



CARIBBEAN CORAL REEF INSTITUTE

ISSUE:

Coral reefs, one of the most valuable and spectacular environments on earth, are also one of the most productive and diverse marine ecosystems. Coral reefs are also valuable assets that contribute to a healthy economy by providing food, jobs, and protection from storms. They create habitat for many fish and invertebrate species with commercial value, support tourism and recreational industries, and shelter coastlines from storm disturbance. Coral reef related activities provide a significant economic benefit for many regions of the United States and the rest of the world.

Scientific evidence indicates that coral reefs are deteriorating rapidly worldwide. Symptoms of this decline include the loss of hard corals, an increased abundance of algae, and conspicuous bleaching episodes and disease outbreaks. Scientists and managers still lack critical information about many of the causes of coral decline, but evidence points to stresses caused by a



Shelf edge spur-and-groove reef¹.

Human Activities Affecting Caribbean Decline of Corals

- Overfishing
- Coastal development
- Sedimentation
- Nutrient over-enrichment
- Increased turbidity
- Pollution
- Ship groundings

variety of human factors (see inset above). Human impacts act separately and in combination with natural factors such as hurricanes, high water temperature, and disease to stress corals and degrade reef systems.

Puerto Rico possesses exceptional and beautiful coral reefs. With a linear coastline of 620 km, it is surrounded by over 5,000 km² of easily accessible (< 20 m depth) coral reef ecosystems. However, high population density and intense land uses have resulted in adverse impacts to the reefs, including sedimentation, eutrophication, and pollution. The effects of overfishing and algal growth further compound these adverse impacts. As a result, there is an ever-increasing need to strengthen resource management capacity through timely, state-of-the-art science and monitoring activities to ensure the long-term sustainability of Puerto Rico's coral reef ecosystems.

APPROACH:

The Mayagüez Campus of the University of Puerto Rico (UPR – M) and the Puerto Rico Department of Natural and Environmental Resources (DNER), created the Caribbean Coral Reef Institute (CCRI) to perform coral reef research and monitoring activities. The CCRI is implemented through a Cooperative Agreement with the Center for Sponsored Coastal Ocean Research (CSCOR) as a coral reef research and monitoring institute to be housed at the Magueyes Island Marine Laboratory in facilities provided by the UPR – M. The goal of the CCRI is to integrate research and monitoring capabilities of the UPR – M, the DNER, and the scientific community at large to provide the DNER with information needed to help the agency fulfill its mandate to manage and conserve Puerto Rico's coral reefs.

The CCRI is managed jointly by the UPR – M and the DNER through a Management Committee (co-chaired by the UPR – M and the DNER) and supported by a Technical Advisory Committee. Day-to-day management of the CCRI will be the responsibility of an Executive Director and a Program Manager. This program structure is modeled after the Hawaii Coral Reef Initiative – Research Program located at the University of Hawaii.

The research and monitoring priorities of the CCRI will be determined through a formal consultation process between the CCRI, appropriate Commonwealth and Federal agencies, stakeholders and the scientific

community. The Executive Director and the Management Committee will advertise an open Request for Proposals for projects to achieve the CCRI's research and monitoring priorities. The projects to be funded through the CCRI will be selected through a formal peer-review process. CCRI will regularly review the impact of its activities through open quarterly Principal Investigators meetings and periodic strategic planning workshops. At these meetings, the CCRI will invite participants to provide comments and advice.

MANAGEMENT AND POLICY IMPLICATIONS:

CCRI's partnership between the UPR – M and the DNER will ensure that state of the



Data collection along a reef transect².

science information is made available in a timely manner to the agency responsible for the protection of coral reefs in Puerto Rico. The close collaboration in the CCRI between scientists and managers will result in scientifically sound management strategies and policies. Finally, the CCRI will also provide a mechanism through

which management practices can be evaluated and modified as necessary in order to maximize their effectiveness.

FOR MORE INFORMATION CONTACT:

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CARIBBEAN CORAL REEF INSTITUTE

Request for Proposals

(FY 2006-2007)

Overview

The Caribbean Coral Reef Institute (CCRI) supports scientific research and monitoring of Puerto Rico's coral reef ecosystems. These activities are directly aimed at understanding the natural and anthropogenic processes and stresses affecting coral reef ecosystems and to enhance Puerto Rico's capacity for science-based management. The CCRI is housed at the University of Puerto Rico and each year is allocated funds by Congress through the National Oceanic and Atmospheric Administration's (NOAA) Center for Sponsored Coastal Ocean Research (CSCCOR). CCRI's Management Committee sets research priorities and final decisions concerning specific projects to fund.

