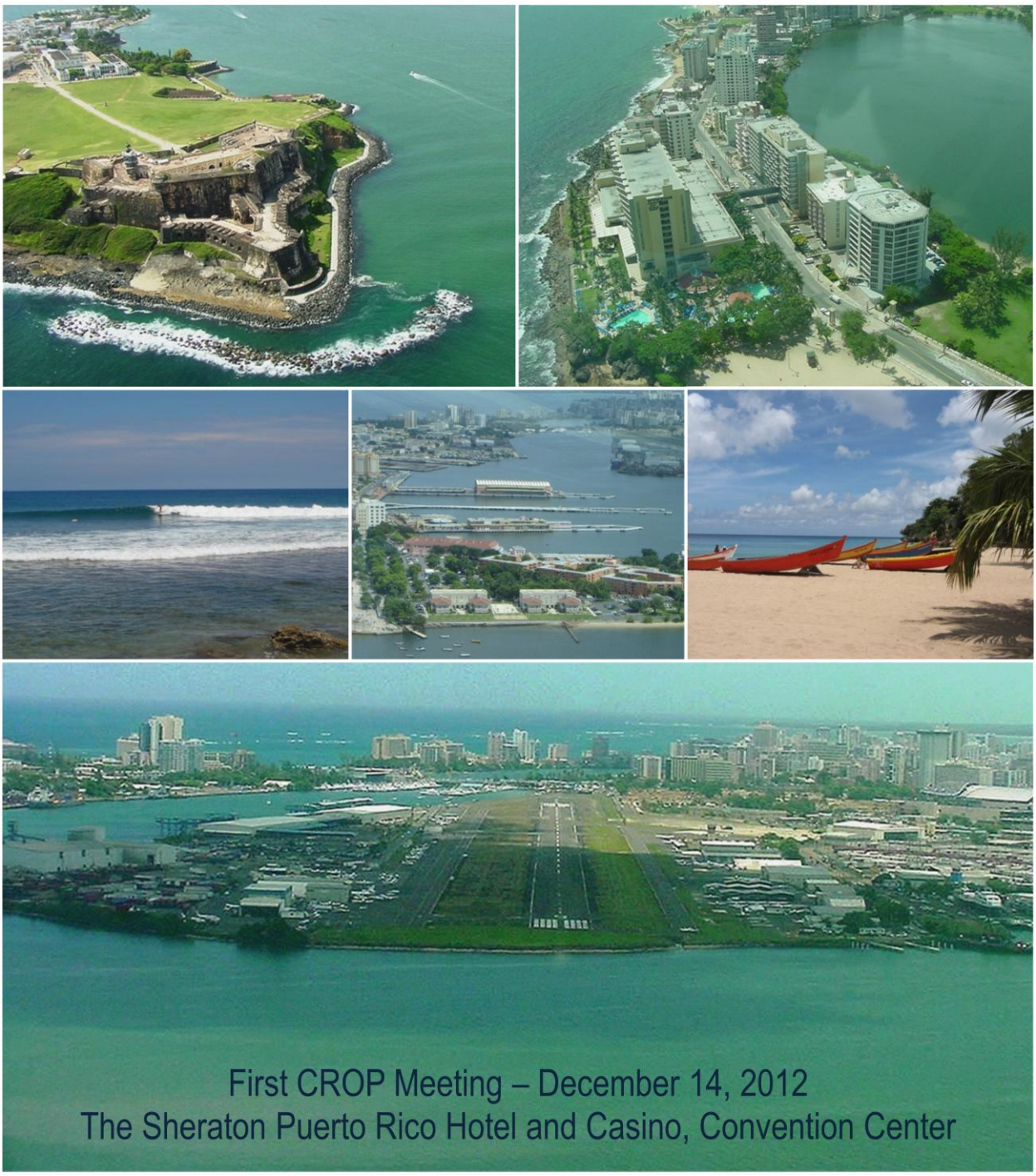
CARIBBEAN REGIONAL OCEAN PARTNERSHIP



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Agenda
Caribbean Regional Ocean Partnership (CROP), First Meeting
December 14, 2012 (9:00 a.m. – 4:30 p.m.)
The Sheraton Puerto Rico Hotel and Casino, Convention Center

Meeting Objectives:

- Introduce the recently established collaborative agreement between Puerto Rico and the U.S. Virgin Islands to stakeholders and partners in Puerto Rico
- Provide the forum for discussion of multi-jurisdictional Coastal and Marine Spatial Planning (CMSP).
- Identify areas of shared responsibility and increased cooperation across Commonwealth and federal agencies, governments, communities and relevant stakeholders through the Caribbean Regional Ocean Partnership.
- Address current issues, concerns and recommendations of stakeholders and coastal resource users.

Meeting Leader: Ernesto L. Díaz
Director Coastal Zone Management Program
Department of Natural and Environmental Resources (DNER)

Facilitador: Aurora M. Justiniano Santos, PhD.
Caribbean Regional Ocean Partnership Coordinator

TIME SCHEDULE	ACTIVITY	ROOM
9:00 a.m. – 9:40 a.m.	Registration and Breakfast	Bahía
9:40 a.m. – 9:45 a.m. Daniel J. Galán Kercadó (DNER)	Welcome Remarks	Bahía
9:45 a.m. – 10:00 p.m. Edwin Almodovar (NRCS)	Caribbean Regional Planning Body	Bahía
10:00 a.m. – 10:45 a.m. Dr. Máximo Cerame-Vivas	Acknowledging Coastal and Marine Ecosystem Services: Past, Current and Future Uses	Bahía
10:45 a.m. – 11:00 a.m.	Morning Coffee Break	
11:00 a.m. – 11:45 a.m. Ernesto L. Díaz (DNER)	Coastal and Marine Spatial Planning in the Caribbean	Bahía
11:45 a.m. – 12:45 p.m.	Lunch	Bahía
12:45 p.m. – 1:00 p.m. Aaron Hutchins (TNC)	Forging Partnerships for Regional Conservation	Bahía
1:00 p.m. – 2:45 p.m.	Round Table Discussion	Bahía
2:45 p.m. – 3:00 p.m.	Afternoon Coffee Break	
3:00 p.m. – 4:30 p.m.	Stakeholders Reports Concerns & Recommendations	Bahía
4:30 p.m. Ernesto L. Díaz	Closing Remarks	Bahía

