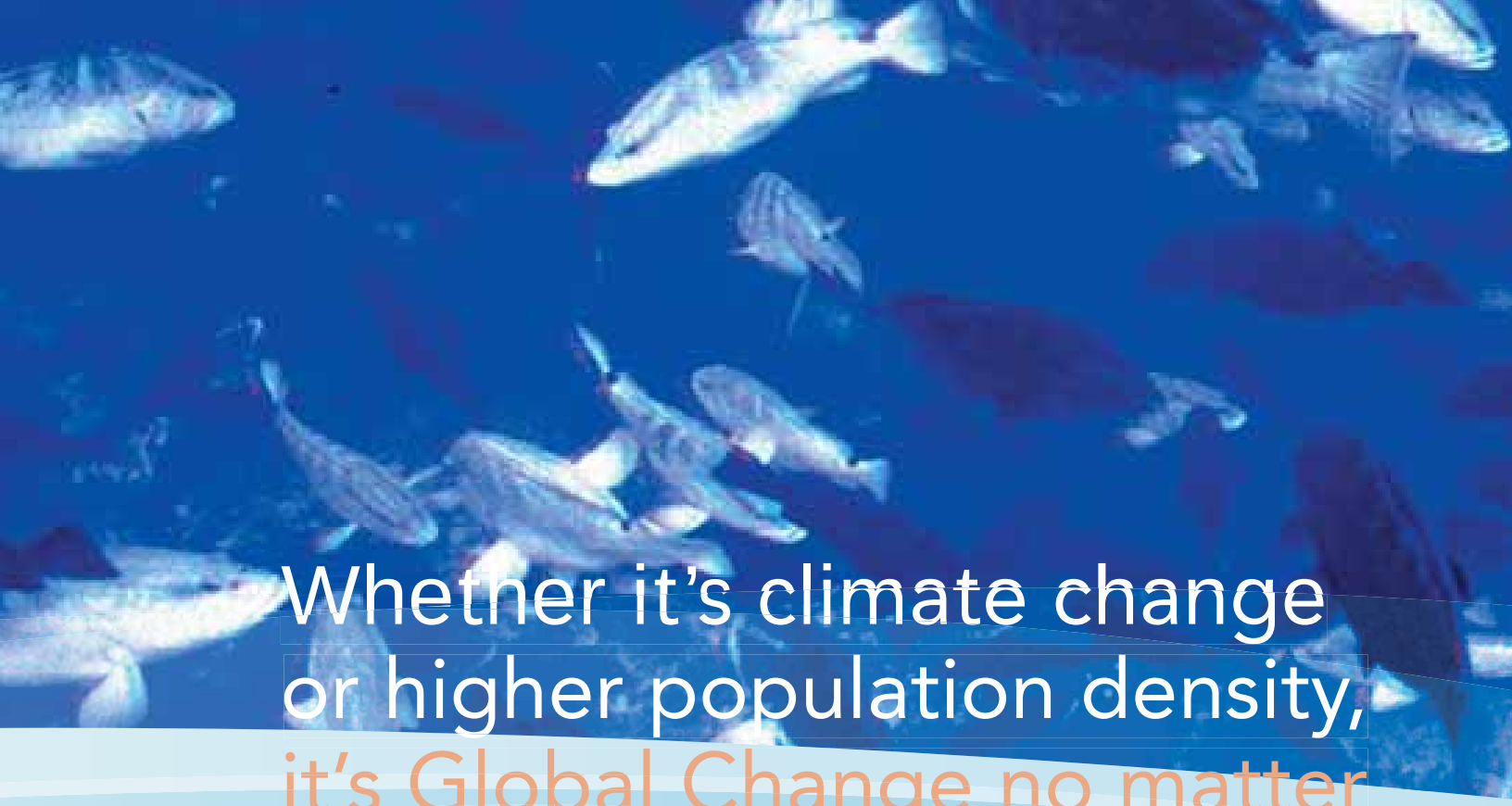




Coral Reef

Targeted Research & Capacity Building for Management

Bleaching
Connectivity
Disease
Restoration
Remote Sensing
Modeling



Whether it's climate change or higher population density, it's Global Change no matter how you look at it.

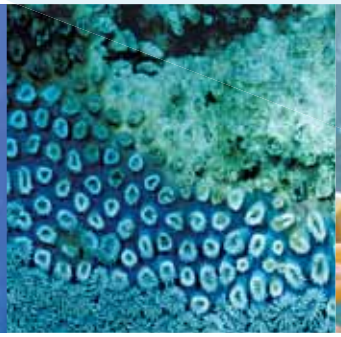
The question is: can the ecological systems that support our wellbeing adapt to the pace of current changes?

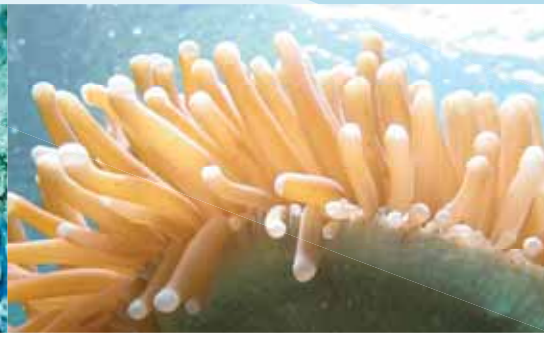
Aerial photograph of hotel development in Cancun, Mexico adjacent to coral reefs.

Our societies face unprecedented and mounting challenges in dealing with human population growth and associated economic development pressures.

Today, over one-half of the world population—more than 3.6 billion people—live within 100 kilometers of the world's coastlines. Two out of three of the world's cities of over 2.5 million inhabitants are located in coastal regions. The pressures and transformations on these land and seascapes are unprecedented in history—both with respect to the spatial coverage and the rate at which they are changing. Throughout much of the world, coasts are over-developed, over-crowded and over-exploited.

