Caribbean – Atlantic Regional Workshop on Coral Reefs and Land-Based Pollution
Embassy Suites Hotel and Casino
San Juan, Puerto Rico
May 18 – 19, 2004

Workshop Summary

The Caribbean – Atlantic Regional Workshop on Coral Reefs and Land-Based Pollution was held on May 18 and May 19, 2004, at the Embassy Suites Hotel and Casino in San Juan, Puerto Rico. The workshop was co-sponsored by the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Agriculture (USDA), with additional sponsorship by the National Oceanic and Atmospheric Administration (NOAA). The purpose of the workshop was to facilitate the development and implementation of Local Action Strategies (LAS) to address land-based sources of pollution impacting coral reef ecosystems, and to share information and strengthen communications among the Atlantic and Caribbean Area jurisdictions on coral reef issues. The format of the workshop was informal and included plenary presentations, breakout groups, and training.

The workshop format was designed to allow the participants from each jurisdiction (Florida, Puerto Rico and the Virgin Islands) to share approaches, successes, and tools for completing and implementing LAS to manage land-based pollutant impacts to coral reefs. Panel discussions and LAS presentations provided a summary of the main goals and proposed projects in each jurisdiction's LAS, existing efforts by each LAS, and tools for understanding and managing pollutant inputs. Training sessions were held to assist in developing and implementing watershed strategies.

A copy of the agenda is provided as Attachment 1 and a list of participants is provided as Attachment 2. The relation of LAS to international agreements in the Caribbean region is provided as Attachment 3. Speakers' power point presentations (if used) will be available online at http://www.coralreef.gov.

Tuesday, May 18, 2004

The workshop began at approximately 8:30 AM. Mr. Rafael Olivieri, Booz Allen Hamilton, facilitator for the workshop, welcomed the participants and discussed some logistical matters and introduced the first speakers.

The workshop began with a welcome by Mr. Fernando Vargas, from the office of the Puerto Rico Department of Natural and Environmental Resources, Mr. Jose Font, EPA, Deputy Director of Caribbean Environmental Protection Division and Mr. Juan Martinez, USDA-NRCS Director Caribbean Area also gave opening remarks.

Following opening remarks, the keynote speaker, Ms. Brenda Torres, Director of the San Juan Bay National Estuary Program (NEP) spoke about the San Juan Bay NEP. San Juan

Bay is located in the northeastern coastline of Puerto Rico. This area is surrounded by urban development areas. Problems to address in the Bay include water quality, fish, habitat, public involvement and aquatic debris. Ms. Torres discussed the critical interface along coastal areas where fresh and saltwater mix. The NEP has developed a water and sediment quality action plan to ensure that activities are compatible with the restoration and conservation of the Bay. Actions the NEP is taking to ensure this occurs include minimizing sediment loadings into the Bay. The NEP is also conducting land use and sediment loading studies to identify sources of sedimentation to help correct some of the problems caused by land use in the San Juan Area, including trash and debris in the waterways, oil spills from cargo ships coming to and from Puerto Rico, increased construction projects and development. The NEP has established several committees to work with the public to improve awareness of the importance of proper land use to protect the watershed.

Panel Discussion: The State of Science – Current Research and Findings on the Effects of Land Based Pollution on Coral Reefs.

Dr. Philip Dustan, University of Charleston, Dr. Rich Appeldoorn, University of Puerto Rico, and Dr. Barry Devine, University of the Virgin Islands all gave presentations as part of this panel discussion.

Dr. Dustan gave a presentation about the global impacts to local coral reefs and the importance of improving local interactions between man and coral reefs. Dr. Dustan has been monitoring diseases that afflict coral and stated that the health of reefs located in the Florida Keys (and elsewhere) must be improved in order to make them stronger to resist global effects. In 1995, there were four coral reef diseases classified and today there are approximately 30 known coral reef diseases. These diseases, such as coral bleaching, are particularly detrimental to older reefs. Factors that affect the health of the coral include sediment, macro algae, and increased carbon and nitrogen distributed via ocean currents from industrial nations. Dr. Dustan also stated that the use of herbicides on land have been shown to directly affect the chlorophyll production of coral. Of particular concern in the Florida Keys is the discharge of septic waste to canals that ultimately discharge to the ocean.