NAMES	AGENCIES/ORGANIZATIONS
Daniel J. Galán Kercadó	Department of Natural and Environmental Resources
Ernesto L. Díaz	Department of Natural and Environmental Resources
Máximo Cerame-Vivas	Keynote Speaker
José F. Ortiz Vázquez	Aqueduct and Sewer Authority
Josué A. Colón Ortiz	Electric Power Authority
Kenneth Cariño	Electric Power Authority (Environmental Protection)
Juan Carlos Galarza	Energy Affairs Administration
Milagros Rodríguez Castro	Puerto Rico Ports Authority
Frederick Muhlach Santos	Land Administration and Land Authority
Hilda Ortiz	Tourism Company of Puerto Rico
José Juan Terrasa	Tourism Company of Puerto Rico
Neftalí Soto Santiago	Department of Agriculture
Rubén A. Hernández Gregorat	Department of Transportation
Juan Vera	Institute of Puerto Rican Culture
Laura Del Olmo	Institute of Puerto Rican Culture
Ángel Meléndez	Environmental Quality Board
Lisbeth San Miguel	Environmental Quality Board
Rubén Flores Marzán	Planning Board
Edwin Irizarry Lugo	Office of Permits Management
Héctor Pesquera	Puerto Rico Police Department
Edwin Almodovar	Natural Resource Conservation Services
David Cuevas-Miranda	Environmental Protection Agency
Carlos A. Rubio Cancela	Commonwealth Historic Preservation Office
Sindulfo Castillo	U.S. Army Corps of Engineers
Ramón Rosario Cortes	Homeland Security
Commander David Berliner	U.S. Coast Guard
Clery Morales Rodriguez	U.S. Department of Agriculture
Susan Silander	U.S. Fish and Wildlife Service
Graciela García-Moliner	NOAA Caribbean Fishery Management Council
Fernando L. Pagés	Tetra Tech, Inc.
Edwin Omar Rodriguez	Tetra Tech, Inc.
Vance Vicente	Vicente and Associates
Eugenio Piñero Soler	Caribbean Fishery Management Council
Edwin Muñiz	U.S. Fish and Wildlife Service
Marelisa Rivera	U.S. Fish and Wildlife Service
Lisamarie Carruba	NOAA National Marine Fisheries Service
Glenis Padilla	NOAA National Marine Fisheries Service
José A. Rivera	NOAA National Marine Fisheries Service
Roberto Varela Betancourt	Puerto Rico Hotel & Tourism Association
Jorge Bauzá	San Juan Bay Estuary
Julio Morell	Caribbean Regional Association
Ruperto Chaparro	Sea Grant, University of PR-Mayagüez
Antares Ramos Álvarez	NOAA Office of Ocean & Coastal Resource Management
Aaron Hutchins	The Nature Conservancy
Raimundo Espinoza	The Nature Conservancy

CROP GOALS AND OBJECTIVES

The Caribbean Regional Ocean Partnership (CROP) was created in May 2012 through a Memorandum of Understanding signed by the Governors of Puerto Rico and U.S. Virgin Islands. The CROP aims to establish mechanisms that will improve regional collaboration on ocean management in order to reduce user conflicts, improve cohesive regional planning, and support healthy communities and ecosystems for present and future generations. A framework for an ecosystem-based management approach will address cumulative effects from anthropogenic activities to ensure the protection, integrity, maintenance, resilience, and restoration of ocean and Coastal Caribbean ecosystems, while promoting multiple uses.

MAIN OBJECTIVES

1. Facilitate the establishment and implementation of the Caribbean Regional Ocean Partnership.
2. Foster effective communication and collaboration between coastal and marine resource users.
3. Identify sustainable funding options for CMSP and a Caribbean Regional Ocean Partnership.
4. Improve collaboration between regional CMSP data managers.

INTRODUCTION

In June 2009, President Obama created the Interagency Ocean Policy Task Force with the main objective to fulfill the United Sates responsibilities to support sustainable and productive uses of the ocean, the coasts, and the Great Lakes. The Task Force was established to promote compatibility among different uses, avoid conflicts and reduce environmental impacts by an implementation strategy that identifies nine priorities, including Coastal and Marine Spatial Planning (CMSP). The Ocean Policy Task Force defines CMSP as *a comprehensive, adaptive, integrated, ecosystem-based, and transparent planning process based on sound science, for analyzing current and anticipated uses of the coastal areas* (Final Recommendations of the Interagency Ocean Policy Task Force, 2010). Through CMSP, areas suitable for different types of activities are identified to facilitate compatible uses, reduce conflicts among users and preserve critical ecosystem services to meet economic, environmental, security, and social objectives.

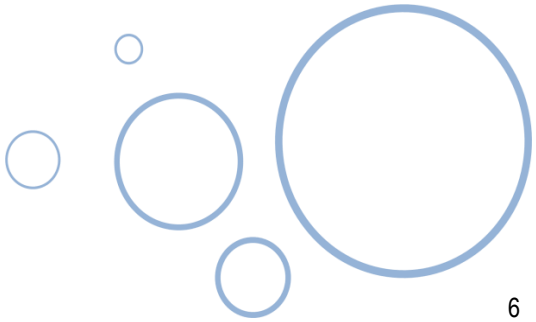
In Puerto Rico the lead agency for the implementation of a Costal and Marine Spatial Planning Program is the Department of Natural and Environmental Resources (DNER) through its Coastal Management Division. The main vision of this program in Puerto Rico is to achieve a safe, healthy, productive, sustainable, and resilient coastal social, economic, and ecological systems. To achieve this vision new initiatives are required. Specifically, the planning and policy implementation processes demand frequent engagement and collaboration of relevant stakeholders, the scientific community and the general public. Costal and Marine Spatial Planning requires effective Commonwealth and federal coordination as well as stakeholder involvement to successfully balance the different demands of coastal resource use, economic development, and conservation. By improving stakeholder involvement CMSP provides a transparent mechanism in which the interests of different sectors can be represented.

In June 2011, the Puerto Rico DNER's Coastal Management Division developed an Assessment and Strategy document in agreement with Section 309 of the Coastal Zone Management Act (CZMA). The Puerto Rico Coastal Management Program (PRCMP) Section 309 strategy was developed based on information generated at the DNER's Coastal Management Division, information provided by Federal and Commonwealth agencies and information provided by the general public. The strategies focus on priority areas that pursue work on the interrelationship between coastal hazards, wetlands protection and management, and coastal and marine spatial planning. The mission behind a coordinated CMSP is to contribute to sustainable development while simultaneously enhancing coastal ecosystems. The Coastal and Marine Spatial Planning program in Puerto Rico

proposes marine ecosystem identification, evaluation, and space allocation that can be adapted for use by stakeholders and governmental agencies. The program plans to minimize adverse impacts in proposed coastal and marine uses and activities by facilitating permit evaluation process, minimizing stakeholder conflicts and promoting economic sustainability (Puerto Rico Coastal Management Program, 2010).