This puts tremendous pressure on coastal eco-systems, many of which are showing increasing signs of stress and even collapse.





Earth Sciences and Image Analysis Laboratory, NASA Johnson Space Center

Coral reefs are among these coastal ecosystems under stress.

Coral reefs occupy only 0.1% of the ocean's surface, yet they are the world's richest repository of marine biodiversity. They are the largest living structures on Earth—the only natural communities distinctly visible from space. Complex and productive, coral reefs have survived over the course of more than 400 million years of evolution, and possess richness, diversity of life and structure that are integral foundations for humanity. Within an equatorial band between the Tropics of Capricorn and Cancer, coral reefs are the lifeblood of nearshore, tropical waters and play a key role for the coastal populations that depend on food and resources for daily livelihoods.

Today, coral reefs around the world are in such serious decline that their defilement risks contributing to environmental and economic instability of many coastal nations. Of the 109 countries with significant coral reef communities, over 93 are experiencing damage to them. Many coral reefs have reached a state of decline that they can no longer be considered as coral reefs, while others are under increasing threat from local human disturbances and impacts from a changing global climate.

Although opinions abound as to the causes, the cumulative and interactive effects of stress on coral reefs and the implications for long-term sustainability of these ecosystems are simply unknown. While managers struggle to maintain a balance between use and conservation in deciding among complex trade-offs, we do not know enough about the fundamental factors affecting coral reefs in many areas to make practical management decisions.

And we are not adequately equipped with the understanding and the tools needed to manage and plan for changes brought about by the transformation of these ecosystems—especially over the past 30 years.

Today's environmental problems are increasingly complex and intractable—overwhelming for individual scientists and managers to resolve independently. There are indeed many actions that can and are being undertaken in working to reverse negative trends for coral reefs, and to raise awareness of their importance to coastal societies, but the tools in the toolbox remain woefully inadequate to manage in the face of acute impacts and multiple stresses.

This information brochure introduces a Global Coral Reef Targeted Research program, whose aim is to shed light on key unknowns through coordinated research and to put this knowledge into the hands of decision-makers where it can make a difference.

It describes the various themes and entities that have come together thus far to form this critical undertaking, and seeks support from new partners who share our global vision.

OUR PARTNERS

The CRTR Program is a partnership between the Global Environment Facility, the World Bank, The University of Queensland (Australia), the United States National Oceanic and Atmospheric Administration (NOAA) and approximately 40 research institutes & other third parties around the world.

What is “Targeted Research?”

The oceans occupy over 70% of the planet’s surface, but our knowledge of their resources is only in its infancy.

The Coral Reef Targeted Research and Capacity Building for Management (CRTR) Program has been established to address fundamental information gaps in our understanding of coral reef ecosystems, so that management options and policy interventions can be strengthened globally. For the first time in history, this Program will join the collective effort of many of the World’s leading coral reef scientists to coordinate research and address key outstanding questions about the health of coral reefs.

The Program is being developed in phases over 15 years, and through focused and systematic research is working to support management and policy and to better integrate results with other disciplines, such as economics and law. The Program will also enhance the capacity of researchers, students and managers within developing countries, so that a global network can effectively share the most up-to-date research to benefit regional, national and local management actions and policy.

The CRTR Program is coordinated across geographic nodes that reflect the regional distribution of coral reefs and the management initiatives underway to conserve them. The regional nodes will be the focal points for research carried out by international scientific working groups and integrated within an overall research framework consisting of three strategic elements:

- Addressing knowledge and technology gaps
- Promoting learning and capacity building
- Linking scientific knowledge to management

A major focus of the CRTR Program is to build capacity in countries with coral reefs to develop and sustain a robust research framework and to apply the findings in practical ways.

James Oliver (reefbase.org)


...significant gaps remain
in our understanding of
many of the basic processes
affecting **coral reefs.**

Addressing Knowledge and Technology Gaps

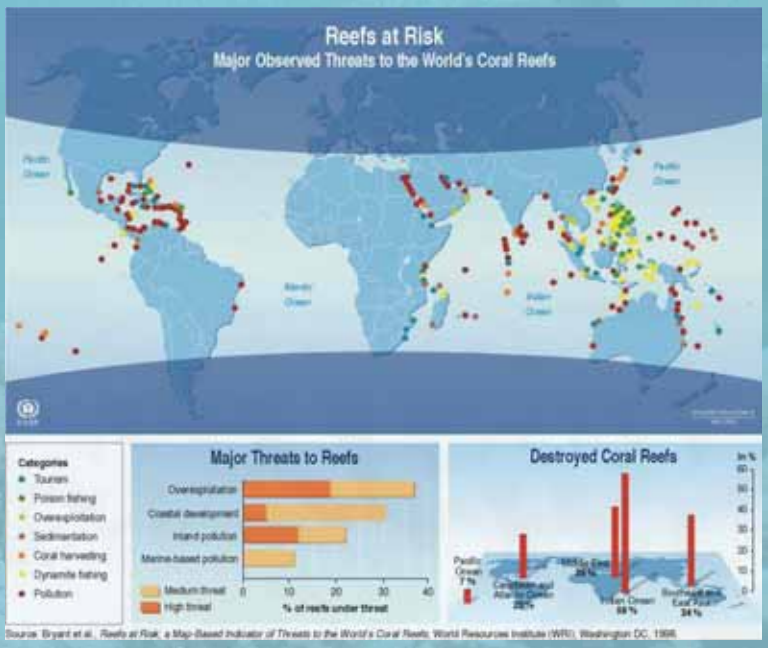
Over the past 10 years, an increasing awareness of the importance of coral reefs has been evident, especially in light of their rapid decline in many regions and their importance to developing countries. However, significant gaps remain in our understanding of many of the basic forcing functions and processes affecting coral reefs—to the extent that current management options remain severely limited. This targeted research framework is systematically identifying information gaps, and prioritizing them in order of strategic importance to management, so that the resulting information and tools developed can lead to credible outcomes.

