Final draft

DRAFT ASSESSMENT AND STRATEGIES

FY 2011 – FY 2015

Prepared in accordance with:

COASTAL ZONE MANAGEMENT ACT - SECTION 309

By:

PUERTO RICO COASTAL MANAGEMENT PROGRAM

December 22, 2010

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INTRODUCTION

The following Assessment and Strategy was developed pursuant to Section 309 of the Coastal Zone Management Act (CZMA). The document is structured to conform to CZMA Section 309 Program Enhancement Guidance issued by NOAA Office of Ocean and Coastal Resources Management covering the period FY2011-2015.

PRCMP 309 Assessment is based on information generated at DNER Coastal management Office or provided by Federal, Commonwealth agencies and municipalities as well as information provided by the Public. The assessment summarizes trends and current status of resources pertaining to the priority enhancement areas identified for Puerto Rico.

The PRCMP 309 Strategies were developed for the selected priority areas in coordination with PRCMP partners. The strategies integrate initiatives to promote increased cooperation among Federal and Commonwealth agencies in order to maximize the value of the investment of 309 funds.

Once NOAA OCRM provides comments to the draft PRCMP 309 Assessment and Strategy, CMO will edit and publish the final draft document for a 30 day review period.

A. Conformance to OCRM Guidance

In July 2009, NOAA/OCRM issued the final draft guidance for the Section 309 Program which considerably streamlines the Assessment and Strategy. This document has adhered as closely as possible to those guidelines.

The Strategy covers the five year period FY 2011– FY 2015. It is understood that OCRM's acceptance of the Assessment and Strategy is an eligibility requirement for receiving new Section 309 funding beginning in FY 2011.

The main body of the report is organized by program enhancement area. For the three priority program areas --- Public Access, Coastal Hazards and Wetlands – the strategy section follows the assessment. A general approach to Coastal and Marine Spatial Planning has been devised for Ocean Resources which would interrelate other enhancement areas for which no strategies have been prepared. No strategies were developed for enhancement areas receiving medium priority recognition .

B. Prior Cycle of Sec.309 Assessment and Strategy

In July 2008, PRDNER submitted an updated and revised Section 309 Assessment and Strategy to OCRM. In the intervening period between the 2008 submission and the present Coastal development trends have remained largely unchanged due to slow economic activity and a major contraction in the construction sector.

The economic downturn beginning in 2008 and continuing to the present has brought a halt to most new building development in both the private and public sectors. Puerto Rico's macroeconomic indicators reflect that the Commonwealth's economy is centered on high value-added services and manufacturing. During 2009, the gross domestic product was nearly $95.7 billion, with a GDP per capita of over $24,000. The Gross National Product[1] was 62.8 billion. As of February 2010, the labor force was around 1.3 million strong, of which 1.1 million were employed. Mean household income was over $28,000 (Source: Government Development Bank).

According to the Government Development Bank, the Puerto Rico GDP composition by Sector (2009) is distributed as follows: Manufacturing: 45.5%, Finance, Insurance and real Estate: 19%, Services: 12.8%; Government: 9.7%, Trade: 7.8%, Transportation and other public utilities: 3.2%, Construction and Mining 1.9%, and Agriculture: 0.7%.

The 2009 statistics reflect a great contraction on the construction and transportation sector. While planning, project design and permitting processes for future coastal development in continuing only a few construction projects are actively underway. Budgetary constraints and employment reductions have likewise moderated governmental activities with respect to public works and new program initiatives.

Proposed Section 309 program activities are consistent with inputs from key Commonwealth and federal agencies. These include the Puerto Rico Planning Board, Department of Recreation and Sports, National Parks Company, Environmental Quality Board, U.S. Fish and Wildlife Service, U.S. Forest Service, International Institute of Tropical Forestry, National Marine Fisheries Service, and the Natural Resources Conservation Service and the results of a PRCMP survey designed to obtain public imput regarding 309 program priorities. Highest priority areas were Coastal Hazards and Coastal Habitats: Wetlands, followed by Public Access, Marine Debris, Ocean Resources, Aquaculture, Energy Facility Siting, Special Planning Areas and Cumulative Impact Analysis.