One of the proposed strategies in Coastal and Marine Spatial Panning is to strengthen partnerships in order to promote coastal adaptation and resiliency. Through a Memorandum of Understanding between the Government of Puerto Rico and the Government of the U.S. Virgin Islands (USVI) it was agreed to advance a CMSP program in alignment with the U.S. Ocean Policy Task. Through this agreement a Caribbean Regional Ocean Partnership Program (CROP) was created to plan and identify multiple usages of coastal areas that are economically efficient for development and ecologically less vulnerable to impacts. The agreement is a collaborative process that plans on taking a comprehensive look at shared marine regions in an effort to reduce conflicts between users and to protect the health of the coasts. The Partnership will work to understand the available information and to use technical tools into the decision making process as they build the capacity for multi-jurisdictional marine spatial planning. The Caribbean Regional Ocean Partnership will focus on protecting marine biodiversity and confronting the emerging threats of climate change, habitat loss, overfishing, and land-based sources of pollution.

This document provides a general view of past and current trends in coastal issues in Puerto Rico as well as in other parts of the world. We also present some of the challenges encountered by coastal zone managers, stakeholders, communities and other decision-makers.



COASTAL AND MARINE SPATIAL PLANNING – OVERVIEW

In Puerto Rico more than half of the population (56%) lives along the shoreline. This high density of coastal population may have negative effects on a region by damaging habitats, causing erosion of coastlines, polluting coastal waters and altering marine ecosystems as well as increasing vulnerabilities to coastal hazards. Effective management of coastal and marine areas requires a balance between reasonable human use and maintaining the area's natural and cultural integrity. In 1972 with the passing of the Coastal Zone Management Act (CZMA), the U.S. Congress recognized the importance of addressing the challenge of continued population growth in coastal zones and encouraged coastal states to develop coastal zone management plans. Since 1972 various coastal and marine issues and trends have been identified. In the West Coast of the United States, planning strategies are recognizing the importance of the connections between ecosystems and the communities that depend on the coastal environment. This type of management, known as ecosystem-based management (EBM), takes into consideration the people and institutions with an interest in coastal resources and their relationships with a particular ecosystem area. While other management programs have failed to include all the stakeholders such as fishermen, business owners, coastal residents or relevant governmental agencies, community-based EBM considers the full range of connections between humans and their coastal environment (West Coast Ecosystem-Based Management Network, 2010).

Regions such as the Philippines, Southeast Asia and Ecuador are also using a community-based coastal management process where local communities are involved in managing the coastal resources upon which they depend. Under their approach, communities managing the resources have legal rights and economic incentives to take responsibility for the frequent use of these resources (Samarakoon, J. et al, 2011). Another CMSP approach that has been applied in some areas such as the Caribbean is the collaborative management program or co-management. Co-management strategies involve Federal, State, local and tribal governments as well as diverse stakeholders in sharing the responsibility for management and stewardship. The government collaborates with communities and resource users to distribute responsibilities for implementing coastal resource management measures. It represents a joint management arrangement between government, communities and other important stakeholders. Other countries like Australia are using a multiple-use zoning approach in areas such as the Great Barrier Reef Marine Park. Zoning is defined as a planning scheme that allows certain activities to occur in specified areas but recognizes that other incompatible activities should only occur in specially designated areas. Zoning focuses on separating conflicting uses and maintaining ecologically valuable areas by providing high levels of protection for specific zones while allowing reasonable uses to continue in other (Great Barrier Reef Marine Park Authority, 2003).

However, despite national, regional and global efforts, some approaches to coastal and marine resources management are not always successful at achieving sustainability. As a result, coastal resources and coastal environments are being rapidly degraded in many regions of the world. Management of coastal zones requires a holistic approach which involves developing a multi-sector management program where all stakeholders and pertinent government agencies are involved. Coastal and marine environments are dynamic systems that are constantly changing due to both natural and human causes and therefore management of any marine area cannot remain static and must similarly adapt. Today, new and emerging initiatives are being used to develop CMSP incorporating social, cultural, economical, and ecological values. Different forms of management such as community-based and co-management have evolved to what is called Integrated Coastal Zone Management (ICZM). During the United Nations Conference on Environment and Development (UNCED) at Rio de Janeiro (1992) the concept of ICZM was defined by understanding the oceans, the seas and adjacent coastal areas as an integrated whole (UNCED, 1992). Integrated Coastal Zone Management is widely employed today as a process that attempts to achieve sustainability by managing the coast using all aspects of the coastal zone, including cultural, geographical and political boundaries. The ICZM is seen as an adaptive, multi-sectorial approach, which attempts a balanced development, use and protection of coastal environments. It is an interdisciplinary method focused on problem definition and solutions of the coastal zone.

In 2012 the United Nations hosted *Rio +20 Conference on Sustainable Development* marking the 20th anniversary of the 1992 Rio Conference on Environment and Development. Rio +20 focused on sustainable development in terms of economic and social development and environmental protection for seven areas of high priority, including the oceans. The importance of oceans in a sustainable development is widely recognized and oceans, seas, and coastal areas are seen as an integrated and essential component of the Earth's ecosystem. Oceans make up 72% of the Earth's surface and represent a natural resource for traveling, tourism, mining, telecommunication, trade and transportation among others. They also provide food and other vital resources that are a critical constituent of the economic prosperity of many developing countries. The importance of a thoughtful management of the world's oceans, coastal and marine spaces was recognized during Rio +20 as a key aspect of a sustainable future (United Nations, 2012).

From a scientific perspective it has been observed that the most effective strategy for conservation and management of coastal resources is through an integrated ecosystem-based approach where the entire ecosystem, including humans, is considered as an integrated part of the system. This management process seeks to maintain the ecosystem in a healthy and resilient condition so that it can provide the services humans need. Ecosystem-level planning also involves stakeholders and takes into account the increasing impacts of multiple human activities on ecosystems, as well as the effects of environmental changes.

A successful and sustainable management of coastal and marine areas and resources requires a coordinated multi-sector approach that takes into consideration the needs and potential impacts of complementary and competing uses such as aquaculture, fishing, recreation, energy, shipping and tourism. A combined effort of government, non-governmental agencies, communities and other relevant stakeholders is essential for effective coastal management. Coastal and Marine Spatial Management should therefore be conducted in a way that involves and benefits all those who depend on the resources of coastal areas and should be integrated in content and protective in nature.