From 1998-2001, scoping sessions were held with scientists and managers around the world to determine where the major gaps lay in the science and technology currently supporting coral reef management. Based on this effort, six themes were identified and led to the formation of six working groups:

1. **Bleaching and Local Ecological Factors**
2. **Connectivity and Large-Scale Ecological Processes**
3. **Coral Disease**
4. **Restoration and Remediation**
5. **Remote Sensing**
6. **Modeling and Decision Support**

The Working Groups

The Working Groups form the scientific basis for the Program and are major areas in which additional knowledge is essential. The Groups have developed priority investigations with the express intention to inform management. The Working Groups are represented internationally and include members from both developing and developed countries. Membership represents major researchers within specific areas of coral reef science.

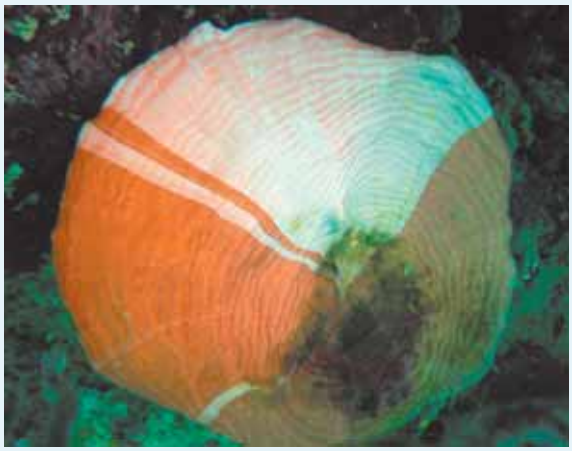


Coral Bleaching and Local Ecological Responses

Chair: Prof. Ove Hoegh-Guldberg, The University of Queensland, Australia

Members: Yossi Loya, Co-Chair, University of Tel Aviv, Israel; Bill Fitt, Cellular responses, USA; John Bythel, Local ecological responses, UK; Rob van Woesik, Local ecological responses, USA; Roberto Iglesias-Prieto, Molecular mechanism/markers, Mexico; Ruth Gates, Cellular responses, USA; Michael Lesser, Cellular responses, USA; Ron Johnstone, Local ecological responses, Australia; Tim McClannahan, Local ecological responses, Kenya; David Obura, Local ecological responses, Kenya.

The Bleaching Working Group's (BWG) mandate is to examine specific physiological mechanisms for coral bleaching as well as the local ecological factors that precipitate bleaching and its after-effects, and differences between direct human stresses with those related to climate change.



Bleaching refers to the loss of symbiotic dinoflagellate algae, *Symbiodinium*, within the coral host leading to a bleached, white appearance. Bleaching is a stress response of the coral host and associated with elevated sea water temperature. Over extended time periods a bleached state can lead to death of the coral, and can occur over large areas of coral reef.
Ove Hoegh-Guldberg

It has drawn together international experts to investigate these critical issues that surround the impact of global climate change on the world's coral reefs. The knowledge needed by management to be effective is by nature enormous and diverse. The BWG will deliver critical information that will enable management to better understand and predict the outcome of climate change on coral reefs and it will focus on four key areas, representing the most urgent information gaps:

1. A more complete understanding of the susceptibility and tolerance of corals to rising sea temperatures.
2. A more accurate model of the impact of global climate change on coral reef ecosystems.
3. Management tools by which to identify and monitor stress on coral reefs.
4. Better scenarios of the socio-economic implications of global climate change on coral reefs.

Large scale bleaching affected the world's largest continuous coral reef in early 2002. More than 60% of the Great Barrier Reef bleached and up to 5% have been severely damaged.
Ernesto Weil