C. Considerations in Revising the Sec. 309 Program Strategy

1. **Climate variability and change and sea level rise**

The potential impacts of climate change on ocean islands is cause for increasing concern as the threat of sea level rise and severe weather events grow in frequency and intensity. As documented in the updated PRCZM Program Document, a preponderance of Puerto Rico's population and economic activities are concentrated in low lying areas some of which are subject to direct impacts of coastal flooding and storm surge. Sea level rise projections made by the Caribbean Ocean Observing System group, based on historical trends, forecast a 0.25 cm sea level rise by year 2100. IPCC scenarios and Potsdam Institute for Climate research have produced different sea level rise scenarios that have been analyzed by PRCMP-CMO. In its 2007 report, the Intergovernmental

Panel on Climate Change (IPCC) projected a global sea level rise of 18 to 59 centimeters from 1990 to the 2090s, plus an unspecified increase that could result from further melting of the ice sheets covering Greenland and Antarctica. PRCMP will be using two sea level rise scenarios for planning and adaptation strategies development purposes: an upper limit of 1 meter and a conservative scenario of 0.25 cm over the course of the next 90 years.

2**. Convergence of Sec. 309 priority program areas**

The overall strategy for the new cycle of Sec. 309 activities is based on the interrelationship between coastal hazards, wetlands preservation, coastal and marine spatial planning and public access. Pursuing work on these components in a coordinated way represents an opportunity for coastal zone management to play a central role in contributing to sustainable development while simultaneously enhancing coastal ecosystems.

There is continuing public discussion and elevated awareness about global warming, weather modification, and potential sea level rise. Such awareness is a precondition for developing "community resilience" in preparing for natural disasters. This rethinking of program strategies, within the overall context of global warming and sea level rise follows from the work conducted in past program cycles.

- Coastal hazards analyses has provided the information base and scientific rationale for new and innovative program responses to climate variability and change as well as potentially catastrophic events;

- Wetlands zoning provides the basis for a wetlands management program that combines both coastal protection and ecosystem enhancement;

- Public access inventories and assessments provide the basis for promoting a system of public parks and promenades that act as barriers to deflect and absorb the impact of ocean waves and storm surge during periods of turbulence while opening up urban shorefront to passive recreation during periods of calm.

- Ocean resources represents an opportunity to develop a planning framework for integrating coastal and marine ecosystems and socioeconomic systems to generate management recommendations for guiding public and private development of our coasts.

D. <u>Responding to emergent public concerns related to coastal hazards</u>

The design of the Sec 309 Strategy stems from the growing awareness of the dangers posed by coastal storms and hurricanes. Puerto Rico faced extraordinary ocean swells (March and September 2008) as well as associated inundation events which severely impacted several coastal communities. These events increased beach erosion in already affected areas such as Rincón.

PRCMP-CMO's concern for recurring rainfall and extraordinary storm surges and swell events affecting coastal communities (2008, 2009 and 2010) demanded a shift of focus in Puerto Rico's coastal hazards strategy, in turn prompting a parallel shift in overall Sec. 309 program strategy.

Key natural systems, such as intertidal wetlands and key geomorphic features, function as coastal barriers providing protection to coastal communities. It follows that geo-referencing, mapping, protecting and effectively managing these systems becomes a key component of the coastal hazards strategy.

Similarly, public access to the coast is increased by promoting coastal promenades and parks. At elevated design levels these components of public access can effectively reduce the vulnerability of coastal communities to coastal storms and hurricanes.

E. Funding constraints

A consideration in designing the Sec.309 program strategy is funding. This document reviews the highlights of Section 309 activities undertaken by the DNER Coastal Zone Management Bureau through September 2010, and recommends redirection of the strategy of the program enhancement process for the 2011 – 2015 program cycle.

Funding poses a major constraint in the design of the Section 309 Strategy. The recommendations being advanced are based on the assumption that full federal funding for Section 309 will be available, under successive CZMA reauthorization provisions, through FY2016.