Dr. Appeldoorn presented a series of projects currently underway that are part of the Puerto Rico Coral Reef Ecosystem Studies Initiative (CRES). He discussed efforts to look at effects of sediment on the health of coral reefs, particularly in Puerto Rico. Rainfall and consequential erosion and runoff increase sediment in coastal waters and affect the reefs. Studies supported by CRES have analyzed the susceptibility of areas to erosion based on rainfall amounts, slope, and development. Monitoring has indicated there has been an increase in the presence of finer grain sediments and silt over time. Sediment plumes appear to have the greatest impact to coral compared to runoff immediately offshore. Monitoring results also indicate an overall increase in nutrient loading and consequent increase in algal cover on coral.

Dr. Appeldoorn presented another project, which is also part of the CRES initiative, that is exploring the presence of fatty acids in coral and its origin (i.e., is it marine or land based). Dr. Appeldoorn stated that some of the fatty acids may be used as biomarkers, but this research is just in the beginning phases and no conclusions can be made at this time.

Dr. Devine discussed sediment loadings in the Coral Bay Watershed on St. John, which is the fastest growing area population-wise in the U.S. Virgin Islands (USVI). St. John has very steep slopes and runoff during rain events goes directly into Coral Bay, which is a small harbor. Although salt ponds collect some flow, it is not sufficient. An increase in sediment, bacteria and fungus in Coral Bay has been documented following rain events. Currently, there are no restrictions on development in St. John and consequently there are no requirements to maintain silt fences, pave roads or maintain trash dumpsters that lead to increased sedimentation and debris in Coral Bay from erosion.

Dr. Devine's research used sediment cores to analyze sediment history and determine the sources of sediment. The core samples showed an impact layer on top with increased carbon, decreased sediment size, and increased nutrients. This pattern was found in both developed and undeveloped areas, although the inner harbor was more stressed. Fecal matter was also identified in core samples. Dr. Devine's research has focused on sedimentation (looked less at coral reef) over the past 5,000 years versus the past 40 years and found that there has been a 1,000 – 2,000 % increase in the sedimentation rate in the past 40 years than over the past 5,000 years.

Dr. Devine emphasized that there is an immediate need to take action even if the sources of the decline of coral health are not scientifically proven. He further stated that there is a need to look at our neighbors and ourselves to get engaged in every day activities to reduce sedimentation and other matter from entering waterways.

Panel Discussion: LAS Presentations

This panel discussed the main goals of each LAS and the proposed projects within each jurisdiction LAS. Speakers on this panel included Mr. Ernesto Diaz, Puerto Rico Coastal Zone Management (CZM) Program, local navigator, Mr. Bill Rohring, USVI CZM Program, local navigator, and Mr. Kenneth Banks, Broward County, Southeast Florida Action Strategy (SEFAST), local navigator.

Mr. Diaz discussed the importance of coral reefs to U.S. tourism, federal fisheries, food, employment/income, storm protection, sustainable recreation, and medicines. He provided an introduction to the U.S. Coral Reef Task Force LAS effort and shared the six key threats to the health of coral reefs that were identified by the Task Force as the LAS focus areas: 1) land-based sources of pollution, 2) overfishing, 3) lack of public awareness, 4) recreational overuse, 5) climate change and coral bleaching, and 6) disease. Mr. Diaz stressed the importance of coordination between local, regional and national agencies to improve involvement in the protection of the reefs. Puerto Rico's LAS

process involves identifying priority watersheds such as the Jobos Bay area, selecting pilot projects, identifying funding for projects, and identifying projects and management tools that contribute to the implementation of best management practices (BMPs) within various watersheds.

Some of the projects identified by Mr. Diaz included:

1. Watershed based models for analysis of non-point sources of pollution at Jobos Bay, Anasco, San Juan Bay Estuary and La Plata.
2. BMPs for agriculture to reduce sediment and nutrient loading to coastal waters and wetlands.
3. Inventory of septic tanks and groundwater wells in critical communities within the Jobos Bay watershed.