Connectivity and Large-Scale Ecological Processes

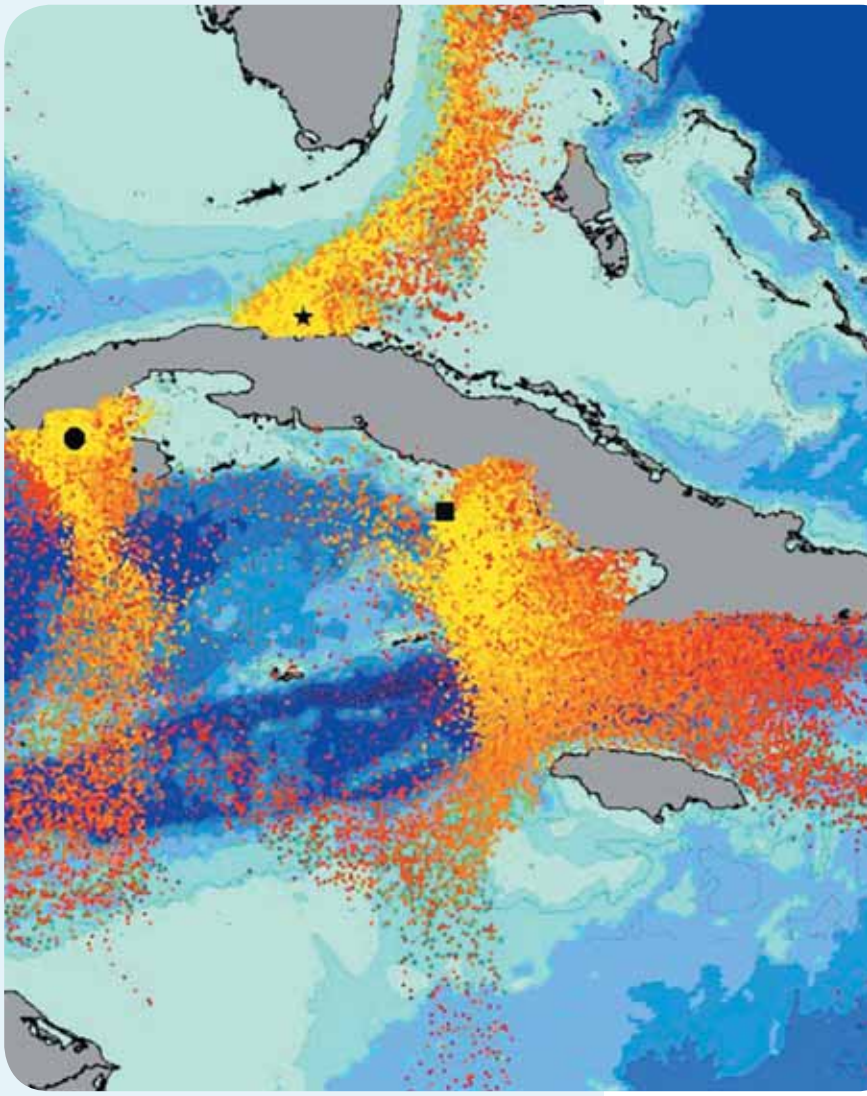
Chair: Prof. Peter F. Sale, Chair (Canada); Menchie Ablan (Philippines); Ernesto Arias (Mexico); Mark J. Butler IV (USA); Mary Alice Coffroth (USA); Robert K. Cowen (USA); Bret S. Danilowicz (USA); Geoff P. Jones (Australia); Ken Lindeman (USA); Serge Planes (France); Barry Ruddick (Canada); Yvonne Sadovy (Taiwan, China); Robert S. Stenck (USA); Alina Szmant (USA); Simon Thorrold (USA)

Coral reefs are patchily distributed ecosystems potentially connected by ocean currents. 'Connectivity' is the flux of items between locations. It exists for nutrients, sediments, and pollutants, and for the transfer of individuals between local populations. Because of the complex nature of water movement in and around coral reef systems, connectivity is difficult to measure and predict. We know that the transfer of non-living materials is likely to be determined by local and regional hydrodynamics, but we know that the transfer of organisms (demographic connectivity) is more complex. This is because passive transport due to hydrodynamics is substantially modified by the sensory and behavioural capabilities of the organisms.

Even though most dispersal amongst populations is done by larval stages, larvae of many reef species are highly capable mid-water organisms that can determine, to a degree, where and when they travel.

Because of these complexities the Connectivity research team focuses on demographic connectivity. This is seen as the most challenging form of connectivity to investigate and studying demographic connectivity will inevitably require that we improve our capacity to model hydrodynamics that drive other forms of connectivity.

The primary objective of the research during Phase 1 will be to undertake demonstration projects that will make empirical measurements of connectivity for selected species at specific locations. This means that new methods for tracing the movements of larvae from source populations to settlement sites will be developed. These new methods will become additional ecological tools for measuring demographic connectivity in other species and other sites, while the demonstration projects will provide early information on connectivity in the specific cases studied.



To what degree are coral reefs connected across space and time? Do they rely upon larval sources from elsewhere, or from local sources of seeding? Are larval sources dependent upon spawning aggregations?
Robert K. Cowen

Claire Paris, Rosenstiel School of Marine and Atmospheric Sciences

Coral Disease

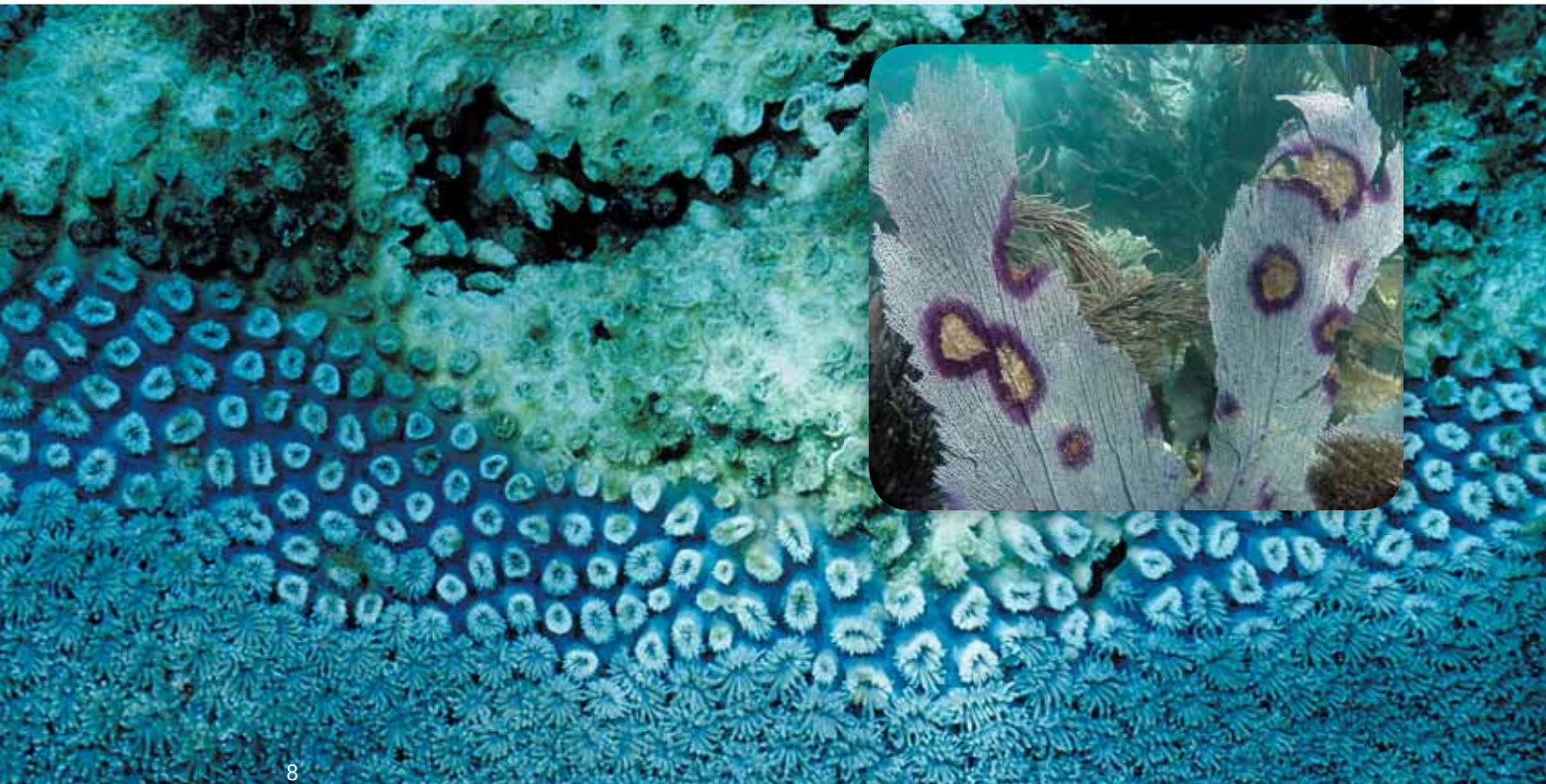
Chair: Prof. C. Drew Harvell, Cornell University, Ithaca, NY, USA