Human activities have affected and altered the ocean environments world-wide and the intensity of maritime uses have increased dramatically and will continue to increase in the future. Coastal communities and associated environments are increasingly facing anthropological and natural alterations. Threats such as coastal flooding are changing lives, communities, and local economies. Damage to maritime and coastal infrastructure aggravates in places where ecosystems are not healthy and are not being used correctly. Coastal management programs must consider all past and current threats and adapt to changing settings in coastal areas. In the next section we discuss the historic, current and potential uses of the coastal and marine spaces and their resources. We also provide an overview of the challenges and success of coastal and marine spatial planning regarding the different uses of the coastal spaces. As part of the Puerto Rico CMSP effort we have initially divided coastal and marine uses and activities into twelve (12) categories.

USES AND ACTIVITIES OF COASTAL AREA AND RESOURCES

COASTAL PLANNING AND DEVELOPMENT

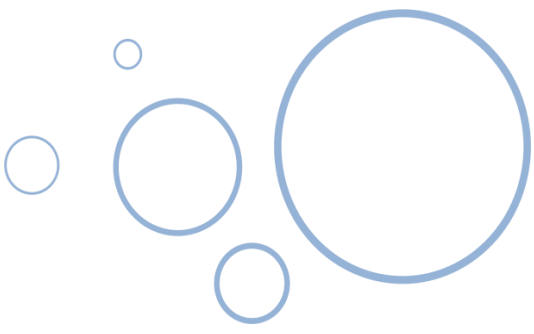
The island of Puerto Rico is densely populated and highly developed along its shoreline and coastal areas. According to the 2010 Census, 56% of the island's population lives in coastal areas (2,317,189 people). Critical infrastructure such as ports, airports, roads, power plants, waste water treatment plants and industrial parks are constructed within 1 Km of the coast. Deforestation in the upper areas of watersheds, increasing urbanization, poorly constructed or maintained infrastructure and impervious surfaces are threatening Puerto Rico's coastal ecosystems. Coastal managers and decision-makers need to evaluate the implications of land-use changes, coastal development pressures, land-based sources of pollution and increased resource use. A balance between anthropogenic needs and environmental health is necessary for the preservation of coastal spaces and resources, while assuring economic and socio-cultural necessities.

In Puerto Rico, the Department of Natural and Environmental Resources (DNER) through the Coastal Zone Management Program (CZMP) provides guidance for the protection, conservation and restoration of coastal ecosystems such as submerged lands, intertidal wetlands, and reef systems. The CZMP (1978) has defined Special Planning Areas (SPA) as "*important coastal resource areas subject to serious present or potential use conflicts, and, therefore, requiring detailed planning*". Special Planning Areas management plans provide guidance for public and private development by identifying the best management practices for each land use category. Management plans may also include recommendations for new natural reserve designations or boundary changes of existing SPAs. Some of the conflicts encountered by the CZMP in SPA are boundaries definition of proposed natural reserves, urban development, shoreline erosion, negligent recreational navigation coastal waters, pollution and sedimentation, among other. While the DNER through the CZMP is the lead agency for planning and managing the maritime zone, the Puerto Rico Planning Board (PRPB) is the lead agency for activities related to land use planning. The Office of Permits Management (OGPe, Spanish acronym) is the lead agency that evaluates, approves or rejects site consultations and makes final determinations regarding consultations and certifications related to coastal lands development.

New trends are emerging worldwide in coastal zone planning favouring a comprehensive, multi-sector approach that incorporates integration and cooperation of different coastal resources users and the involvement of local people in decision-making. Other effective tools such as remote sensing or geographic information system (GIS) techniques greatly improve planners and managers capabilities, therefore creating a dynamic and adaptive planning

process. The advantage of using remote sensing and GIS technologies is the ability to gather data sets for large or inaccessible areas in short time. Incorporating information obtained through remote sensing and GIS analysis as part of regional coastal planning has proven to improve the ability to protect coastal areas and resources.

In summary, coastal areas are facing the pressures from land use change and development activities that are threatening the components of these fragile ecosystems. There is a need to recognize the ecological uniqueness and particular value of the coastal and marine zone resources. Coastal Zone Management sustainability strategies focus in preserving the ecological health of the coastal areas, protecting the biological diversity while fulfilling economic as well as development and cultural needs. Today, the basic foundation in coastal planning is to use different and effective management approaches to avoid natural and anthropogenic impacts to coastal and marine spaces and resources through the promotion of sustainable and best use practices.



TOURISM AND RECREATION

Tourism is one of the largest industries in the world and in most of the cases, tourism is environmentally dependent. In 2011 nearly 4.2 million tourists visited Puerto Rico spending a total of $3,142,800,000, which represents 7 percent of the island's gross national production (Economic Report to the Governor, 2011). Most visitors are attracted to the island's coastal spaces and resources. Recreation activities such as fishing, swimming, diving, surfing, wind-surfing, jet skiing and snorkeling have increased in volume and number during the last decade and coastal areas are among the most visited by tourists in Puerto Rico. This trend has triggered an increase in construction of tourism facilities and urban development along coastal zones. During recent decades there has been more demand for space in coastal lands to build second homes and tourism related facilities. However, inadequately planned tourism and urban construction may impact local coastal communities. Rapid tourism development may contribute to contamination and degradation of marine environments through inadequate used water waste systems and sedimentation, loss of habitats and lack of environmental awareness by visitors. To accomplish sustainable tourism a balanced should be achieved between coastal resource use and a healthy environment.

The Puerto Rico Tourism Company is the lead agency responsible for promoting and developing the tourism industry. The agency has the responsibility of making recommendations for the development of tourism projects and overseeing the public policy for the sustainable development of tourism. Other agencies involved in tourism and recreation in Puerto Rico are the National Parks Company which administers recreational areas in the coasts and the DNER which has the responsibility of establishing and administering recreational areas.

One of the major challenges in coastal tourism management is to develop coastal tourism strategies that will not affect the quality of the natural resources. It is important to minimize tourism-induced problems and secure the sustainability of the tourism industry as well as the coastal resources. Coastal tourism management needs to include participation and integration of various stakeholders including community and local political leadership to ensure a productive consensus. Many tourism directors recognize Integrated Coastal Zone Management (ICZM) as a strong planning tool towards the sustainable development of coastal tourism. ICZM is based on a comprehensive understanding of the relationships between coastal resources, their uses, and the impacts of development on the socio-economic necessities and the environment.