Availability of funds

Support of research by the CCRI is dependent upon the availability of yearly funding by Congress. It is expected that the total funding available to support research will be approximately \$300,000 per year. The CCRI will support one or two-year proposals. However, funding of the second year of a two-year proposal is dependent on demonstrable satisfactory progress during the first year and availability of funds for the second year and is not guaranteed. Therefore, two-year proposals must have milestones and delivered products scheduled for each year that meet program specifications. One-year proposals will be scheduled for funding in the first or second year at the discretion of the CCRI. The anticipated start date for CCRI projects funded through this RFP would be October 1, 2006 or 2007.

Due Date for Applications

Deadline for Pre-proposals - May 15, 2005

Deadline for Full Proposals – August 1, 2005

The RFP for FY08 projects is expected to be announced through the NOAA NURP program in March 2007 with funding to begin October 2008.

Research Priorities

For the funding period covered by this RFP, the Management Committee has identified the following five priorities:

1. Basic Assessment of resources

Target areas for support under the CCRI include the following:

- Habitat mapping of unmapped areas of the Puerto Rico shelf.
- Assessing the health of Puerto Rico's coral reefs*
- Assessing the status of Puerto Rico's commercial (foodfish, ornamental) and recreational reef-based fisheries resources.
- Assessing the status of Puerto Rico's resources supporting boating and diving (scuba, snorkeling) activities.
- Assessing water quality in areas of coral reefs.

2. Understanding Reef Processes

Coral reefs are well known for their complex interactions among species and processes. Many of these are still not understood. The basic physiology and energy budgets of corals are also poorly understood, yet it is at the physiological level that environmental stresses affect coral health. The CCRI seeks to support research that enhances our understanding of the biology and ecology of coral reef resources relative to natural and anthropogenic threats/stresses and management needs.

3. Research to Enhance the MPA Process

Marine reserves and MPAs in general are considered potentially important tools for ecosystem-based management. Success of MPAs can be related to complex biological and social design factors, fisher acceptance and enforcement. The CCRI seeks to support:

- (1) Research addressing the impact of MPA designation on health of underlying coral reef ecosystem, and
- (2) Research targeting the biological and social environments and processes that can facilitate MPA design, implementation and management, including the development of management plans.

4. Water Quality and Coral Reef Health

The CCRI seeks to support research that will enhance our understanding of the extent and effects of reduced water quality (eutrophication, sedimentation, turbidity, pollutants) on the health of corals and coral reefs. Particularly desirable are those projects that can most directly impact the regulatory process. The CCRI is also interested in supporting research on identifying and quantifying the land-based activities that directly affect water quality and coral reef health.

5. Dynamics of Coral Diseases and Syndromes

A variety of diseases and syndromes affecting both corals and other coral reef-associated organisms have been documented in the last several decades. Stress caused by poor water quality and elevated temperatures may contribute to disease susceptibility, and the causes, temporal dynamics and ultimate fates of algal and cyanobacterial growth on living coral are not sufficiently understood. The CCRI seeks to support research that will enhance our understanding of the extent, dynamics, causes and impacts of these threats/stresses and how they might be affected by other forms of stress.

Eligibility

Eligible applicants are institutes of higher education, non-for-profit institutes and state and local government agencies. Federal researchers are not eligible to apply for CCRI funds but are encouraged to collaborate with eligible applicants. Proposals will be accepted for work within Puerto Rico.

Typical Awards

Proposal budgets for CCRI funded projects should range from \$30,000 to \$50,000 per year, but larger budgets (up to \$115,000) may occasionally be considered.

Cost sharing or Match Requirements

Cost sharing is not required, but the ability of the project to leverage additional funds can make the proposal more competitive.

Full Funding Announcement

The full request for proposals (RFP), as well as additional information and guidelines for proposal preparation and details on various Caribbean research programs, can be found at www.perryintsitute.org.

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**FEDERAL GRANTS
APPLICATION PACKAGE PREPARATION SUMMARY**

1. TITLE OF GRANT PROGRAM

Caribbean Coral Reef Institute (CCRI)

2. OVERVIEW

a. Points of Contact:

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b. Description of Grant Program as it relates to Coral Ecosystem Conservation

The Caribbean Coral Reef Institute (CCRI) results from a Cooperative Agreement between the UPR-M and NOAA/CSCOR. The CCRI is housed within the UPR-M.