Members: Garriet Smith, Co-Chair, USA; Bette Willis, Co-Chair (Australia); Farooq Azam, USA; Eric Jordan, Mexico; Eugene Rosenberg, Israel; Ernesto Weil, Puerto Rico; Laurie Raymundo, Philippines/Guam

Over the last 20 years, unprecedented increases in disease on coral reefs have contributed significantly to coral reef degradation. Disease-related damage of coral reefs has been well documented in the Caribbean, but recent observations of coral disease in other regions of the world are just beginning, and disease occurrence in these other regions may be a potential harbinger for increasing outbreaks and impacts associated with increased climate warming.

What has prompted this rapid emergence of coral disease? The Disease Working Group (DWG) is targeting investigations to address this question, to understand this emergent problem and to develop tools and responses that can be used for management. The Disease Working Group is basing its work program around the following major tasks and hypotheses issues:

1. Global assessment of coral diseases and anthropogenic facilitators.
2. Exploration of the impacts of disease on coral and community diversity.
3. Process-oriented studies of epidemiology of coral disease, and
4. Elucidation of the mechanisms of resistance to disease.



Coral lesions and diseases have become prevalent within the Caribbean Sea, as shown in this species of massive coral (below) and Gorgonian sea fans (below, right). While the Caribbean has been previously reported as having the highest incidences of coral diseases, new findings supported by this Targeted Research program are showing that coral disease is also prevalent in other oceans, such as the Pacific and Western Indian Oceans

main: Woolcott Henry
inset: Ernesto Weil

Restoration and Remediation

Chair: Dr. Alasdair Edwards, University of New Castle-Upon-Tyne (U.K.)

Members: Edgardo D. Gomez, Co-Chair (Philippines), Andrew Heyward (Australia), Richard E. Dodge (Caribbean), Baruch Rinkevich (Israel), Aileen Morse (USA), Tadashi Kimura (Japan), Makoto Omori (Japan).

The world-wide degradation of coral reefs, particularly in the last two decades, has prompted greater attention to remediation and restoration. This has resulted in a wide range of initiatives broadly classified as improving the existing condition of impacted coral reefs (mainly through human influence). Early initiatives have focused more on artificial reefs where "reefs", or more accurately "fish-aggregating devices" are created on noncoral reef platforms, mainly to enhance fisheries production. While this approach is still being expanded more recent activities have been directed specifically at restoring degraded coral reefs.

The diversity and scale of remediation/restoration activities vary tremendously. They cover habitat modification, coral transplantation, species re-introduction, and the enhancement of recruitment potential (or colonization by young). Some of these interventions involve large-scale sub-tidal structures designed to facilitate natural colonization of reef species, while others use simpler and less costly approaches.

Reef remediation and restoration will continue to have an increasingly important role in the future and efforts are likely to expand. However, viable approaches and technologies are in relatively early stages of development, and in most cases are currently difficult to implement over large areas.

Reef remediation/restoration should not replace reef protection as the first management option. However, large areas of degraded reefs make it unavoidable to ignore remediation and restoration actions. The loss of biological and economic services from degraded reefs continually emphasize the need for maintaining the ecosystem, and where degraded, to restore it to a level where significance can be returned.

The Restoration and Remediation Working Group (RRWG) is examining the state of restoration and remediation techniques and is targeting investigations to test the efficacy of a range of potential applications. The research includes the following considerations:

- the scientific protocols necessary to design and implement restoration strategies
- baseline data for developing effective criteria
- the efficacy and feasibility of restoration and remediation techniques
- prospects for enhancing natural recovery
- opportunities to combine reef remediation with small and micro-enterprise at the local level working on three research programs for Phase One.

