

## **Local Action Strategies**

This Appendix provides an overview of the progress that states, territories, commonwealths, federal agencies and non-governmental partners have made over the last five years (2002-2006) in developing and implementing Local Action Strategies (LAS) to reduce threats to the Nation's coral reef ecosystems. The U.S. Coral Reef Task Force (CRTF) initiated development of Local Action Strategies in partnership with the U.S. All Islands Coral Reef Coordinating Committee and the state of Florida during the fall 2002 to increase resources, coordination and effectiveness of local coral reef conservation efforts in U.S. jurisdictions. The LAS initiative was specifically designed to help increase and link the goals and objectives of the U.S. National Action Plan to Conserve Coral Reefs (2000) with locally driven priorities and actions. The LAS are locally-driven, short range roadmaps for collaborative and cooperative action among Federal, state, territory, and non-governmental partners. The LAS identify and implement priority projects to reduce key threats to valuable coral reef ecosystems in each region.

Taken together, the LAS from the seven U.S. coral jurisdictions (American Samoa, the Commonwealth of the Northern Mariana Islands (CNMI), Florida, Guam, Hawaii, Puerto Rico and the U.S. Virgin Islands) have identified over 750 projects under applicable LAS focus areas to address five priority threats to coral reef ecosystems: land-based sources of pollution; over fishing; recreational overuse and misuse; lack of public awareness; and climate change, coral bleaching, and disease. In addition, several jurisdictions have developed LAS to address three other significant threats within their jurisdictions; these include population pressure, aquatic invasive species, and maritime industry and coastal construction.

The LAS development process began in 2002 based on a core set of guidelines that were applied in different ways to meet the specific needs and priorities of each jurisdiction. Project implementation began in earnest in 2003-2004. This report is particularly timely as several jurisdictions are now completing the core elements of their initial LAS and are beginning to examine how best to revise their LAS to more effectively achieve coral reef management objectives in the future. This report is intended to help improve those efforts.

### **Projects and Funding**

Of the 760 total projects identified in 2002-2003, 493 (65%) are currently underway or have already been completed and approximately \$25 million from government and nongovernmental sources has been applied to project implementation. This funding represents approximately 40% of the total needed budget for implementation. A substantial portion of this \$25 million was raised through programs that existed prior to the LAS initiative but support the LAS effort. Although there are significant differences in LAS funding across jurisdictions, the average amount of funds received by each jurisdiction for LAS project implementation was just over \$1 million per year. In a few jurisdictions, the federal funds that were used for LAS implementation have been leveraged nearly one to one with direct non-federal match funds.

In addition to direct funding support for LAS implementation from the range of federal, local, NGO and academic organizations for LAS implementation, local agencies have successfully leveraged significant volunteer services and in-kind resources, including time and skills, which have not been quantified in the total amounts of support received. Perhaps the most notable accomplishment of the LAS process is the countless numbers of stakeholders that have been involved with LAS development and project implementation in each jurisdiction. More than 1,000 stakeholders have contributed to LAS development and implementation in Florida alone.

### **Accomplishment Highlights**

The LAS process has resulted in a number of important accomplishments during the five years since this initiative was launched in 2002. Overall, the most notable progress made to date has been in the areas of developing new or expanded partnerships among numerous governmental, nongovernmental, and academic institutions, and in the area of increasing outreach and public awareness of coral reef issues.

In the area of new or expanded partnerships, for instance:

- An interagency watershed group has been working effectively in CNMI for the past few years on watershed protection,
- A partnership was established between the Florida Department of Environmental Protection, the Florida Fish and Wildlife Conservation Commission, and the National Coral Reef Institute to comprehensively map and initiate long-term monitoring of southeast Florida's reefs, and
- An important partnership was established in Puerto Rico between the DNER Coral Reef Initiative and the Puerto Rico Tourism Company to produce educational pamphlets for tourists.

In the area of increasing outreach and public awareness:

- A year-long "Rare Pride" education and outreach campaign was initiated in American Samoa and the marine science program at the local community college was enhanced and expanded through LAS projects.
- In the U.S. Virgin Islands, a consortium of coral reef specialists assisted in designing a coral conservation campaign for several major U.S. east coast airports
- A "Guardians of the Reef" initiative was launched in Guam to engage high school juniors and seniors in delivering coral reef education programs to elementary classes, and
- The Southeast Florida Coral Reef Initiative sponsored a series of workshops for the local marine tourism industry to encourage sustainable marine tourism.

Progress has also been made in building local capacity to address management issues and improving our understanding of coral reef processes.

- A number of effective workshops were held to address various threats to coral reef ecosystems including innovative technologies for stormwater and wastewater management and watershed protection in Hawaii
- Commercial and recreational fisher's workshop and enforcement training for coral reef protection in Puerto Rico.
- CNMI successfully hosted a summer internship program to introduce college students to natural resource careers and provide hands-on experience in coral reef resource management.

To increase understanding of coral reef ecosystems,

- The Southeast Florida Coral Reef Initiative (SERCRI) in partnership with the University of Central Florida, College of Charleston, Broward County Environmental Protection Department and Haereticus Laboratories completed the first phase of a biomarker study aimed at linking land-based sources of pollution to coral reef degradation and initiated the second phase of this study.
- The Coral Reef Advisory Group in American Samoa completed development of a long-term territorial monitoring program and is working to create a research field station to focus on coral resilience, and
- The aquatic invasive species team in Hawaii completed a series of surveys and is designing control techniques to better understand and address detrimental impacts of invasive species on Hawaii's reefs.