In addition, Mr. Diaz discussed some conservation projects such as training marina operators and farmers, preparing a Guide on Coral Reef Laws and Regulations, designating areas as natural reserves and improving signage.

Mr. Rohring discussed the need for USVI to look at permit requests and sediment loading data and convey this information to the decision makers and developers. He stated that it was important to target home owners to increase their awareness about the watershed. He has started a smart growth program that targets adults because although children's programs are useful, there is a need to educate the adults who are making the ultimate decisions about managing their homes and businesses. Although USVI does not have much agriculture that uses fertilizers and pesticides, they do have problems with livestock. USVI has identified funds and projects to address problems with cattle and goats.

Mr. Banks, representing SEFAST, estimated the recreational value of coral reefs at $2 billion in Broward County. The economic importance of the coral may help to get the attention and support of more people.

SEFAST has identified four issues that need to be addressed.

1. Determine the areal extent and condition of reefs. Using GIS information SEFAST is analyzing the condition of coral reefs off the coast of Florida. There is a need to assess the data and identify any gaps in the data already collected.
2. Determine the extent of pollution. The sources of pollution that affects the coral reefs the most must be identified. There is also a need to prioritize the types and sources of land-based pollution to be controlled.
3. Determine the link between water pollution and reef health. This includes identifying how pollution affects coral reef health. Priority areas need to be identified to be surveyed for additional biological and water quality pollutant indicators.
4. Design and implement activities to reduce land-based sources of pollution affecting the coral reef ecosystem.

Lunch Speaker: Ms. Thera Edwards, National Environmental and Planning Agency of Jamaica

Ms. Thera Edwards of the National Environmental and Planning Agency of Jamaica discussed how Jamaica is addressing the issue of runoff. Of concern is pollution caused by human and agricultural waste, tourism development, solid waste disposal, flooding, inadequate drain systems, sustainable economic activities, unemployment, infrastructure capacities during storm events, and improper land management that leads to land degradation.

Jamaica implemented an innovative program that targeted the authorities who can cite people for violating regulations and judges who set the fine for violators. They met with the authorities and judges and educated them regarding the impact of peoples' actions and how it directly affected the health of the coral. They also provided pocket-sized listings of the regulations for the authorities to keep on hand.

Ms. Edwards also spoke of Jamaica's public outreach program, which includes posters that are simple and humorous, yet informative to get across the importance of well maintained sanitation, not washing cars in streams, using silt fencing, etc. Jamaica has also produced a short video showing what you should not do. Jamaica's approach to involving people at the local level was very well received by all the jurisdictions.

Panel Discussions

Three Panel Discussions were held on the afternoon of May 18, 2004. The order in which these panel discussions were held varied from the agenda to accommodate the schedule of some of the speakers.

Panel Discussion: Tools for Understanding and Managing Pollutant Inputs

This panel discussion focused on new technologies and management tools for reducing the impact of land-based sources of pollution to coral reefs. Ms. Aurelie Shapiro, NOAA, National Ocean Service, Ms. Lauretta Burke, World Resources Institute, and Mr. Francisco Monroig, University of Puerto Rico all gave presentations.

Ms. Burke's presentation related to linking land-based sources of pollution with coastal ecosystems. Her presentation focused on the Reefs at Risk in the Caribbean, which is a collaboration of over 20 international and regional partners and uses GIS to evaluate the threat to reefs from land-based sources (sediment, nutrients and toxic substances). The purpose of the Reef at Risk project is to integrate spatial information on coral reefs, develop regionally-consistent indicators of pollution, develop GIS-based tools for analysis, evaluate potential economic losses, and raise awareness about linkages between human activities and coral reef health. Four threats were modeled: coastal development, watershed-based sources of sediment and pollution, marine-based threats, and

overfishing. The presence of coral disease, coral bleaching and the economic value of coral reefs was also examined. For each threat "stressors" or sources of pollution/sediment were mapped and the impact of each stressor to the reefs was estimated. This provided an indication of whether a reef is threatened at a low, medium, or high level.

Ms. Shapiro's presentation provided examples of summit-to-sea satellite imagery. The study area presented included St. Croix, USVI and Puerto Rico. The satellite imagery provides base maps, maps of shallow water benthic habitats and land cover, and changes in coral ecosystems over time. The imagery spatially links the coral reefs with nearby watersheds and provides a tool for monitoring coral reefs.