These programs involve studies of both natural recovery processes and restoration interventions:

1. Integrated long-term monitoring of natural recovery processes and selected restoration interventions on standardised substrates (such as settling plates or tiles made of the same material and uniformity) to evaluate efficacy and cost effectiveness and to help determine the key processes driving or hindering recovery.

2. Enhancing coral larval recruitment – through mass culture in open sea from egg to colony, by using attractants, or by augmenting larval supply to the reef.

3. Enhancing recovery by culture and transplantation of corals – using transplants direct from the reef or transplants derived from nursery reared branches, nubbins (small coral fragments) or spat (baby corals).

Stands of the elkhorn coral, Acropora palmata, at Carysfort Reef in the Florida Keys between 1987 and 1998.
Phillip Dustan
College of Charleston, SC

Nursery corals being reared for reef restoration trials by CRTR Program researchers

Remote Sensing

Chair: Prof. Peter J. Mumby, University of Exeter, U.K.

Members: Laura David, Co-Chair (Philippines); Ellsworth LeDrew (Canada); Stuart Phinn (Australia); Alan Strong (USA); William Skirving (Australia); Mark Eakin (USA)

Prior to this targeted research effort, the remote sensing of coral reefs has been conducted on an ad-hoc basis with little consistency or general insight into its limitations. Remote sensing is a technology-driven practice and until now, the remote sensing of coral reefs has been conducted on an ad hoc basis with little consistency or general insight into its limitations.

For example, we know that some aspects of coral reef health can be resolved on shallow reefs in French Polynesia but we cannot predict whether this would be a realistic expectation in say Jamaica, where reefs have a different flora and fauna, are located in deeper water, and where light penetration is slightly reduced because of higher suspended sediment concentrations in the water column.

Without a generic understanding of the limitations of coral reef remote sensing, the technology may continue to be oversold or deployed for unrealistic management objectives, resulting in an inappropriate use of financial resources.

The Remote Sensing Working Group (RSWG) will be developing and testing a wide range of remote sensing tools, including satellite, airborne, acoustic and in-field methods.

The Remote Sensing Working Group (RSWG) will quantify the limitations of coral reef remote sensing by combining modeling and field experiments.

The RSWG will be focusing on four key areas:

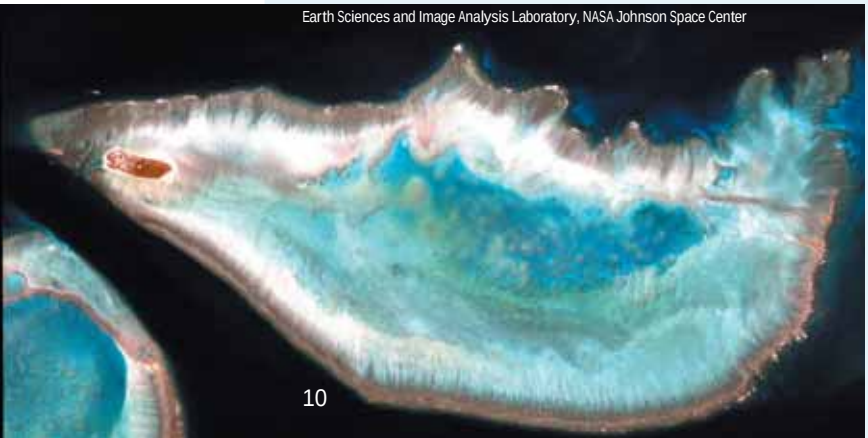
1. Creation of decision-support and analysis software for monitoring the health of coral reefs using remote sensing.
2. Development of methods to detect changes in coastal environment.
3. Application of remote sensing to the inventory, monitoring and management of biodiversity.
4. Creation of an Ocean Atlas and tools to manage coral bleaching.

The Group will evaluate the limitations of coral reef remote sensing by combining radiative transfer modelling and field experiments, to provide tools to identify various coral reef habitats and the extent of living coral and algae. New indicators of stress on reefs are also being developed from satellite-based observations of sea surface temperature, wind speed and solar insolation.

Through these objectives, the RSWG aims to:

- Provide better information for managers by developing and testing the tools necessary to measure and monitor the status of coral reef ecosystems at multiple spatial and temporal scales.
- Improve the use of spatial information by developing the application of remote sensing products for conservation science and spatial decision-making.
- Critically examine the cost-effectiveness of new methods to ensure that the best use of information.

Earth Sciences and Image Analysis Laboratory, NASA Johnson Space Center



Satellite (IKONOS) image of Heron Island, Australia, captured in April, 2004, immediately following a period of coral reef bleaching. Heron Island is the small land mass (brown) to the left of the image, whereas most of the living reef structure can be seen as light brown. Note the living patch reefs (seen as small dots) in the center of the image. The bright white dots surrounding the edges of the reef are waves. The RSWG is using this and other images of coral reefs to determine the degree to which change detection may be possible over large areas.

Modeling and Decision Support

Chair: Prof. Roger Bradbury, Australian National University, Canberra, Australia

Members: Pascal Perez, Co-Chair, Australia; Porfirio Aliño, Philippines; Ernesto Arias, Mexico; Bohdan Durnota, Australia; Craig Johnson, Australia; Rob Seymour, U.K; Peter Campbell, Australia/USA.

A major outcome of the CRTR Program will be to improve our predictive capability in assessing impacts to coral reef ecosystems, in the face of cumulative stress from increasing coastal populations, changes in climate and other uncertainty. The Modeling and Decision Support Working Group (MDSWG) is focused on the development of tools to improve coral reef management and communication.