Moreover, the LAS effort has led to significant advancement and improvement in coral reef management in all jurisdictions.

- In Guam, Eco-permit legislation was enacted to manage activities in Guam's Marine Preserves and a Conservation Officer Enforcement program ensures greater protection for natural resources in the Marine Preserves.
- A new framework for marine managed areas is under development in Hawaii, and
- The U.S. Virgin Islands Coastal Zone Management Commission recently adopted regulations to implement a management plan for the East End Marine Park on St. Croix. The park regulations are currently pending approval by the USVI Governor's office.

### **Challenges**

Limited capacity of local institutions to manage activities that impact reefs continues to be the major challenge to increasing the scope and effectiveness of coral reef conservation efforts, particularly in the territorial and commonwealth jurisdictions. Although there has been some increase during the past 4 years in federal and state LAS funding (as well as the commitment of private and volunteer resources), additional funding is needed to complete all of the proposed LAS projects. While close to \$25 million in implementation funds have been raised during the past 4 years, almost \$37

million, representing 60 percent of the total cost for project implementation, is still needed to complete the first phase of LAS projects if all of the projects originally proposed are still appropriate for funding. Part of the funding needed represents project costs for new LAS that have recently been developed and are just beginning implementation in some jurisdictions, such as the Climate change, coral bleaching and marine disease LASs in Hawaii and Guam. In addition, this funding figure does not include the additional out year costs for developing, and implementing a second cycle of LAS.

Of particular concern is the need for additional sources of funding for large scale projects such as watershed restoration projects to address existing land based sources of pollution and a marine laboratory in American Samoa. Funding such projects may require the development of new long term funding sources, if we are to be successful in abating major land based sources of pollution which are harming coral reef health.

### **Detailed list of LAS Accomplishments**

The LAS activities outlined in this report have addressed local coral reef management needs, and resulted in on-the-ground achievements such as capacity building, effective use of marine protected areas, increased education and outreach, increased best management practices, and improved research and monitoring of coral reef health. These LAS efforts have provided a framework for Task Force member agencies to connect local priorities to national goals, and coordinate Federal agency actions with local management of reef resources to better address priority threats. This effort represents a significant step forward in advancing the goals of the Puerto Rico Resolution. The accomplishments summarized in this section reflect the efforts of all of the seven jurisdictions to implement their LAS over the last five years (2002-2006).

### **Improved Coral Reef Management**

States and territories have made significant progress with new management plans or regulations for marine protected areas in places such as Guam, Puerto Rico and the U.S. Virgin Islands; installed mooring buoys in numerous places, and taken steps to reduce the effects of sedimentation and storm water on corals, particularly during coral spawning periods.

#### **American Samoa**

- American Samoa EPA 2005 Water Quality Standards revisions include **prohibiting activities which have the potential to adversely affect coral reproduction** starting 5 days after the October full moon for a stoppage period of no less than 60 days, which includes the major coral reef and pololo spawning period.

#### **CNMI**

- The CNMI completed **architectural and engineering designs for stormwater control into the Laulau Bay Area of Saipan** and will begin implementing certain portions of the design plans for stream crossings as more funding becomes available.
- A study on nonpoint source pollutant tracking for the **Garapan Watershed** has been completed, and a **Conceptual Stormwater Management Plan** was developed as a result of the study. The product is now utilized by the Department of Public Works as a guide for drainage improvements in the subject area.
- The CNMI has put forth tremendous efforts towards prioritizing protecting the island's coral reefs focusing on the reduction of land-based pollution, fisheries management, marine protected areas and public awareness and education,. A major accomplishment in conservation planning efforts is the **management plan for the Mañagaha Marine Conservation Area** which was completed in 2005. This plan outlines management strategies and an action plan for 15 years, and includes management goals, objectives as well as short and long-term strategies for accomplishing those goals.

### Florida

- Florida's Maritime Industry and Coastal Construction Impacts (MICCI) Team held a **workshop** to develop "**Guidelines for Rapid Response to, and Restoration/Repair of, Coral Reef Injuries in Southeast Florida.**" Among the 60 participants at the 2-day workshop were agency representatives from FDEP, NOAA, NPS, USACE, USCG, Miami Dade, Broward, Palm Beach and Martin Counties, as well as representatives from local and national NGOs, consulting, engineering, and legal firms. The MICCI Project Team is completing the "Guidelines" document for anticipated release in Spring 2007.
- In Florida, a review of state and local water quality standards and available data was conducted to **identify and characterize the links between pollution and coral communities**; and where possible, to quantify the relative contributions of point and non-point pollution sources.

### Guam

- Executive Order 2003-17, issued by the Governor of Guam, mandated a **government-wide recycling program**.
- Several legislative changes in Guam have resulted in the **Eco-Permit to require a permit for all activities in the Marine Preserves**.
- Guam's Reserve Conservation Officer Program provides **additional enforcement** for the protection of the marine preserves and other natural resources.
- An **attorney dedicated to natural resource issues has been placed in the Attorney General's Office**.