Coastal tourism is one of the fastest growing industries in the Caribbean and world-wide. Caribbean countries are highly dependent in coastal tourism. Puerto Rico's goal is also projecting to increase the contribution of tourism to its Gross National Product. Maintaining a healthy coastal and marine ecosystem is vital for the sustainability of coastal tourism. Coastal managers, tourism companies and other stakeholders need to focus their efforts on an integrated approach to balance the economic needs of the tourism industry and the protection and conservation of a healthy marine environment. There is a wide recognition of the importance to promote tourism that supports the economic and social needs by establishing coastal areas with maximum potential for tourism related uses without affecting the natural environment.

FISHERIES AND AQUACULTURE

The United Nations Conference of Sustainable Development reported that by 2008, fish provided 3 billion people with more that 10 percent of their animal protein. At the same time, fish and aquatic plant sales reached 106 billion dollars while the fisheries industry provided income for nearly 540 million people especially in developing parts of the world (United Nations, 2012). In 2010, world commercial fishery landings and aquaculture production were approximately148.5 million metric tons (Current Fishery Statistics No. 2011). However, increased commercial and recreational fisheries activities represent a growing threat to marine ecosystems, driving the need to implement legislation for the conservation and sustainable management of these marine resources. The primary Federal legislation that governs the management for marine fisheries in the United States and Puerto Rico is The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), which provides for the conservation and management of fishery resources within the U.S. Exclusive Economic Zone (EEZ). The Magnuson-Stevens Act aids in the management of fisheries, promotes the conservation and rebuilding of overfished fisheries and protects Essential Fish Habitat (EFH), which are necessary for the spawning, breeding, feeding or growth of fish.

In Puerto Rico, The Department of Natural and Environmental Resources administer the fisheries in Puerto Rico jurisdictional waters through the Fishing Regulation of Puerto Rico pursuant to the dispositions of *The Department of Natural and Environmental Resources Organic Act*; *The Uniform Administrative Procedure Act*; and *The Fisheries Law of Puerto Rico*. The Department of Natural and Environmental Resources formulates the regulations with the authority to promote conservation and management of the fishery resources based on the necessities of Puerto Rico's communities.

Most of the commercial fishery in the island is conducted at a local small-scale, mainly in coastal habitats and over the insular shelf. Some of the species most commonly caught are dolphinfish, yellowtail snapper, silk snapper, and lane snapper, while the largest harvests by weight tends to be dolphinfish or king mackerel among others. Meanwhile, Puerto Rico supports a large and diverse marine recreational fishery which targets different species including many reef fish species. Most of the recreational fishery trips are made by anglers using private boats or charters and primarily concentrates on the fishery of the common dolphinfish. Both commercial and recreational fishing practices in Puerto Rico have caused environmental impacts due to overfishing. Management strategies for a sustainable use of fishery resources should include identification and conservation of essential fish habitats, fishery monitoring

programs, conservation practices as well as the implementation of education programs that promote public and community awareness.

Marine fish aquaculture has also decreased in Puerto Rico in the last decades. This reduction has been associated permit requirements driving investors to move to other countries. Other conflicts encountered by the marine aquaculture industry are related to commercial fishermen facing requirements for the same space or price difference between commercial fisheries and aquaculture products. The DNER's CZMP supports the formulation, administration, and effective implementation of strategic plans for marine aquaculture in Puerto Rico. Some issues being addressed by the CZMP's strategic plan are regulations and policies, mapping, program guidance, outreach and education. In terms of regulations, The Puerto Rico Planning Board specifies zoning districts or locations where culture of fish could be promoted to encourage development of aquaculture projects. The CZMP recognizes the need to produce more complete bathymetric and habitat maps. Also, the program looks to evaluate the emerging issues surrounding aquaculture programs, and a more careful monitoring of ornamental fish imports and exports as well as the monitoring of exotic-invasive species in Puerto Rico. There is a need to develop aquaculture projects that minimize impacts to coral reef ecosystems, fishery stocks, and existing fishing communities.

Throughout history, fisheries have provided food, income, and employment to coastal communities around the world and in Puerto Rico. However, the deterioration of water quality, the destruction of essential fish habitats and the declining health of fish stocks have prompted the evaluation of the existing management programs. It is necessary to implement management programs that ensure long-term viability of the fisheries industry and that protect fish stocks, water quality and conservation of marine ecosystems.

WATER QUALITY

Water quality conservation is vital for the sustainable development of Puerto Rico. Coastal waters resources are affected by land-based sources of pollution and marine debris threatening the oceans, coastal ecosystems, our economy, and human health. According to the PRCZMP Marine Debris Assessment of Section 309, 80% of marine debris in Puerto Rico is land-based generated. Poor land use practices and deforestation in the upper areas of watersheds have contributed to soil erosion that carries large sedimentation loads into water bodies affecting the quality of the water. Also, sewage and solid waste disposal have been a major problem affecting the coastal and marine water quality in Puerto Rico. The absence of incentives to improve waste management practices has resulted in adverse effects on coastal ecosystems and water resources. Management and disposal practices of solid waste in Puerto Rico are challenged by the limited disposal area available and most solid wastes ends up in one of the island's 32 landfills, many of which need to improve their operations in order to comply with Federal and Commonwealth regulations.

The quality of coastal and marine waters in Puerto Rico is also affected by agricultural practices, land development, contamination by point-source discharges and storm wash-off of metals, pesticides, pathogens or other products from urban areas. A comprehensive solid waste management plan that includes a reduction in solid waste generation, increase recycling and promotes efficiently managed landfills is needed in order to preserve the coastal and marine environments. The main agencies responsible for solid waste management in Puerto Rico are the Solid Waste Authority, the Environmental Quality Board, and the municipalities. DNER's Regional Offices are responsible for beach maintenance. The Puerto Rico Aqueducts and Sewer Authority is the agency responsible for providing drinking water and to manage sanitary sewers and wastewater treatment plants.

To achieve a successful management of coastal water resources, solid waste management and marine debris control needs to be improved. It is important to reduce sources of marine debris in the coastal zone by implementing recycling practices as well as controlling land based and vessel generated debris through reduction programs, promotion of more rigorous research, monitoring and enforcement. Also, local communities and voluntary organizations play an active role in solid wastes control. Voluntary groups are constantly working in beach cleanups, collecting solid waste from beaches, lakes, and other waterways. There is a need to effectively reduce the volume of marine debris through active participation of Commonwealth and Federal agencies, coastal municipalities and the multiple stakeholders that use and depend on coastal and marine areas and resources. The Caribbean Regional Ocean Partnership and the Coastal and Marine Spatial Planning programs will pursue this initiative to ensure that the different community-based uses of coastal and marine waters are acknowledged and protected.