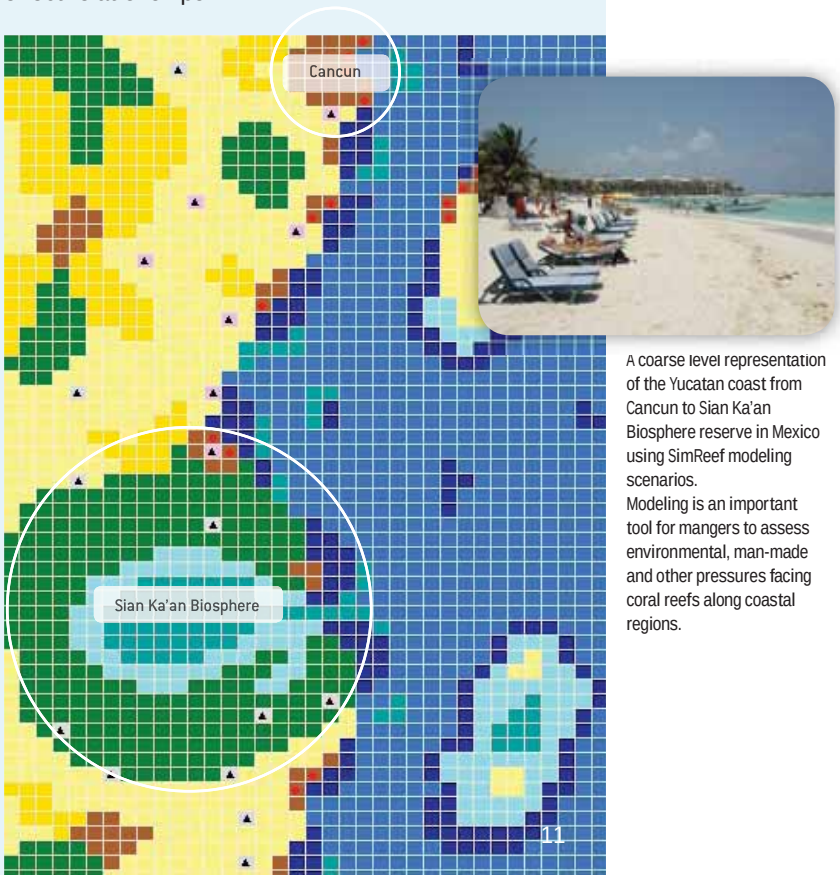
The MDSWG integrates the work of the other five working groups, and combines this with social, economic, ecological and physical information. Scenario building, which will allow the forecasting of reef ecosystem response to stress under different management/use options (including upstream or offsite development), will provide decision-makers with the basis to improve management interventions and the design or strengthening of relevant policies that contribute to the sustainability of coral reef ecosystems.

Included in this type of synthesis and analysis may be the impact of human stress on altering trophic relationships on coral reefs, particularly the relationship between nutrients, overfishing, and the overgrowth of corals by seaweeds and the reversibility of transitions between coral dominated and algal-dominated states.

The major design goals of the MDSWG include the following:

1. Long-term field efforts of the various working groups' results will be used to parameterize models
2. The decision support systems are based on needs that are of high priority in developing nations
3. There is a strong local capacity to maintain and improve the systems after initial development
4. Current expertise in Australia and the US on agent-based modeling, supplemented by partners in Europe, is built upon and combined with the considerable body of knowledge of coral reef ecology and hydrodynamics accumulated by the various working groups.

The Working Group intends to develop a set of spatially-explicit models that can serve as layers within Geographic Information Systems, and are designed to provide analyses of the potential impacts of various management interventions on coral reefs and associated local economic and social systems. The layers will be interlinked to provide for interdisciplinary analyses of potential cause and effect relationships.



A coarse level representation of the Yucatan coast from Cancun to Sian Ka'an Biosphere reserve in Mexico using SimReef modeling scenarios.
Modeling is an important tool for mangers to assess environmental, man-made and other pressures facing coral reefs along coastal regions.

Promoting Learning and Enhancing Capacity

Building scientific and management capacity in countries where coral reefs occur is a major thrust of the CRTR Program. Support for capacity building will focus on key regions and development of the Centers of Excellence to serve as the focal points for scientific learning exchanges. The CRTR Program aims to bring researchers from the various Working Groups together to orient field research, brief one another on findings and, based on these results, modify and design the subsequent phases of targeted research.

Currently, most coral reef research is based in universities and research institutes in the developed world, whereas most coral reefs are located in developing countries. Rectifying this global imbalance in knowledge and capacity is a key mission of the CRTR Program.

Centers of Excellence

In the first phase of the Program capacity is being enhanced in three developing country sites or nodes so that they can function as regional Centers of Excellence. These three sites are also supported by a fourth site based in a developed country.

The four Centers are:

- Australasia: Heron Island Research Station, the University of Queensland, Australia (Representative: Professor Ove Hoegh-Guldberg)
- Eastern Africa: University of Dar Es Salaam, Marine Science Institute, Zanzibar, Tanzania (Representative: Dr Alfonse Dubi)
- Mesoamerica: Universidad Autónoma Nacional de México, Instituto de Ciencias del Mar y Limnologia, Puerto Morelos, Mexico (Representative: Dr Roberto Iglesias-Prieto)
- South-East Asia: Marine Science Institute, University of the Philippines, Philippines (Representative: Professor Ed Gomez)

The locations and institutions have been selected on the basis of significant ongoing investments in coral reef management and the existence of baseline data and infrastructure – essential to carrying out coordinated research.

The Centers serve as a convening location for each of the Working Groups, so that research can be discussed and implemented with regional and local scientists in a collaborative spirit.

Each Working Group is conducting core elements of their investigations in at least two of the four regional nodes during Phase 1. Research plans, standard methods and capacity enhancement are being coordinated to maximize the level of effort between as many of the sites and Working Groups as possible.