### Hawaii

- The Department of Land and Natural Resources (DLNR) is currently working on a **new framework for marine managed areas** in Hawaii. The framework will identify and group areas with similar management goals and objectives as well as biological and socio-economic criteria. During the summer of 2005, the draft framework was presented to small focus groups in communities around the state to obtain input with most comments focusing on increased and improved outreach and education, enforcement, and preservation of traditional methods. A revised draft is currently being circulated for DLNR review. The final draft will be presented at public meetings prior to final approval by the Board of Land and Natural Resources.

- In support of the Aquatic Invasive Species LAS, **administrative rules for ballast water management** for the state of Hawaii have been drafted and sent to the State Attorney General's office for review.
- The Hawaii **Aquatic Invasive Species (AIS) Team members inspected several vessels** before they traveled to the Northwestern Hawaiian Islands. The July 2005 grounding of the M/V *Casitas* on Pearl/Hermes atoll required the use of a tug and barge from Honolulu to help remove the vessel from the reef. Prior to both vessels leaving Honolulu, the AIS Team inspected their hulls and found several non-native (and potentially invasive) species. Based on this finding, the vessel owners were requested to clean the hulls and undergo re-inspection.
- The AIS Team has undertaken the **eradication or removal of several invasive species**, including an intentionally introduced corallimorph, *Actinodocus nummiformis*, the aquatic weed *Egeria densa* (Brazilian elodea) from a lake at the Hoomaluhia Botanical Garden, and the invasive octocoral *Carijoa riisei* from the island of Kauai, in an attempt to prevent its introduction into the ecologically sensitive Northwestern Hawaiian Island Marine Preserve.
- Hawaii's land-based sources of pollution LAS has identified cesspools as a significant source of nutrients that affect coral reefs. **Cesspool replacement criteria** for the Hanalei Watershed have been developed. Ten cesspools have been engineered, and permits have been applied for.
- Hawaii has published "Getting Involved in Caring for Hawaii's Coastal Resources: A Community Guidebook, which is a **guide to assist communities in engaging in coastal stewardship initiatives**.

#### **Puerto Rico**

- Puerto Rico installed **demarcation buoys and coral reef signage** in the Canal Luis Peña Natural Reserve in Culebra and Desecheo Island marine protected areas, comprising eight reefs. Coral reef protection signage based on the poster "Cuidado con los Arrecifes" was installed at Palominos and Icacos in the Cordillera Reefs Natural Reserve, Tamarindo and Flamenco beaches in Culebra, and Buyé in Cabo Rojo. Signs will soon be posted at Sardinera and Pájaros beaches, Mona Island, Balneario Pelicano, and the dock at Caja de Muertos Reserve, Ponce, and La Parguera, Lajas.
- A **final draft of the Puerto Rico Coral Reef Management Plan** is presently being reviewed for final approval and adoption by the DNER Coral Reef Committee.
- A **new regulation for the Protection and Management of the Puerto Rico Coral Reefs** was signed by the Secretary of DNER. The regulation is currently in the final stages of the approval process required for the enactment of new regulations.
- A number of **mooring buoys, shallow water signage and aids to navigation have been installed** in three of Puerto Rico's natural reserves: La Parguera, La Cordillera and Canal Luis Peña, and at Desecheo island marine reserve.
- **Community-based processes have resulted in draft managements plans for three of Puerto Rico's natural reserves**, Tres Palmas Marine Reserve, La Cordillera Natural Reserve and Canal Luis Peña Reserve.
- An exercise was completed to develop a **list of priority natural reserve sites for management plan development in Puerto Rico**.
- DNER is leading the effort to develop **management plans for three additional Natural Reserves**: Mona Island, Humacao and Vieques Bioluminescent Bay.
- A **legal analysis of community participation in management planning** for the protection of marine protected areas in Puerto Rico is being finalized in collaboration with the University of Puerto Rico - Río Piedras Campus. This legal analysis describes

and interprets, for the first time in Puerto Rico, the basis for community participation in the development of management plans and in management of marine protected areas. A guide for both the public and DNER staff will be produced to communicate study results.

### Virgin Islands

- The Territory is in the final stages of **adopting regulations to implement the management plan for the East End Marine Park on St. Croix**. This Park, which covers 60 sq. miles, is the first site in the Virgin Island's system of Marine Parks.
- The Territory completed the **installation of mooring buoys within the East End Marine Park**. The locations of the buoys were selected based on an analysis of use patterns to ensure that the most heavily visited areas for boaters contained an adequate number of moorings in order to protect important benthic habitats.

## New or Expanded Partnerships or Collaborations to Implement LAS Projects

In every jurisdiction, LAS efforts have brought together groups of diverse organizations and people either to develop comprehensive LAS plans or to address specific problems, such as invasive species or coastal construction practices. The LAS process has also had substantial success in leveraging small amounts of additional sources of funding, particularly in Florida and Hawaii. The jurisdictions also report a high degree of volunteer effort in various areas