ENERGY

Most of the energy exploration, production, and transport take place along the coast. The coastal and marine environments offer several options for renewable energy sources and coastal countries recognize the need of developing energy facilities in their coastal regions. Benefits such as energy self sufficiency, cleaner power sources and lower energy costs may arise from the exploration, development, production and transportation of energy resources in coastal areas. Electric power generating plants, facilities for treatment or storage of liquefied natural gas, wave energy facilities or wind turbines are some examples of the types of energy facilities that have been or can be located in coastal areas. However, coastal regions are already under significant pressure from a multiplicity of human activities. The impacts of energy development must be considered as a factor adding to those existing pressures. Coastal Zone Management Programs must consider the effects on the benthic and pelagic habitats from marine energy facilities and should identify potential monitoring and mitigation strategies. To address energy requirements, coastal management programs need to balance energy facilities sitting and other coastal dependent activities such as fishing, navigation, tourism and recreation. However, planning for coastal energy facilities can be challenging due to Federal and Commonwealth regulations, lack of available information and community or environmental groups' opposition.

Electric power generation in Puerto Rico is highly dependent on foreign oil imports. There are two power generating plants that use coal and natural gas, while renewable energy sources such as wind and solar are just emerging. A study from the University of Puerto Rico (Mayagüez) for the Puerto Rico's Renewable Energy Portfolio (2008) report that ocean waves have great potential for energy production. The study concluded that waves represent the largest, naturally produced, untapped energy resource for Puerto Rico. Offshore wind farms are also known to offer a high potential of electricity production in Puerto Rico. The study found that the two identified areas, the east coast (1,920 km^2) and south coast (825 km^2), can result in a total installed wind capacity of 13,725 MW. Worldwide wind generation has proven to be one of the most cost effective of the renewable generation options. However, wind-farm projects are frequently challenged environmental groups for the effect they might have on some animal species. Another promising alternative energy resource is Ocean Thermal Energy Conversion (OTEC). Through OTEC, solar radiation is converted to electric power using the ocean's natural thermal gradient. The OTEC technology converts the difference between warm surface waters and deep cold waters into mechanical and electrical energy. Other technologies that need to be explored include ocean wave energy technologies such as Land Installed Marine Powered Energy Transformer (LIMPET) and Pelamis.

Several agencies use coastal and marine spaces for managing the energy requirements of Puerto Rico. The Puerto Rico Energy Affairs Administration (PREAA), the Puerto Rico Electric Power Authority (PREPA), and the Puerto Rico Aqueducts and Sewer Authority (PRASA) play an important role in the development of Puerto Rico's infrastructure. The PREAA is in charge of implementing the public policy for the development of alternate and renewable sources of energy and programs related with the management, use, protection, and conservation of Puerto Rico's energy resources. There are six major power plants located in Puerto Rico's coastal zone, three located on the north coast (San Juan, Palo Seco, Cambalache) and three on the south coast (Guayanilla, Guayama and Salinas). In terms of renewable energy sources, four major wind power facilities have been proposed or are currently under construction for development at Guayanilla, Santa Isabel, Arecibo, and Naguabo and the Government is also considering the construction of waste-to-energy facilities to be built on the north coast of Puerto Rico.

Puerto Rico has a population of 3.7 million people and the electricity consumption is approximately 19.2 billion kWh (2010). The island has abundant renewable energy resources, such as solar, wind and ocean and therefore an effort should be made to integrate these renewable resources into the electric power generation and transmission system. The renewable energy potential is available and coastal managers need to identify areas where these technologies might operate without damaging the coastal environment or affecting other coastal dependent activities.

NAVIGATION

Marine transportation is an essential component of the global economy. Approximately 90-95 percent of the world trade is conducted by ships. Shipment of crude oil, petroleum products and gas, food and other materials are transported through different maritime routes. The U.S. Coast Guard (USCG) estimates that approximately 3,000 vessels arrive to Puerto Rico and the U.S. Virgin Islands annually. While operating in U.S. waters, these vessels are subjected to U.S. and International laws and regulations. In Puerto Rico, both Federal and Commonwealth agencies have regulatory and administrative responsibilities in navigation related matters. The administration of the maritime terrestrial zone, navigable waters and submerged lands within port areas are the responsibility of the DNER and the Puerto Rico's Ports Authority (PRPA). The PRPA has jurisdiction over ports, public docks and navigable waters that are part of harbors. Also, the PRPA regulates submerged land and water under docks and harbor areas, as well as buildings over harbors that are under the control of the Government of Puerto Rico. Other issues concerning transportation, security, maintenance, and development of instruments for navigation are the responsibility of the USCG, the U.S. Army Corps of Engineers (USACE) and the National Oceanic and Atmospheric Administration (NOAA). The USCG is responsible of conducting commercial U.S. vessel inspections to ensure the safety of commercial vessels in the ports of Puerto Rico. It also conducts state ports control examinations, provides documentation and licensing services to U.S. Merchant Mariners and controls shipping and port installation activities.

Technical support and cartographic, hydrographic, and oceanographic information that allows for safe navigation in Puerto Rico and U.S. waters is provided by NOAA. The agency is also responsible of preparing nautical charts used for commercial, recreational, and military navigation. NOAA works directly with pilots, mariners, port authorities and recreational boaters.

The Department of Natural and Environmental Resources (DNER) through the Office of the Navigation Commissioner is responsible for the registration and numbering of vessels in Puerto Rico and monitoring aquatic safety. The DNER in coordination with the Puerto Rico Tourism Company is responsible for the promotion of tourism in Puerto Rico and regulates nautical tourism and activities related to yachts for tourism purposes. Through the "Puerto Rico Navigation and Aquatic Safety Act", the DNER also promotes safety for maritime and aquatic recreational practices in beaches, lakes, lagoons and other bodies of water. The Act also ensures the protection of the fauna, flora and other natural resources which could be affected by recreational activities. The DNER fosters the orderly use of bodies of water to stimulate commercial and recreational use of navigable of waters.

Management of navigation waters requires a safe, efficient, and navigable waterway system to support domestic commerce, international trade, and military requirements. Coastal managers and relevant stakeholders need to identify navigational challenges facing the marine transportation system as well as providing the services that promote a safe and efficient navigation system.

SAFETY AND SECURITY

Maritime security and surveillance are important for coastal countries as they have a special interest in law enforcement to protect their commerce and marine resources. The concept of coastal and marine safety involves military, civil, economic and environmental security and includes all necessary actions needed to identify and monitor activities in the maritime area. This requires a careful understanding of coastal and marine uses including transportation, marine resources and marine habitats. Multiple uses of the coastal and marine spaces create new challenges for maritime surveillance that need to be addressed by the different marine space users. Coastal and marine zone security includes the protection of communities and their natural environments from different types of threats such as oil spills, illegal fishing, trafficking or negligent recreational activities, among other.