Centers of Excellence will benefit from equipment and facility upgrades, research scholarships to promote participation of developing country graduate students and post-doctoral fellowships, and support for local research priorities, developed in consultation with regional research interests and the Targeted Research Working Groups.

Experimental mesocosms, like these tanks (below) containing small coral replicate samples, help control physical variables to better understand the underlying physiological mechanisms of various coral reef stressors, such as elevated temperature, light radiation, nutrients, pollutants and other factors. This research was initiated during a 2002 coral bleaching workshop of the Targeted Research Program, and is being established at each of the Centers of Excellence.
Ove Hoegh-Guldberg

Enhancing regional expertise

Through the Centers of Excellence in each of the four regions, Working Group members will engage with other researchers from within the region, as well as other Working Groups, and will jointly conduct investigations, share knowledge and engage in training opportunities with doctoral and post-doctoral students from participating developing countries. Post-graduates are supported through stipends and research scholarships.

Based on experiences during the project development phase, apprenticeship- type models proved to be highly successful by combining world-class, seasoned researchers with younger post-doctoral and graduate students in a supportive working environment. This brings international expertise in the development and use of various techniques and investigative strategies that will provide opportunities for regional and local researchers to benefit.

The Centers of Excellence will also serve as focal points for the network of scientists to engage with managers, NGOs, local stakeholders and other interested groups. These groups will participate in targeted learning exchanges about management and policy implications of the research and how such coordinated information can be integrated into practice. The meetings also present opportunities for the scientific community to learn and benefit from the knowledge of local stakeholders, especially those who may possess traditional and local knowledge of coastal and marine resources.

Linking Scientific Knowledge to Management

The targeted research framework has been designed to support managers, policy makers, and other stakeholders, and the results generated will be formulated for application into management and policy contexts.

Over the course of the Program's implementation, the information and tools produced will be disseminated as knowledge products to enhance management approaches and interventions and to inform policies that affect coral reefs at local, national and regional levels.

The Synthesis Panel

The governing body for the CRTR Program is a guiding Synthesis Panel, which provides oversight and direction to the targeted research program. The Panel, comprised of the Chairs from each of the Working Groups, representatives from each of the Centers of Excellence, and additional professionals and scientists, steers the targeted research framework, modifies study designs and the focus of investigations, reviews results, and helps synthesize and interpret the data in formulating conclusions and applications.

The Synthesis Panel serves as a key interface in bringing coordinated scientific findings into discussion with other disciplines, such as economics and law, and also assists the Working Groups in reporting summary findings to the scientific and management communities, and to make policy recommendations where appropriate.

By helping to inform management and policy with the knowledge required for sound decision making, the CRTR Program seeks to overcome an important obstacle to effective management. Informed policies, coupled with investments to improve the socio-economic welfare of coral reef-dependent countries can only improve the prospects for the conservation of the world's coral reefs.

Synthesis Panel Members:

- Nancy Knowlton, Chair, University of California Scripps Institute of Oceanography, USA
- Nyawira Muthiga, Wildlife Conservation Society, Kenya
- Paul Greenfield, Deputy Vice Chancellor, the University of Queensland, Australia
- Patricio Bernal, UNESCO Intergovernmental Oceanographic Commission (IOC)

Other members of the Synthesis Panel include the representatives from each of the Centers of Excellence and the Chairs of the six Working Groups.

A major benefit of the CRTR Program is the interactions between coral reef researchers in both developed and developing countries. Members of the RSWG and RRWG discuss remote sensing images during a meeting in the Philippines.
Andy Hooten

Local Government Initiative

Linking Program outputs and information to the management and policy audiences is a critical outcome for the CRTR Program. A local government initiative (LGI) has been launched with the realization that, although coral reefs are under threat globally, it is actions at the local level which may determine the fate of any particular coral reef system.

Local governments face a range of issues in relation to coral reef management: a lack of public awareness about the range of human impacts on reefs and their implications for community welfare; lax enforcement and low levels of compliance with regulations to protect reefs; destructive, illegal and over-fishing; pollution from untreated waste and surface run-off; lack of alternative income-generating opportunities; absence of integrated planning and lack of funding.

The intent of the LGI is to reach out to local government and communities associated with the four COEs to share new knowledge about threats to their coral reefs, what measures can be taken locally to address these, and to jointly identify solutions.

Through the COEs, the LGI aims to:

- Raise awareness about good management practices in their regions
- Interpret research findings for the benefit of local resource managers

photo: Susan Siar

- Partner with local governments to help bring their policies and business practices in line with those factors essential to maintaining coral reef health and productivity.

Key outputs emerging from the LGI include building capacity of mayors and local government units in the fundamentals of coastal urban management; a compendium of good management practices for coral reefs and their dissemination in user-friendly formats.

These practices include Integrated Coastal Management, Marine Protected Areas, guidelines on sustainable tourism, fishing practices, waste management and controlling coastal erosion. The rationale, methods, results and lessons learned from these practices have been drawn from around the world and have been pre-tested with Mayors from the Philippines and shared with local government leaders from Mexico, Cook Islands, Tanzania, Fiji, Papua New Guinea, Hawaii and Australia.

Would you like to share our vision?

The CRTR Program aims to protect the integrity and sustainability of coral reef ecosystems by bringing the best available science to bear on management and policy decisions that affect their future and those who depend on them. To do this, we are reaching beyond the scientific community, to engage reef managers, local government and the Non-Government Organization community.

We seek to expand our current partnerships by building new alliances with private foundations and the corporate sector. Only by aligning all these interests can we hope to achieve our goal of sustaining coral reefs and the intricate web of life that they support.

More information: http://www.gefcoral.org

Published by
The Coral Reef Targeted Research & Capacity Building (CRTR) Program

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