Mr. Monroig discussed innovations that Puerto Rico is trying in the coffee industry, which is a critical employer in Puerto Rico. Coffee is grown in the southwestern zone of Puerto Rico. Headwaters for several rivers that empty into the Atlantic or Caribbean Ocean are present in this portion of Puerto Rico. Steep slopes characterize much of the growing area, which can cause runoff to enter the ocean during rain events. Several factors are a concern with the coffee processing industry, including: use of water, location of processing facilities near water, and proper disposal of wastewater. Coffee production uses a lot of water to transform the berry into the bean, transport the beans between process steps, wash beans, remove pulp and fermentation. This requires the processing facilities to be located near water, which is a concern. Wastewater from the processing needs to be properly disposed.

The National Coffee Research Center at Columbia (CENICAFE) has implemented new technology that uses less water and decreases the size of equipment needed, which are often placed along steep slopes. The new technology decreases the amount of water required to produce coffee, reduces the amount of sediments entering waterways and uses less electricity. Further, the amount of waste pulp is reduced using new technology and the more concentrated waste pulp can be used as compost. The new technology should be in use at 30 facilities by the end of 2004. The University of Puerto Rico is also investigating technologies used by other coffee equipment manufacturers.

Panel Discussion: Tools for Understanding and Managing Pollutant Inputs

The second panel discussion of the afternoon focused on existing technologies and management tools for reducing the impact of land-based sources on pollution of coral reefs. This panel discussion included presentations by Mr. Kevin Madley, Florida Marine Research Institute and Mr. Bill Rohring, USVI CZM Program.

Mr. Madley discussed Florida's Fish and Wildlife Conservation Commission's (FWC) involvement in Southeast Florida Coral Reef Initiative (SEFCRI) and the problem that although many studies on coral reefs have been performed, managers and decision makers do not know what information is available or how to access the information. Mr. Madley emphasized that it is important to provide tools that give information to managers

and other researchers to facilitate planning decisions. A CD is available that was produced by the FWC, EPA and the Florida Keys National Marine Sanctuary that includes data collected from 43 monitoring sites. The monitoring data includes species inventory, presence of disease/condition of reef, videography, image analyses, and statistical analysis. The information can be viewed in its entirety or in summary form.

In addition, information is available online for the South Atlantic Bight (SAB) area; the coastal area from North Carolina to Florida's east coast. GIS mapping and video can be downloaded for the SAB and several different sets of data can be viewed.

Mr. Rohring stated that the failure of septic systems in the USVI is a chronic problem. Innovative alternate septic systems are being constructed in the USVI that are funded by the EPA 319 and NOAA 310 Coastal Non-Point Source Pollution programs. He presented an example project in USVI where innovative tiered landscaping is created using layers of gravel, soil, and vegetation to serve as the septic system for homes and businesses. They hope to introduce the alternate systems to more home owners and businesses, but it requires money and education to be effective. In addition, the systems have to be maintained so there has to be a commitment by the owner to maintain the septic system for it to be beneficial.

Panel Discussion: Existing Efforts

The third afternoon panel discussion, *Existing Efforts*, discussed some existing projects and efforts that address impacts of land-based sources of pollution on coral reefs, best management practices for addressing priority problems such as runoff and erosion and success stories. Mr. Steven Blair, Miami-Dade Department of Environmental Resources Management, Ms. Julie Wright, USDA/NRCS, Dr. Jorge Rivera Santos, University of Puerto Rico Water Resources Institute participated in the panel.

Mr. Blair discussed the surface water quality program at Miami-Dade County and the Biscayne Bay water quality program. Miami-Dade County has 103 water quality sampling stations in Biscayne Bay that are sampled monthly for multiprobe parameters, light intensity, and physical, biological and chemical parameters. Monitoring data has been collected from Biscayne Bay since 1979 and the trends of pollutants have been mapped. Total phosphate has showed a consistent increasing trend. The numerous canals and tributaries that empty into Biscayne Bay are affecting water quality. Consequently, programs have been established to divert discharge from canals to coastal wetlands. In addition, $38 million has been targeted for stormwater improvements by 2006 and $1 billion targeted for flood control projects by 2010.