### American Samoa

- The American Samoa Governor's Coral Reef Advisory Group (CRAG), consisting of the agencies locally involved in resource management issues, recently signed an **interagency cooperative agreement**, enhancing the group's ability to uphold its mission. The agreement outlines how the participating agencies shall coordinate amongst themselves, build capacity, recognize each agency's respective expertise, commit staff, and ensure timely reporting and accountability. The signatory agencies include: American Samoa Department of Marine and Wildlife Resources, American Samoa Environmental Protection Agency, American Samoa Department of Commerce (including Coastal Management Program and Fagatele Bay National Marine Sanctuary local component), and the American Samoa Community College. Several locally active federal programs also play critical roles, namely the National Park of American Samoa and Fagatele Bay National Marine Sanctuary. As threats to American Samoa's coral reefs span among the mandates of the different departments, coordination and cooperation is critical for effective management.
- CRAG participates in a **broader governmental effort** to protect and improve management of the territory's ocean resources as an advisory group within the Ocean Resources Management Council. This participation serves to enhance collaboration between CRAG agencies and other governmental and non-governmental organizations.
- The CRAG assisted in formulating **linkages between concurrent monitoring and research efforts**, particularly the Territorial Monitoring Program and the coral disease surveys.
- The LAS process in American Samoa brought about **three new programs** through gap identification, funding, or partial funding: the Territorial Monitoring Program, the Marine

Science program at the American Samoa Community College, and Marine Protected Area Program support.

### **CNMI**

- The CNMI's Coral Reef Protection LAS was a product of **significant collaborative effort** between CNMI public agencies, non-profit groups, business owners, interested members of the community, and federal agency partners. Through the LAS effort, coral-reef management throughout the Commonwealth has notably improved.
- CNMI and federal natural resource agencies and stakeholders have been working together over the past several years with the **Interagency Watershed Group**. Through this group, agencies coordinate ongoing projects and develop new ideas regarding sources of land based pollution in CNMI's watersheds.. Numerous strategic planning sessions have occurred. Currently, the agencies are working on several watershed-based approaches to curbing pollution.
- An LAS project in the **Laolao Bay** area has attracted many **stakeholders and volunteers** in assisting the resource agencies with a revegetation project, and the volunteers have since been involved in a variety of restoration projects throughout the CNMI.

### **Florida**

- A **partnership was established** between the Florida Department of Environmental Protection (DEP), the Florida Fish and Wildlife Conservation Commission (FWC), and the National Coral Reef Institute (NCRI) at the Nova Southeastern University Oceanographic Center to comprehensively map and initiate long-term monitoring of southeast Florida's reefs.
- The FDEP's **Coral Reef Conservation Program (CRCP)** was established in Miami in May 2004 to plan, direct, and coordinate the implementation of Florida's LAS – the Southeast Florida Coral Reef Initiative (SEFCRI). The CRCP promotes and coordinates research, monitoring, partnerships, and stakeholder participation toward the protection of southeast Florida's reefs.

### **Guam**

- Guam **strengthened existing environmental education partnerships**. The results of this increased collaboration include, but are not limited to, the following: public/private partnership of aluminum recycling in Guam schools, eco-friendly events such as the Guam Liberation Day Parade, Annual Earth Day/Island Pride Festival, Guam Fisherman's Festival, Manaka Run, Kids Fishing Derby, and the Sleep with the Sharks program.
- Guam partnered with The Nature Conservancy to begin **developing Conservation Action Plans**, thus **incorporating a holistic, site-based, ecosystem approach to coral reef conservation**.

### **Hawaii**

- Through the Aquatic Invasive Species LAS, Hawaii's Department of Aquatic Resources (DAR) has **increased partnerships with numerous agencies and organizations to address Aquatic Invasive Species**. Some of the partnerships include the University of Hawaii, The Nature Conservancy, National Park Service, City and County of Honolulu, Hawaii Department of Agriculture, and Hawaii Department of Health.
- An **Aquatic Invasive Species Response Team** was established by DLNR/DAR to respond to and begin to mitigate impacts from alien species.
- Hawaii's **Climate Change and Marine Disease (CCMD) LAS steering committee was formed** in 2005 with representatives from Federal and state agencies, research

institutions, and NGOs. The steering committee assisted in collecting information and developing an initial background paper on coral bleaching and disease. The steering committee developed goals and objectives for the CCMD LAS and prioritized the actions in the LAS. The LAS is expected to be finalized in October 2006.

- The **Recreational Impacts LAS partnered with the Hawaii Ecotourism Association** to develop the goals, objectives, and priorities of the LAS. Project implementation is underway.
- The **Coral Reef Fisheries LAS coordinator in Hawaii partnered with the Waikiki Aquarium** to submit a NOAA education mini-grant to create a “Threats to Hawaiian Reefs” exhibit at the Aquarium. If funded, the LAS threats to coral reefs will be featured at the Aquarium, with interactive and traditional aquarium displays as well as a live aquarium exhibits.
- The **Land-Based Sources of Pollution LAS is assisting with organizing and facilitating a local advisory committee** for Honolua, Maui. The LAS coordinator discussed formation of a local advisory committee with Maui Reef Fund, Project SEA Link, and Maui Land & Pineapple (MLP) Company. MLP is planning to establish several committees that deal with cultural issues, recreational use, and other issues within the Bay.