In Puerto Rico, Commonwealth and Federal agencies are responsible of natural resource surveillance and civil safety. The conservation and protection of natural resources, territorial waters, submerged lands and the maritime-terrestrial zone fall under the DNER jurisdiction while The Office of the Navigation Commissioner is in charge of plan coordination efforts and preventive surveillance. The DNER Rangers Corps protects natural resources by implementing the laws and regulations administered by the agency such as the authority to board and search vessels, the endangered species laws, the Puerto Rico Navigation and the Aquatic Safety Act as well as those activities included as part of the NOAA – DNER Joint Enforcement Agreement.

The United States Coast Guard is in charge of marine environmental protection, port surveillance, defense of maritime areas and navigational security of recreational vessels. The USCG also enforces laws and regulations relative to national defense, narcotics operations, fisheries management, marine transportation, marine safety, maritime security and waterways management. The safety of citizens in territorial waters is the responsibility of the Puerto Rico Police Department (PRPD) through the Maritime Surveillance Units of the PRPD Joint Swift Action Team (FURA, Spanish acronym). The PRPD is also responsible for enforcing the laws administered by the Puerto Rico Police and other agencies, such as the DNER, for the protection of natural resources. Agencies such as USFWS, NOAA, and USACE also have enforcement officers responsible for implementing the laws administered by each of the agencies.

Effective monitoring of coastal waters requires increased cooperation between all the aforementioned agencies involved in maritime surveillance. Costal managers need to assess coastal and marine threat levels and take the necessary actions or precautions by identifying, prioritizing and managing the different risks of a coastal zone.

DREDGE AND FILL

There is a high demand for inland waterway developments, marinas, ports, navigation channels, and other engineering works in the coastal areas of Puerto Rico. The majority of the goods consumed, as well as construction products and materials are imported and brought by ship. Puerto Rico's ports handle large quantities of cargo entering or leaving the island. Navigation channels are economically vital for the local and regional sustainability and maintaining navigational depths of ports and harbors is crucial for the economic well-being of Puerto Rico. However, navigation channels are gradually filled by natural sedimentation processes and dredging is necessary to keep the waters navigable. It is estimated that approximately 6 million dollars are spent annually to drag or maintain navigation channels is Puerto Rico due to sedimentation problems. Dredging is also needed to create new navigation channels or to deepen the existing channels and berths, for recreational, safety or commercial navigation. Although dredging is necessary, a thorough analysis of the possible dredging methods and the appropriate places for the disposal of dredged material should be carried out. Care must be taken to ensure that the dredged material is placed in designated areas that will not harm the environment.

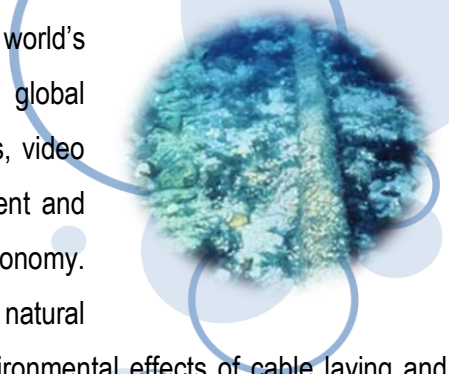
Several Federal and Commonwealth agencies have laws and regulations governing dredge and fill activities of Puerto Rico. Most of the dredging projects associated with federal navigation and military logistics are carried out by the U.S. Army Corps of Engineers (USACE). The USACE also has the responsibility of performing civil work projects, non-federal dredging activities, defense operations and national security infrastructure, while the Puerto Rico Planning Board has the authority to deny an endorsement of a permit for filling, dredging, and deposit of dredged sediments. Other agencies such as The Department of Natural and Environmental Resources (DNER) and the Environmental Quality Board (EQB) through the Erosion and Sedimentation Control Plan also have permit authorities related to dredging and filling activities.

The disposal of dredge material is regulated by The Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA). Under MPRSA the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (USACE) have different responsibilities pertaining dumping of material into ocean waters which cannot occur unless a permit from the pertinent agency is issued. The Clean Water Act (Section 404) also regulates discharge of dredged or fill material into waters and wetlands of the United States. Section 404 requires a permit for the discharge of dredged or fill material into navigable waters at specified disposal sites, including fill for development, water resource projects and infrastructure development. Under this Act, no dredge or fill material

should be discharged if other practicable alternative exists that is less damaging to wetlands, streams and other aquatic resources.

New channel developments and other coastal engineering projects have resulted in increased dredging and filling activities on coastal environments. Coastal zone managers need to coordinate with harbor authorities to ensure that the growth and efficiency of Puerto Rico's ports occurs in an environmentally sensitive manner. Managers should also consider potential adverse effects, both to humans and to the environment, which may result from dredging and from disposal and management of dredged material. Dredging should be avoided when dredged sediments are thought to be polluted as may be the case of sediments in cities and industrial areas that are often contaminated with pollutants introduced to waterways from point and non-point sources of pollution. Governmental agencies as well as other interested stakeholders need to work together to continue the economic development of the ports while preserving, conserving and restoring the harbor's natural environment.

COMMUNICATION



Undersea communication cables are responsible of over 95 percent of the world's intercontinental digital traffic, making them one of the most important global infrastructures. Nowadays a single cable carries millions of telephone calls, video and internet data. Countries rely on submarine cables for both, government and private communications and operations that are vital to the global economy. Domestic laws and regulations require an evaluation of the effects on the natural environment of underwater communication projects to ensure that any environmental effects of cable laying and maintenance are considered before authorization is provided to lay a cable on the seabed. However, studies suggest that the environmental impact of submarine cables is minor. Over 80 percent of cable routes are located in the deep ocean and the environmental effect is limited to the placement of a non-toxic tube on the ocean floor. In coastal areas however, underwater cables are subjected to heavy maritime traffic, natural hazards and technical failures and therefore some protection is necessary to limit activities that could potentially damage the cables.

The demand for telephone and fast internet access is continually increasing in Puerto Rico. Communication infrastructure projects are necessary to provide the island the capacity to handle this increasing demand. The island economic growth depends on the improvement of the communication infrastructure. Underwater communication cables help build the capacity and reliability of telecommunication services improving the commercial, governmental and public sectors.