Ms. Wright discussed problems in the USVI that have affected water quality including increased sediment in surface water following storm events, failing septic systems, marinas and recreational boating, and other nonpoint source pollutants. USVI is currently doing demonstration projects to train construction companies and homeowners on sediment and erosion control measures (silt fencing, mats, dikes, and porous paving).

They are also establishing laws and policies that include critical area setbacks, BMPs, stormwater permitting, and watershed restoration. Hydroseeding is also being used on St. Thomas but not elsewhere in the USVI.

The number of failing septic systems is a major concern and several alternative septic systems are being funded by EPA and NOAA at homes in Magens Bay and Coral Bay. USVI has adopted an education and outreach program to educate the public on the importance of BMPs to preserve water quality.

Dr. Santos discussed a project called the Comprehensive Integrated Management Plan (CIMP) project for the Mayaguez Bay watershed. Numerous rivers discharge to Mayaguez Bay on the western portion of Puerto Rico. Monitoring of Rio Grande de Anasco, Rio Yaguez and Rio Guanajibo has shown elevated levels of metals, bacteria, organics and inorganics, nutrients, and sediment. Land use along the rivers upstream of the bay includes agriculture, industrial and commercial use. Under CIMP, funding is provided to organize the stakeholders, monitor the watershed, and implement BMPs to decrease land-based sources of pollution that enter the watershed.

Break-Out Session

A break-out session was held to allow each jurisdiction, Florida, Puerto Rico and USVI, to discuss how to link efforts and tools that were presented earlier in the day to their own LAS projects. After the break-out session each jurisdiction reported back to the group. The following is a summary of what each jurisdiction reported to the group.

Florida

Florida identified the following three goals for its LAS:

1. Characterize the Reef Condition
    - Increase the number of water quality monitoring stations to gather information based on biomarkers established for coral reefs (i.e., not for humans) and to fill in data gaps, particularly in Dade County.
    - Add a no-take zone and monitor the zone in north Florida counties.
    - Identify long-term sites and experimental sites to be monitored.

2. Quantify and Characterize Land-Based Sources of Pollution
    - Determine the link between coral reefs and pollutants and whether data is currently available that would create this link. There is a lot of data available; however, it is not pulled together and organized. The coral reef task force is currently identifying what each agency is doing to help identify data gaps.

3. Funding

- Florida discussed the possibility of a tourism tax or a license plate fund to generate money for coral reef studies and protection. Other sources of funding would include federal agency support (e.g., EPA).
- There is a need for funds to educate the public and to get the attention of politicians, judges (Jamaica's approach), and adults.

Puerto Rico

The Puerto Rico jurisdiction developed the following wish list:

1. Target watersheds and organize a stakeholders' forum approach.
2. Identify septic tank improvement projects for watersheds in Jobos Bay and look at what USVI has done with their septic systems.
3. Prioritize watersheds.
4. Get stakeholders support for Jobos Bay.
5. Monitor additional pollutants at water quality stations not just sediments and nutrients (e.g., agricultural contaminants).
6. Integrate monitoring data and watershed management and take into account the scale of what is being monitored and what sources are contributing to the problem.
7. Provide information to the non-scientific community in an easy to understand format (such as what Jamaica has done with posters and videos).
8. Increase the use of small scale community projects.
9. Improve coordination in Puerto Rico at the island level and improve dissemination of information and results via newspapers, internet, mass media. Decisions are being made regardless of information available because the decision-makers are not aware of available information.

U.S. Virgin Islands

The USVI jurisdiction identified two objectives:

1. Use San Juan Bay Estuary in Puerto Rico as an example to establish the use of best management practices and include the community in developing strategies.
2. Improve the use of Best Management Practices through education and demonstration projects that target homeowners and agriculture businesses.

To accomplish these goals USVI agencies will work with Dr. Devine and the University of the Virgin Islands and use baseline data to identify the problems and sources to help focus monitoring efforts into manageable units. USVI liked the innovations presented by Puerto Rico regarding the coffee plantations and possibly USVI could identify innovative solutions for livestock and agriculture practices. USVI liked Jamaica's approach to informing decision makers about laws protecting water quality and their public outreach campaign.