### **Puerto Rico**

- Puerto Rico **strengthened partnerships to develop local action strategies for land-based sources of pollution** with the US Department of Agriculture Natural Resources Conservation Service, US Environmental Protection Agency, US Army Corps of Engineers, Puerto Rico Environmental Quality Board, and the Puerto Rico Planning Board, among others. Pilot projects were implemented at the **Jobs Bay National Estuarine Research Reserve (JBNERR) watershed** in order to reduce sediment and pollutant loadings to coastal waters by requiring and enforcing best management practices (BMPs) and preventive management measurements (MMs) for land use and activities.
- The **Puerto Rico Coral Reef Initiative Program partnered with the Puerto Rico Tourism Company** to co-lead the development of the LAS for recreational overuse. Through this partnership, a number of educational pamphlets aimed at tourists were produced and distributed to local businesses and tourist information centers. These pamphlets include, “Coral Reef: Precautions for Recreational Users in Puerto Rico and the U.S. Virgin Islands”, “Coral Reefs and Tourism,” “Mangrove Forests and Tourism,” and “Tourism and Seagrass Beds”.
- **Partnerships between DNER, the Caribbean Fishery Management Council and the NOAA NMFS Caribbean Field Office were strengthened** by the LAS effort through cooperative work on projects to develop local action strategies for overfishing and lack of awareness.

### **Increased Outreach and Public Awareness**

Almost every Jurisdiction has made great progress in addressing the need to better inform the public of the importance of coral reefs, their status, and threats to their health. Many jurisdictions have developed comprehensive outreach and education efforts where none existed before. For example, Hawaii, American Samoa, Guam,

and the U.S. Virgin Islands have developed comprehensive coral reef outreach programs, with many partners, utilizing multiple products and media outlets.

#### **American Samoa**

- In American Samoa, funding for the Coral Reef Education and Outreach Coordinator increased **coral reef programs in schools and increased media** coverage.
- In American Samoa, the LAS funded training for and implementation of a year-long **Rare Pride Campaign** by the Coral Reef Education and Outreach Coordinator.
- CRAG, through the LAS, supported the continued development and expansion of the **Marine Science Program** at the American Samoa Community College.
- CRAG has supported the production and distribution of several editions, in both English and Samoan, of the **American Samoa Natural History Guide**. This Guide has served as a valuable resource to students and teachers and has increased public understanding of the territory's unique resources.

#### **CNMI**

- An outreach and education group called **the CNMI Organization for Conservation Outreach (CoCo) was formed**. During the past year, CNMI has carried out a number of successful **coral reef-related outreach and education** activities. Resource agencies have involved students and the community at large in coral reef protection issues through school visits, the annual Environmental Symposium, the Boater's Awareness Campaign, and coral reef stakeholder meetings related to local action strategy development, and there is an RFP for a Coral Reef Curriculum project.
- The CNMI completed a **fisheries regulation booklet**, and quarterly **forums** with fishermen have begun.
- CNMI's **Interagency Marine Monitoring Program** has revised and expanded its website (<http://cnmicoralreef.net>) to provide improved information regarding monitoring activities and improve program data access.

#### **Florida**

- Florida's coral program in partnership with the, NOAA, and NGOs, developed and launched a **marketable identity for the Southeast Florida Coral Reef Initiative (SEFCRI)**. The identity includes a logo and tagline, "Acting Above to Protect what's Below", which provides a consistent point of reference for the community as they begin to see SEFCRI messages, brochures, exhibits, website, and other outreach products. A seven-page media kit containing key SEFCRI messages was completed in conjunction with the identity.
- The SEFCRI conducted a needs assessment to determine **the best approach and public outreach messages** for a campaign targeting increased awareness and appreciation of southeast Florida's reefs. Results of the study are available online at (<http://www.dep.state.fl.us/coastal/programs/coral/reports/>).
- The SEFCRI Awareness and Appreciation Team sponsored a series of free **workshops for the marine tourism industry** during May 2006 entitled "Coral Reefs & Sustainable Marine Tourism: Protect Your Business by Protecting Your Reef." The workshops featured international and local experts discussing the socioeconomic value of the coral reefs, innovative local solutions, and market sustainability. Interactive discussions explored emerging issues and encouraged reef conservation as a best management practice.

#### **Guam**

- **A series of environmental education and outreach** products was developed to promote coral reef awareness as part of a larger social marketing campaign. The campaign prominently features Professor Kika Clearwater, a cartoon spokesperson, on a variety of merchandise. Products include an airline video played for all incoming flights to Guam, patches, pins, pencils, posters, and restaurant tent cards, a quarterly newsletter, environmental calendars, a recycling guide, fish and wildlife fact sheets, public service announcements for radio, newspaper, and television, teacher guides, and school curriculums.
- There has been a significant **increase in the number of community-driven activities including volunteer clean-ups, tree plantings, aluminum can recycling drives, and stormwater drainage painting.** The natural resource agencies have provided support in the form of plastic bags, work gloves, recycling guides, trees, and paint.
- The government of Guam established two **annual awards to commend environmental stewardship.** These formal government awards are the Environmental Steward of the Year and the Governor's Green School Award.
- The Guam Coastal Management Program has developed "**Guardians of the Reef**", a group of eleventh and twelfth graders, who will produce and present a program regarding coral reefs to every third grade classroom on Guam.
- An **Environmental Education Strategy**, a dynamic document intended to provide guidance to all government agencies **was developed through the collaborative efforts of the Environmental Education Committee.** This document is a direct reflection of Guam's Lack of Awareness LAS.
- The Guam Coastal Management Program contracted QMarck, Inc, a marketing research firm to conduct a **marketing survey in 2005 to establish baseline data regarding public perceptions concerning the environment** and most popular sources of information. The results of this survey have been used to allocate "lack of awareness" funding appropriately, in order to maximize the benefits; the GCMP is reaching the most amount of people for its budget.