In Puerto Rico submarine telecommunication cables are located in the north coast, particularly at El Condado, San Juan and Isla Verde. Operations of submarine telecommunications cables are considered one of the most important uses of the sea and therefore are considered within coastal management programs. Coastal managers need a thorough understanding of the interaction of submarine telecommunications cables with the marine environment. A balance must be achieved between the increasing technological demands and the marine conservation needs.

CONSERVATION AND RESTORATION

Puerto Rico's coastal area consists of diverse ecosystems that are ecologically, economically and environmentally important. Coastal areas provide habitat for a wide range of vegetation and wildlife, have recreational and historical resources and are important due to their ecological, recreational and historical values. Unfortunately coastal ecosystems are threatened by a continuous degradation from a variety of causes, including pollutants, overfishing, development, physical disturbances and changing climate and oceanographic conditions. The conservation and restoration of coastal environments such as mangrove, sea-grasses, coral reefs and estuaries is vital for the sustainability of marine ecosystems in Puerto Rico.

The conservation of Natural Protected Areas in Puerto Rico is achieved through multiple efforts of Commonwealth and Federal agencies such as DNER, the U.S. Forest Service and the U.S. Fish and Wildlife Service as well as non-governmental organizations such as the Puerto Rico Conservation Trust. The Department of Natural and Environmental Resources is the lead agency for the protection, conservation and management of natural resources and their current and potential uses as provided in its Organic Act. The National Park Service is responsible for the conservation of landscapes, natural and historic objects and wildlife. The National Marine Fisheries Service (NMFS) of the National Oceanic and Atmospheric Administration (NOAA) and the US Fish and Wildlife Service (USFWS) are also responsible for administering the laws for the protection, conservation and restoration of natural resources. The NMFS is responsible for the management, conservation, and protection of marine resources and their habitats. The USFWS works in the conservation, protection and improvement of wildlife and its habitats, particularly on land while the Caribbean Fisheries Management Council (CFMC) works with the protection of fisheries and marine resources. By 2010, the DNER had submitted 42 recommendations for natural reserve designations of which 40 were approved by the Puerto Rico Planning Board (PRPB). Currently approximately 8% of the land area and 26.98% of jurisdictional waters and submerged lands beneath them are legally designated as natural protected areas. Natural Marine Reserves in Puerto Rico have an area of 2,082.57 km^2 and 1,462.91 km^2 are Marine Extension of Natural Reserves.

As part of the conservation and restoration practices, coastal mangers need to assess the threats to natural resources and evaluate successful approaches for ecosystem restoration and enhancement. It is necessary to promote cooperation and involvement among government, non-governmental agencies and environmental groups to restore natural resources and their services.

HISTORIC PRESERVATION

Puerto Rico's historic coastal spaces and resources are part of our individual formation and cultural identity. Therefore, places with significant historic and cultural importance should be protected and preserved. The conservation of cultural landscapes requires an approach where public education, information and assistance are integrated by pertinent agencies as part of the protection and enhancement of the natural resources of the Island. The lead agencies for the conservation of the historical and cultural heritage of Puerto Rico's coastal and marine spaces and resources are the Institute of Puerto Rican Culture (ICP, Spanish acronym) and the State Historic Preservation Office (SHPO). Both agencies are responsible for recommending public policy regarding the conservation of historic properties or resources in Puerto Rico. The Institute of Puerto Rican Culture was created to preserve the historic and cultural patrimony of Puerto Rico and is also in charge of protecting archeological resources on land or under water. The SHPO was created by the Organic Act of the Puerto Rico Commonwealth Historic Conservation Office and is responsible for complying with the provisions assigned by the National Historic Conservation Act of 1966.

The US National Parks Service (NPS) also has jurisdiction over the preservation of historic places and sites in Puerto Rico coasts and submerged lands. The NPS was created through the National Park Service Organic Act of 1916 and is part of the US Department of the Interior. The NPS has the responsibility to regulate, preserve and promote national parks, monuments, and reserves with great scenic, natural or historic value. The agency administers the National Registry of Historic Places, created by the National Historic Conservation Act of 1966, which is the reference used by SHPO to issue project consultations. The NPS is also authorized by the Abandoned Shipwrecks Act (ASA) to promulgate management guides for shipwrecks found to have great historic value. Section 2103 of the ASA established that shipwrecks located in submerged territories of any US state (including Puerto Rico) will be the property of said state and that each jurisdiction must promote the historic conservation of such shipwrecks. If the shipwrecks are in Federal waters, they are considered to belong to the US Government. In Puerto Rico, the NPS is in charge of the administration and maintenance of San Juan Historic Sites such as the San Felipe del Morro Fort, the San Cristobal Fort, El Cañuelo and the Old San Juan ramparts. Historic preservation and conservation should ensure wise use of resources as well as social, economic, and environmental sustainability. Coastal and Marine Spatial Planning must also protect community character, the quality of a place and connecting people with their communities and environments. These should be at the top of the priority goals and objectives of any successful preservation and conservation initiative to protect natural coastal habitats and cultural resources in Puerto Rico.

RESEARCH AND EDUCATION

Puerto Rico is surrounded by vast coastal ecosystems such as coral reefs, sea grass meadows, mangrove forests, wetlands, and beaches. These ecosystems provide suitable opportunities for scientific research, education and training to promote science-based decisions about the use and conservation of the island's coastal and marine resources. Many research and education activities are dedicated to the advancement of the coastal sciences and the study of the complex problems within the coastal zones of Puerto Rico. It is important to translate and interpret coastal issues for the public and to assist in the development of professional coastal research programs. As part of the coastal management program there is a responsibility to practice and promote coastal and marine stewardship through research, monitoring, education, training and community involvement.

Agencies such as the Puerto Rico Department of Natural and Environmental Resources (DNER) and the National Oceanic and Atmospheric Administration (NOAA) have the responsibility to improve public understanding of the coastal and marine ecosystems. These agencies and the PRCZMP promote knowledge about the importance of the oceans and the coastline by research and education opportunities. The main mission is to increase the conservation and preservation of healthy coastal and marine ecosystem. Other nationwide organizations such as Sea Grant provide education and information resources for a better understanding of the conservation of Puerto Rico's marine resources. Some of Sea Grant's educational activities include workshops, marine-science field trips, marine exhibits, and educational materials, such as environmental magazines, that promote conservation of coastal and marine resources.

The Department of Natural and Environmental Resources through the Coastal Zone Management Program, also promotes environmental education, scientific investigation and community participation as a vital part of the management of coastal spaces and resources in Puerto Rico. There is a growing need to promote an efficient exchange of information, constructive cooperation, and productive coordination between different agencies and users of the coastal and marine spaces and their resources.

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