CCRI initiates and coordinates (a) long- and short-term research and monitoring activities aimed at addressing the major threats to coral reef ecosystems including over fishing, sedimentation and turbidity, eutrophication, algae blooms, diseases and bleaching, acute and chronic pollution, mechanical damage, and introduced species and to provide information needed for the effective management of coral reef ecosystems, and (b) long- and short-term research and monitoring to advance the understanding of biological and physical effects on the

health of coral reefs to build management capability in an ecosystem context.

c. Eligibility

Eligible applicants are institutions of higher education, non-for profit institutions, and state and local government agencies. Federal researchers are not eligible to apply for CCRI funds, but are encouraged to collaborate with eligible applicants.

Proposal budgets for CCRI funded projects should range from \$30,000 to \$50,000 per year, but larger budgets may occasionally be considered.

d. CCRI Research Priorities:

The area of investigation is limited to Puerto Rico. The past RFP identified the following priorities:

i. Basic assessment of resources

Assessments provide a basic measure of the status of reef resources and reef health, usually on a broad geographic scale, and provide the basis for quantifying ecosystem change in response to natural processes, anthropological stresses and management intervention. Target for support under the CCRI include the following:

- a) Habitat mapping of unmapped areas of the Puerto Rico shelf.
- b) Assessing the health of Puerto Rico's coral reefs*
- c) Assessing the status of Puerto Rico's commercial (food fish, ornamental) and recreational reef-based fisheries resources.
- d) Assessing the status of Puerto Rico's resources supporting boating and diving (scuba, snorkeling) activities.
- e) Assessing water quality in areas of coral reefs.

*Basic assessments of reef and reef fish communities should follow standard CCRI monitoring protocols.

ii. Understanding reef processes

Coral reefs are well known for their complex interactions among species and processes. Many of these are still not understood. For example, events such as over fishing and the

Diadema die-off have had profound impacts on overall reef ecosystems as they involve removal of species, such as herbivores or predators, from the system. Such community changes may result in overgrowth of algae or an increase in coralivores, respectively. The basic physiology and energy budgets of corals are also poorly understood, yet it is at the physiological level that environmental stresses affect coral health. Knowledge of coral physiology and energy allocation could show how corals combat different stresses and may place limits on their ability to combat cumulative stress or the ability to treat one stress (e.g., bleaching) by relieving the impact of another stress (e.g., pollution).

The CCRI seeks to support research that enhances our understanding of the biology and ecology of coral reef resources relative to natural and anthropogenic threats/stresses and management needs.

iii. **Research to enhance the MPA process**

Marine reserves and MPAs in general are considered potentially important tools for ecosystem-based management, and Puerto Rico has an extensive array of MPAs, including four no-take marine reserves. In addition, PR Law 308 calls for a 3% closure of coral reef areas. Success of MPAs can be related to complex biological and social design factors, fisher acceptance and enforcement. The successful implementation of MPAs requires balancing the biological and ecological processes pertinent to fisheries and marine ecosystems while also considering policy and legal frameworks, history, politics, etc. Biological and ecological aspects include an understanding of the area/system to be managed to insure that ecological functions are sustained and biological/conservation goals can be met, as well as follow-up assessments to verify expected ecosystem response. Social aspects target enhancing stakeholder acceptance and compliance and include understanding processes affecting resource utilization, pathways of information exchange, and determining alternate economic activities, among others. The CCRI seeks to support:

- a) Research addressing the impact of MPA designation on health of underlying coral reef ecosystem, and
- b) Research targeting the biological and social environments and processes that can facilitate MPA design, implementation and management, including the development of management plans.

iv. Water quality and coral reef health

Parameters, which affect coral reefs, are numerous, and many land-based activities affect nutrient and sediment addition to near-shore waters. Elevated nutrient concentrations (particularly in concert with reduction in herbivory) promote algal growth. Sediment in suspension reduces water clarity, which may affect photosynthetic activity of corals, and hence their nutrition. Sediments that fall out of the water column require removal from coral surfaces, a process requiring additional metabolic expense to the coral. Sediments may also play a role in recruitment processes to uncolonized substrata. In addition to sediment and nutrients, anthropogenic activities also increase levels of other water borne contaminants. These include both straight toxins and hormone mimics that disrupt essential physiological processes, such as reproduction or larval metamorphosis and settlement. The toxic and/or sublethal effects of most pollutants are largely unknown. The CCRI seeks to support research that will enhance our understanding of the extent and effects of reduced water quality (eutrophication, sedimentation, turbidity, pollutants) on the health of corals and coral reefs. Particularly desirable are those projects that can most directly affect the regulatory process. The CCRI is also interested in supporting research on identifying and quantifying the land-based activities that directly affect water quality and coral reef health.