## Hawaii

- Hawaii's "**Living Reef**" campaign provides a comprehensive approach to addressing the lack of public awareness of the significance of coral reefs. Over forty organizations and government agencies developed a multi-media approach to present a clear and simple message to the public about the importance of protecting coral reefs.
- Two **Living Reef Awards luncheons** have been held to honor individuals and organizations that have exhibited outstanding leadership to conserve and care for the reefs. Over 30 individuals and organizations from across the State have been nominated and honored at these annual awards, which have been attended by over 200 people annually.
- The **Fisherman Outreach Program** was developed to better understand the interests and recommendations of fishermen for fisheries management. The program collected and analyzed interviews with 55 fishermen on Maui and the island of Hawaii. The interviews reflected that fisheries in Hawaii have declined; fishermen want to see healthy and abundant fish stocks in the future; and they recommended that awareness-raising, improved enforcement, and community involvement be used to accomplish that vision. A report is available of the summarized findings.
- **Hanalei Watershed outreach activities** included the following: quarterly Hui meetings held, video recorded, and broadcast on public television station; Hanalei Watershed Hui (HWH) newsletter published twice a year; website updated regularly; and HWH taught

688 school children in 2005, gave presentations at Save Our Seas, Taro Festival, Earth Day, and World Water Quality Monitoring Day.

- In partnership with For the Sea Productions, Snorkel Bob Foundation and Hawaii's Living Reef Program, a 7 minute **internationally award winning video** entitled '**Hawaii Reef Etiquette**' was produced and **is now being shown on all cruise ships, and other key locations statewide.**

### **Puerto Rico**

- Puerto Rico created a **full-color poster on impacts to coral reefs** caused by the illegal collection of ornamental fish and invertebrates.
- A **series of education and outreach materials** was produced, including "Cuidado con los Arrecifes" poster and comic book, and adapted and translated two booklets originally produced by the Virgin Islands Marine Advisory Service, "Detective Goo Too Preventing Water Pollution"—a twelve-page comic book addressing point and non-point source pollution—and "Children and the Sea: a coloring book on ocean care and conservation"—a sixteen-page coloring book on ocean care and conservation. A Spanish version of each was produced for the first time.
- Puerto Rico assisted in the design of a **coral reef conservation campaign for airports**, including developing messages and translating them into Spanish. The campaign will expand to include Puerto Rico's international airport and roadside billboards.
- Through a project funded by the NOAA coral reef conservation general grant program, a contractor **developed television and radio public service announcement (PSA) campaign** to be broadcast on local television and radio stations.

### **U.S. Virgin Islands**

- The LAS process helped launch the **Virgin Islands Network of Environmental Educators (VINE)**, an outreach and education network with members represent 28 natural resource agencies on the islands of St. John, St. Croix and St. Thomas. Network members collaborate on outreach and education planning throughout the islands.
- The Virgin Islands Coral Conservation Consortium (VICCC) was formed to assist in crafting outreach strategies and messages for the LAS focus areas of public awareness. VICCC helped design a **coral conservation campaign for airports** in New York, Miami, and Washington, D.C. A follow-up campaign in the USVI for tourists and residents is being developed.
- A **Snorkeling Excursion Program** has been implemented in partnership with local NGO's. Future implementation will be done in conjunction with local dive shops.
- A commercial van has been purchased and is being retrofitted for use as a **portable kiosk for teaching coral reef education** through the St. Croix East End Marine Park.
- A quarterly newsletter sponsored by members of VINE is distributed in the community and to schools in an effort to **integrate coral reef education in public and private schools.**

## **Capacity Building to address Management Issues**

Jurisdictions have taken numerous actions to increase human capacity, such as hiring new staff and provide training for staff involved in coral reef issues. In addition, NOAA has funded Coral Reef Management Fellows in each jurisdiction, and is working with the jurisdictions to develop a proposal for capacity needs assessments in each jurisdiction.

### American Samoa

- American Samoa obtained funding to **expand human capacity** and develop key skills in several departments (GIS specialist at DMWR, MPA Coordinator, Monitoring Coordinator, Coral Reef Initiative Coordinator, Coral Management Fellows, Education and Outreach Coordinator).
- American Samoa **provided training opportunities and workshops** addressing natural resource law enforcement, education and outreach, climate change adaptation, community-based monitoring, and MPA development. **Participatory Learning and Action (PLA)** workshops were held for several villages participating in the Department of Marine Wildlife Resources (DMWR) Community Fisheries Management Program. Community members were provided with tools to develop Community Action Plans for improving their MPA sites and resources.
- An **internship program** for marine science students from ASCC was established to generate opportunities for Community College students to develop skills and gain experience in management and science projects related to the effects of land based sources of pollution on coral reefs. It has also served to increase youth involvement in reef conservation activities.

### CNMI

- CNMI's **internship program** has been very successful; the resource management agencies hosted twenty-two college-level interns during the summers of 2003-2006. The internship program introduces CNMI post-secondary students to natural resource careers and gives them an opportunity for hands-on involvement in coral reef resource management.
- CNMI agencies have **expanded capacity** with a Watershed coordinator, MPA coordinator, Education and Outreach Coordinator, Coral Reef Monitoring Assistant and Coral Management Fellows.

### Florida

- The Florida Coral Reef Conservation Program's (CRCP) capacity was strengthened by establishing a **partnership with Florida Gulf Coast University to provide staffing services and the subsequent addition of three new staff to the CRCP**. This expanded capacity has enabled the CRCP to create new and collaborative relations with stakeholders, develop and implement additional LAS projects, and increase community outreach efforts.