Wednesday, May 19, 2004

The second day of the workshop began at approximately 8:15 AM. Mr. Olivieri welcomed the participants, went over some logistical matters and introduced the first speakers.

Presentation: Measuring Success

The goal of the Measuring Success panel and breakout activity was to consider how to develop and measure different types of performance indicators for the LAS projects developed by the jurisdictions.

The opening presentations discussed choosing indicators and implementing coral reef monitoring programs. Dr. Richard Dodge from the National Coral Reef Institute (NCRI) at NOVA Southeastern University, Mr. Carlos Ramos of Puerto Rico Coral Reef Ecosystem Studies Project, and Mr. Tom Schueler of the Center for Watershed Protection presented.

Dr. Dodge stated that monitoring has been expanded in the Florida Keys and there are currently 53 monitoring sites. At each monitoring location a species inventory, underwater digital video, and digital photographs are taken. The kinds of data that can be obtained, such as species inventories and the presence of disease or bleaching can show predicted change and actual change. Monitoring results have shown the following:

- Stony coral species richness declined at 72% of stations from 1996 to 2003.
- A significant decline in stony coral cover was documented at 63.9% of stations (1996 to 1999).
- Stony coral cover did not change significantly between 1999 and 2003.
- Stony coral disease infection increased in the number of taxa infected and the number of stations where infections occurred.

Dr. Dodge also discussed the development of a tissue-based coral stress indicator that uses a four-tiered rating scale and analyzes tissue from target species. To rate coral stress divers would be trained in the application of an index. Experiments have been conducted using control tanks and treatment tanks. Coral collected for experiment purposes will be monitored for stress and if determined to be too stressed the coral will not be sampled and will be allowed to recover.

Mr. Ramos discussed monitoring of sediment yields in St. John's Island (USVI) at Fish Bay and La Parguera, Puerto Rico. From 1971 to 1999 there has been a dramatic increase in roadways constructed and in an increase in sediment discharged to the watershed. Sediment was measured in relation to rainfall amounts, slope and grading. The amount of sediment was compared for areas with and without sediment and erosion controls in place (i.e., ungraded roadway vs. abandoned roadway). Using monitoring data, sediment yields could be measured and predicted for natural versus disturbed areas. The data indicated a direct correlation between disturbed areas with unmaintained roadways and lack of sediment and erosion control measures and the level of sediment entering the watershed.

Mr. Schueler gave a presentation on the different types of performance indicators for land based sources of pollution including: water quality indicators, physical/hydrological indicators, biological indicators, social indicators, program indicators and watershed indicators. He explained how indicators are useful in reporting the success of our management efforts and provided the group with the following characteristics of good performance measures. They are:

- Related to management actions
- Easy to count or measure
- Don't cost a fortune to collect
- Linked to resource quality (crabs, fish, coral)
- Can measure progress over time (years)
- Understandable to public and elected officials
- Can actually show a trend

Break-Out Session

Following the presentations, each jurisdiction broke out into groups and worked to develop performance indicators for the goals and objectives in their LAS and discuss how they would be measured. The following is a summary of what each jurisdiction reported to the group.

U.S. Virgin Islands

Objective 1 - Identify Non-Point Source Pollutants of Concern in Watershed

Indicators:

- Coral reef monitoring
- Sediment traps
- Percent of land based sediment in core samples
- Amount of sediment collected on a monthly basis in sediment traps –not much additional money needed
- Miles of unpaved roads and driveways (unpaved, graded, ungraded slopes)
- Number of earth change permits

Amount of pollutants in stormwater should be tested:
Regularly:

- Nutrients (nitrate, nitrite, NH3, phosphorous)
- Turbidity/total suspended solids
- Fecal coliform/e. coli

Less frequently:

- Heavy metals
- Pesticides/herbicides

Pollutants to be measured should be selected by watershed.