v. Dynamics of coral diseases and syndromes

A variety of diseases and syndromes affecting both corals and other coral reef-associated organisms has been documented in the last several decades. These include in part bleaching, black band, white band, white pox, white plague, dark spots, yellow blotch as well as tumors. These result in death to coral tissue, but in most cases, the causative agents are not known nor are the methods of infection. Much of the microbial community inhabiting corals are undocumented and its role in the progression of various diseases and syndromes is unknown. It is very probable that stress caused by poor water quality and elevated temperatures may contribute to susceptibility, but these relationships are not known. Epizootic growth of algae and cyanobacteria on living coral is also a significant impact, but the causes, temporal dynamics and ultimate fates are not sufficiently understood. The CCRI seeks to support research that will enhance our understanding of the extent, dynamics, causes and impacts of these threats/stresses and how they might be affected by other forms of stress.

e. Grant Cycle

The RFP process is conducted through the NOAA-NURP Program at the Caribbean Marine Research Center (CMRC). The tentative timeline for the process is:

March	RFP for pre-proposals is posted.
April/May	Pre-proposals due. Full proposals requested.
August	Full proposals due.
August-November	Peer reviews.
December	Funding decisions made.
September	Funding of projects.

f. Grants Management

Funding:

Upon notification of the availability of funds, the awarded institution's Finance Office should submit an invoice in the amount of 50% of the award at the start of the project. The remaining 50% of the total amount should be invoiced on a quarterly basis. Invoices should be accompanied by a report detailing all expenses to the date.

Deliverables and Reporting Requirements:

- i. PowerPoint presentations highlighting project's activities, to be given at CCRI Quarterly Meetings.
- ii. Two (2) Progress Reports per year and a Final Report. The latter must include a separate section that summarizes the major findings and details the management applications and implications of the results.
- iii. Data and metadata (electronic copy) to be archived with NOAA's Coral Reef Information System (CORIS).
- iv. Three copies of any publications, abstracts, videos and other materials resulting in completely or in part, from project related work.
- v. Organize and conduct a workshop or seminar, as requested, in order to deliver information on the results and methodologies developed, and provide technical training for managers, resource trustees, scientists, and/or the public.

Any publication, video or similar project should acknowledge the support given by the CCRI. Suggested wording for such acknowledgement is as follows:

"This work was supported by the Caribbean Coral Reef Institute, University of Puerto Rico – Mayagüez (Project No, _____), through support provided by the National Oceanic and Atmospheric Administration, US Department of Commerce (Award No. _____). The statements, findings, conclusions, and recommendations are those of the author(s) and do not necessarily reflect the views of U.S. Department of Commerce, National Oceanic and Atmospheric Administration or the Caribbean Coral Reef Institute, University of Puerto Rico – Mayagüez."

g. Matching Funds Requirements

There is none, but the ability of the project to leverage additional funds can make the proposal more competitive.

h. Evaluation

All proposals are evaluated on the basis of the following criteria:

- i. Scientific merit
- ii. Applicability of the proposed research to CCRI's current research themes.
- iii. Actual or potential application to the management of Puerto Rico's coral reef resources.

Guidance on Preparing the Application

- iv. Read carefully and respond to research priorities and evaluation criteria, and other guidelines and limitations stated in the RFP.
- v. All pertinent information as to the guidelines for CCRI's RFP is found at <http://peryinstitute.org>.
- vi. Potential applicants with doubts or questions are encouraged to contact the CCRI's office
- vii. Proposals should be neat, well structured, and with clearly presented ideas.
- viii. We encourage proposals that incorporate local personnel and institutions that could contribute to local capacity building.

Previously Approved Pre-proposals

The CCRI is a new program and currently is going through its first RFP and peer review stages. The following is a list of pre-proposal titles that were approved for the FY06 call for proposals:

1. Coral Recruitment: Experimental studies of factors that affect recruitment success in Puerto Rico
2. Mapping Red Hind Groupers at Spawning Aggregation Sites with an AUV and Long-Term Acoustic Recorders
3. Taking costal mapping to a new level
4. The mapping of Benthic communities on the Cabo Rojo shelf with Side Scan Sonar
5. Role of the Viable but Nonculturable State and Bacterial Cell-Cell Signaling in Acroporid Coral Disease
6. Spatial and Temporal Variability in Colony and Disease Dynamics in Major Reef-Building corals in La Parguera, Puerto Rico
7. Development of software applications for assessing the effects of land disturbance on sediment yields
8. Effect of land use change on the quality of coral reef waters over the past 60 years in PR
9. Targeting inappropriate land development at the Tres Palmas Marine Reserve: mechanisms for effective management
10. Puerto Rican coral reef long-term ecological monitoring program