### Guam

- Guam provided **training opportunities** for managers, teachers, and stakeholders. Several stakeholder workshops were held to educate various levels of stakeholders on public outreach, coral reef management, and proper recreational use practices.
- Two **scholarships were created for graduate study in marine biology and natural resource management**. The scholarships require recipients to work for the government of Guam for two years upon completion of Masters' degrees.

### Hawaii

- The Hawaii Land Based Sources of Pollution (LBSP) LAS projects have been helping to build the capacity of stakeholders in the three priority watersheds as well as state-wide. The LAS coordinator has provided **technical assistance to stakeholders LBSP issues related to coral reef protection issues** and coordinated workshops and training on storm

water, wastewater and erosion control practices. The coordinator has also assisted local watershed groups with grant applications and identifying funding sources.

- A **workshop series on land-based pollution threats** to coral reefs was held as part of Hawaii's LAS development. A workshop on "Innovative technologies for stormwater & wastewater management" was held in Hawaii in October 2005. In addition, the Center for Watershed Protection conducted training and workshops in Maui and Molokai in Feb 2006.
- An **Aquatic Invasive Species Response Team** has been formed on Oahu and a Monitoring Specialist and AIS Technician have been hired for the island of Hawaii.
- The Aquatic Invasive Species Coordinator has undergone USFWS **Hazard Analysis and Critical Control Point training** to identify possible sources of AIS introduction through state activities.
- The State has partnered with the U.S. EPA to utilize the services of **two EPA presidential fellows** to assist on various projects related to the Land-Based Sources of Pollution LAS.
- A NOAA-sponsored **workshop** was held in Hawaii to begin a Pacific and Indopacific regional dialog on protocols, nomenclature and assessment of **marine disease**.

### **Puerto Rico**

- A workshop provided classroom and field **training for administrative hearing officers** jointly with the Puerto Rico Department of Natural and Environmental Resources (DNER) Coral Reef Ranger Team on the biology and importance of coral reefs.
- Two orientation **workshops were offered to recreational fishers** in Puerto Rico concerning state and Federal fisheries laws.
- **Commercial and recreational fishers' workshops** we conducted in numerous communities throughout Puerto Rico in collaboration with the Puerto Rico Sea Grant College Program, DNER, NMFS Highly Migratory Species Division, and NOAA Enforcement. Commercial fisheries workshops were held in San Juan, Aricebo, Ponce, Mayagüez, Guánica, Puerto Real, Humacao, Aguadilla, Lajas, Fajardo, Guayama, Vieques, and Culebra. Workshops for recreational fishers were held in San Juan, Aricebo, Boquerón, and Ponce.
- Key technical staff from the Puerto Rico DNER that evaluate proposed development projects benefited from **two courses on the use and management of information and data available in the DNER's GIS Data Management Center**. Participants were introduced to ArcGIS and provided the basic training to allow them to work with ArcView, ArcEditor, and ArcInfo.
- A **series of short workshops on coral reef related issues** including fishing regulations, the Coral Reef Conservation Act of 1999, the Puerto Rico Fisheries Law 278, basic coral reef ecology, determination of development impacts on coral reef, and results of recent research on coral reef in Puerto Rico **were offered for personnel of DNER, Environmental Quality Board and other stakeholders**. DNER's scientific personnel including the coral reef staff technical advisory committee, the Auxiliary Secretary for Permits unit and personnel of the Bureau of Scientific Affairs conducted the short seminars.
- The **First DNER Symposium on coral reefs is being planned by coral reef researchers in Puerto Rico**. The expected audience for this activity will be the members of both the Interagency and Internal Coral Reef Committees, participants on the LAS effort and others that have shown interest on coral reefs.

### **U.S. Virgin Islands**

- USVI provided an **Areawide Conservation Planning Workshop** technical staff working in local NGO's and territorial government agencies.
- The VI Coastal Zone Management program has hired **additional permit inspectors** to assist in technical review of site design and inspection

## Increased Understanding of Coral Reef Ecosystems

Jurisdictions have also undertaken applied research to better understand coral reef ecosystem processes, and develop better management techniques. Examples include expanded coral reef monitoring, the development of bio-markers, and studies of sediment loadings in watersheds which affect coral reefs.

### American Samoa

- LAS funds have enabled the American Samoa Coral Reef Advisory Group to attract graduate students and highly qualified researchers to the Territory to conduct **management-driven scientific studies and monitoring**.
- Utilizing LAS funds, CRAG developed a **long-term Territorial Monitoring Program**,
- LAS funds have supported the creation of a **research field station on Ofu**, where unique coral reef lagoons and species are the focus of research on coral resilience,
- The American Samoa EPA, in partnership with the Commonwealth of Northern Mariana Islands, is at the forefront in **developing coral reef biocriteria** and is implementing a diagnostic coral reef monitoring program. This program, now supported in part by LAS funds, has been developed to inform managers, the public, and politicians of the impacts of watershed-based pollution on reef communities around Tutuila Island. It also serves to guide curative, restorative, and preventative management actions.