Objective 2 – Increase Use of Best Management Practices by Homeowners and Farmers

Indicators:

- Increase in the number of inspections of development projects
- Increase in the attendance at BMP demonstration workshops
- Increase in the number of demonstration projects implemented by watershed residents
- Increase in the number of homeowners adopting recommended practices
- Increase in the number of farmers adopting recommended practices

Criteria for selecting and prioritizing what indicators to measure will depend on:

1. Cost/Affordability
2. Existing Efforts
3. Meaningfulness
4. Human Resource Capacity
5. Ability to Link Economic Indicators
6. Importance of information that will result in influencing management decisions

Florida

1. Track implementation of each LAS
2. Identify the percent of diseased coral – data being collected now that shows diseased coral and the distribution of coral sponges
3. Get the information to public and elected officials using public service announcements
4. Number of beach closures in LAS would serve as an indicator and gets the attention of the public and decision makers

Puerto Rico

Puerto Rico has a Nutrient Management Plan for 500 acres in the Jobos Bay watershed where farmers were trained in BMPs. They now have five years of data from Jobos Bay and need to determine if fewer nutrients and sediment have entered Jobos Bay where the Nutrient Management Plan is in place.

Additional action items Puerto Rico identified included:

- Improve compliance with National Pollutant Discharge Elimination System (NPDES) permits
- Review the number of land clearing permits
- Enforce permit programs
- Determine if they have enough personnel to process the number of complaints received regarding land clearing permits
- Train government personnel (e.g., rangers) who will be enforcing the laws

Panel Discussion: Resources for Implementing the LAS

Following the breakout session a panel discussion was held regarding funding resources available to each jurisdiction. Ms. Allison Castellan, NOAA, Ms. Dana Wusinich-Mendez, NOAA, Mr. Chet Arnold, Nonpoint Education for Municipal Officials (NEMO), Mr. Craig Hooks, EPA, and Mr. Juan Martinez, USDA/NRCS (USDA/Natural Resources Conservation Service) all presented.

Ms. Castellan discussed the Coastal Non-Point Program Funding that funds jurisdictions' Coastal Management Programs (CMP). The funding is provided to decrease non-point sources of pollution and builds upon existing CMPs and water quality programs, addresses land-based sources of runoff and represents a comprehensive pollution prevention approach. Over the past four years, $10 million has been funded per year.

Ms. Wusinich-Mendez discussed funding that can support LAS's available via NOAA's Coral Reef Conservation Program, including:

1. State Territory Management Grants – money goes to state or territorial natural resource agency annually to support coral reef management priorities
2. Coral Reef Monitoring Grants
3. General Coral Reef Conservation Grants – for non-governmental organizations and academic institutions to support priority coral reef management initiatives
4. Fishery Management Council Grants
5. International Grants
6. Coral Reef Research

Additional information on this grant program is provided at http://www/coralreef.noaa.gov/grants.html

Ms. Wusinich-Mendez also mentioned the National Fish and Wildlife Foundation's (NFWF) Coral Reef Conservation fund as a potential source of LAS funding. This fund supports coral reef conservation projects proposed by U.S. or international non-profit organizations, academic institutions, and government agencies (except U.S. federal agencies). For more information visit: http://nfwf.org/programs/coralreef.html.

Mr. Arnold talked about the NEMo Program. NEMO provides information, education and assistance to land use decision makers. NEMO's educational programs address the relationship between land use and natural resource protection.

Mr. Hooks discussed available funding through EPA. Although there is no direct funding for coral reefs, grants are available for improving the coral reef ecosystem (e.g., coastal wetlands). Examples of relevant EPA grants programs include:

- Targeted Watershed Grants Program – funds up to 20 watersheds annually
- Water Quality Cooperative Agreements (CWA 104(b)(3)
- Non-Point Source Pollution Control Grants (CWA 319)

- Clean Water Act State Revolving Fund

Mr. Martinez discussed funding opportunities through USDA–NRCS. The Farm Bill of 2002 provides funding for farmers to meet environmental challenges on their land. Mr. Martinez also discussed several grant programs available for the management of natural resources.

Concurrent Training Sessions

Two concurrent training sessions (Training Session I and II) were held in the afternoon. Participants signed up for a training session of their choice, provided there was space available, prior to the workshop.