### CNMI

- CNMI's **long-term monitoring program** has entered its seventh year and has expanded survey coverage from the outer reefs to include reef associated lagoon habitats on Saipan and reef flats on Saipan, Rota and Tinian.
- Two manuscripts describing the relationships between changing environmental variables (both natural and human generated) and lagoon and coral reef communities have been submitted for peer-review and publication. Since the initiation of CNMI's **contemporary monitoring program** (2000), four manuscripts have been accepted or are currently in review, which communicate the program's monitoring methods and techniques. This process has facilitated the review of CNMI's methods and goals by the international science community, and subsequently improved monitoring effectiveness.
- Local government and NGO contributors created an **ecologically-based habitat map of the Saipan Lagoon** to compliment existing NOAA maps which provides an enhanced level of detail to assist management planning and decisions.
- An **in-shore creel survey** was initiated including training in species identification and data collecting. The surveys will be expanded in the future to include boat-based nearshore fishing activities and include other areas in Saipan, Tinian, and Rota.

### Florida

- The SEFCRI completed **the Southeast Florida Coral Biomarker Local Action Study** which successfully tested the feasibility of using cellular diagnostics to link land-based sources of pollution to coral reef degradation. The study report is available online.

- Florida also completed the four years of the Southeast Florida Coral Reef Evaluation and Monitoring Project (SECREMP). This **long-term, comprehensive monitoring program**, initiated in 2003, is providing important status and trends data for the northern extension of the Florida Reef tract in Miami-Dade, Broward and Palm Beach counties. SECREMP reports were published online. In 2006, the SECREMP was expanded to include three new sites in Martin County bringing the total number of SECREMP sites to 13.
- A **benthic habitat map** for the shallow seafloor (from 0m to 35m) of Broward County in southeast Florida was developed. Data collected using Laser Airborne Depth Sounder (LADS) bathymetry, multi- and single-beam bathymetry, acoustic seafloor discrimination, ecological assessments and ground-truthing were integrated to produce this first in a series of habitat maps for the southeast Florida region. Mapping of adjacent Palm Beach County commenced in winter 2004 and will be completed in spring 2007.
- The SEFCRI Land-Based Sources of Pollution (LBSP) Team established a **LBSP technical advisory committee** (TAC) composed of expert scientists to provide guidance and technical **expertise in the design and development of LAS projects targeting land-based sources of pollution and water quality** in the coastal waters of Dade, Broward, Palm Beach, and Martin Counties. The LBSP TAC has developed conceptual scopes of work for critical research projects and prioritized the work effort developed by the LBSP focus team.

## Guam

- Numerous LAS activities are aimed at improving and **increasing data collection** in support of management and legislative changes and proposals.
  - The local Monitoring Group was formed to coordinate comprehensive **data collection**.
  - The Coral Bleaching and Disease group will collect data on the issues related to **coral disease**.
  - The Environmental Monitoring and Assessment Program (EMAP) will identify specific long-term **water quality monitoring** sites along the coast and in Guam's rivers in an effort to identify non-point sources of pollution.
- An evaluation of **soft corals as bio-indicators of persistent contaminants** in Guam's waters has provided a potential, less-expensive method to coastal managers for monitoring the health of Guam's coral reefs.
- A **GIS erosion potential model for Guam's Ugum watershed** will assist managers by providing rates of sedimentation from the Ugum Watershed to Guam's coastal waters taking into consideration variables such as, amount of vegetation, rainfall rates, soils, and geology. Such information will help guide the allocation of resources for land-based sources of pollution at that specific site.
- A study examining the **effects of personal motorized watercraft on marine ecosystems** was conducted.

## Hawaii

- Along with partners, the state of Hawaii created an integrated **statewide coral reef monitoring** scheme for benthos and fish for the Main Hawaiian Islands.
- The aquatic invasive species team in Hawaii completed a series of surveys along the south shore of Oahu to **map the distribution of *G. salicornia* in Maunalua Bay**. This information will be utilized to develop a strategic management plan to protect important areas, such as Hanauma Bay. The group is also defining the long-term potential **impact of the alien orange keyhole sponge** on coral reefs, designing **control techniques** for an

- invasive alga, looking at the impact of another invasive alga's mats on larval settlement, and investigating traditional practices adapted for use in **replanting Hawaiian seagrass** after an invasive alga has been removed.
- As part of Hawaii's Land-Based Sources of Pollution LAS, **the distribution of Igarol 1051, an antifouling paint used on boat hulls, in seawater and sediments and its impact on photosynthesis and cellular health are being assessed.** The group is also assessing a largely unknown, native Hawaiian sand-producing alga and its potential as **nutrient scrubbers** in soft sediments, which impacts corals susceptibility to nutrient loading.
  - For a **study of sediment load to the Hanalei River**, a USGS gauging station was upgraded to a sediment collection station in the of Fall 2004; two radiometers were installed at the USGS gauge and upstream of Weke Road in June 2004. Modeling training was conducted, and turbidity monitoring began August 2003. A draft map was completed and algorithms were developed for native and invasive trees using QuickBird imagery.
  - Systematically evaluated taape (an introduced snapper fish), native goatfish, opakapaka (Hawaiian snapper), and freshwater stream fish to **assess the likelihood that extraintestinal pathogens found in introduced fish are transmitted to native fish.**

#### **Puerto Rico**

- A long term monitoring program was developed with funding from the **NOAA State and Territorial Coral Reef Ecosystem Monitoring Grant.** A DNER contractor worked to characterize the coral reefs and continually monitors seven natural reserves around the coasts of Puerto Rico.