Training Session I was given by Mr. Tom Schueler from the Center for Watershed Protection (CWP) and addressed watershed management in island systems. Mr. Schueler offered a presentation on tools to protect watersheds on small islands and led several group discussions focusing on: watershed strategies for islands, adapting eight tools of watershed protection, site design, erosion and sediment control and stormwater practices. He acknowledged that island watersheds are unique and that existing tools for their management must be adapted. He also discussed the characteristics that make island watershed unique such as soil composition, impervious cover, terrain, development patterns and near-shore ecosystems. He emphasized special BMPs for roads. The session ended in a large group discussion on how to overcome existing barriers to the effective implementation of better practices. More information on CWPs efforts, training opportunities and useful materials for watershed managers can be found at www.cwp.org.

Training Session II was given by Mr. Chet Arnold from the NEMO Project. The overall goal of the training session was to explore the possibilities of Caribbean-based NEMO efforts that target coral reef protection. Mr. Arnold first provided the group with a general overview of the NEMO Project and National NEMO Network, which promotes natural resource-based land use planning and design to local land use decision makers. Discussions then focused more specifically on NEMO's educational approach, supporting research, geospatial tools and program partners. Mr. Arnold also gave specific examples of projects NEMO Programs have carried out. Finally, Mr. Arnold described the National Network, and how to develop a NEMO program and become a Network member. The workshop concluded with a discussion of the possibility of developing a Caribbean NEMO and how NEMO could be adapted to the particular landscape, land use system and natural resource issues of the Caribbean. More information about NEMO and the NEMO Network can be found at http://web.uconn.edu/nemo/index.htm.

Following the training sessions, participants regrouped for closing remarks.

Closing Remarks

After the training sessions, the LAS navigators from each jurisdiction gave brief closing remarks on how the information provided in the training sessions and the workshop as a whole will benefit their LAS efforts.

Florida

Presentations given and information gathered will help with monitoring techniques in Florida.

U.S. Virgin Islands

Overall USVI felt the workshop was valuable to make connections with people from the other jurisdictions as well as learning about the great initiatives taking place in Jamaica. They expressed interest in learning more about the specific projects that were presented by Ms. Thera Edwards and coming up with some similar initiatives for the USVI.

Puerto Rico

Puerto Rico stated that they would like to increase coordination with stakeholders and increase networking with academia and non-government organizations. There is a need to create ownership and pride amongst Puerto Ricans to improve the use of best management practices. Further, the jurisdiction wants to make information more user friendly so that scientists and decision makers are able to understand the information. How the information is delivered is important and needs to be taken into account with planning.

The workshop concluded at approximately 5:30 PM.

ATTACHMENT 1
AGENDA

ATTACHMENT 2
LIST OF PARTICIPANTS

ATTACHMENT 3
LIST OF APPLICABLE INTERNATIONAL AGREEMENTS

Relation of the Local Area Strategies to International Agreements in the Caribbean Region

Provided by Mr. Patrick Cotter, U.S. EPA

Applicability of Land Based Pollution LAS Efforts to International Agreements

Coral reefs are valuable to local biodiversity and local economies. LASs have been developed by the state of Florida, the Commonwealth of Puerto Rico and the Territory of the U.S. Virgin Islands, which specifically address the need to protect coral reef resources from the impacts of land-based sources of pollution. The LASs will be implemented to support local and national efforts to control land-based sources of pollution through sound science, assessment of monitoring results, and environmental management decisions.

In a larger context, the U.S. and other countries in the Gulf of Mexico and wider Caribbean region support using the watershed approach to protect coral reefs from land-based sources of pollution. Conventions and international agreements are effective instruments to help coastal resource managers in U.S. federal agencies, states, territories, and tribes to work with their colleagues throughout the region. As the LASs are put into practice, U.S. leadership and collaboration in the implementation of the following international agreements will be supported:

- Convention for the Protection and Development of the Marine Environment of the Wider Caribbean (Cartagena Convention)
- Protocol to the Cartegena Convention Concerning Pollution from Land-Based Sources and Activities (LBS Protocol)
- Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities (GPA)
- International Coral Reef Intitiative (ICRI)
- White Water to Blue Water Partnership Initiative (WW2BW)