In designing the general work plan for the priority enhancement areas, the following assumptions have been made with respect to future funding:

- OCRM will direct approximately 18% of overall 306/309 appropriations to the Sec. 309 program;

- Unlike 306 funds which require a 50% state match, 309 funds will continue to require no local match. However, PRCMP-CMO has established a collaborative agreement with University of Puerto Rico and Sea Grant for the implementation of CC-SLR and Public Access strategies. This partnership greatly increases CMO capabilities for implementing the PR 309 Strategy.

- The focus of Section 309 efforts during the first year of the new program cycle will be on adapting the program to the new strategy, as well as completing any remaining tasks in the 309 program components that were included in the approved 2008 strategy and work plan.

F. Methodology used in ranking priority program areas

In developing this revised Sec. 309 program, PR DNER pursued a course similar to that followed in previous 309 iterations. The methodology relies on eliciting the views and opinions of knowledgeable individuals, Federal and Commonwealth agency staff, environmental organizations, and a cross-section of public opinion. Nevertheless, a final decision on strategy design is made by DNER with concurrence by OCRM.

1. Use of questionnaire

A limited opinion survey has been conducted among concerned and informed citizens and environmental professionals. Among the findings was the high level of concern expressed by respondents about coastal hazards, particularly hurricanes and coastal flooding and the recognition of the importance of coastal wetlands to ameliorate the impacts of inundations associated with storm surge and rainfall events.

2. Consultative process

Consultations on the 309 Assessment and Strategy were held with staff and officials of the Planning Board, the Environmental Quality Board, Department of Recreation and Sports, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Natural Resources Conservation Service, International Institute of Tropical Forestry and other agencies. The final draft of the Assessment and Strategy developed under CZMA, Section 309 for the period 2011-2015 is posted for a 30 days public review period on the DNER Portal and PRCMP web page.

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PROGRAM ENHANCEMENT ASSESSMENTS

WETLANDS ASSESSMENT

Section 309 Enhancement Objective

Protection, restoration, or enhancement of the existing coastal wetlands base, or creation of new coastal wetlands.

Summary of 2006-2010 Program Accomplishments

During the 2006-2010 Sec. 309 cycle there were significant program accomplishments. These included: (1) Preparation of zoning guidelines for submerged lands as a means of implementing wetland protection policies; (2) delineation of zoning boundaries and mapping of zoning districts in coastal waters along the Caribbean coast as an innovative management measure for protecting submerged lands, and; (3) consensus building through outreach and networking with multiple stakeholders, as well as the convening of conferences and workshops and dissemination of technical reports. These outreach and educational activities were conducted as a means of generating public support for the implementation of enforceable policies and programmatic measures for protecting submerged, intertidal, and estuarine resources.

Representative milestones are specified below as indicative of program accomplishments.

Program changes and initiatives.

- Zoning guidelines for submerged lands were designed to implement public policies for the sustainable use of marine resources. The guidelines provide a scientific and methodological basis for the comprehensive zoning of submerged lands; zoning districts were delineated and mapped in order to minimize use conflicts among stakeholders, user groups, and the public, and; to maximize the sustainability of marine space.

- A plan for zoning the submerged lands along the south coast of Puerto Rico has been completed and presented to the DRNA Secretary for departmental approval. It will subsequently be submitted to the Planning Board as the basis for the adoption of marine zoning maps (consistent with the implementation of Regulation 17, chapter 4, section 25). It is noteworthy that this program initiative is also consistent with Presidential Executive Order 13457 of July 19, 2010.

- Wetlands mapping resulted in the delineation of 188 zoning districts on the south coast with the following proposed classifications:
  --88 districts were evaluated, classified and proposed for preservation.
  --48 districts were evaluated, classified and proposed for conservation.
  --52 districts were evaluated, classified and proposed for mangrove protection.

- In fulfillment of a legislative mandate required by Law 314, a wetlands inventory was completed that identified candidate areas for natural reserve designation.

- The Alert Response Net was established to collect data on the condition of marine resources. Information is to be compiled and made available to the public through the DNER internet portal.

Technical and professional presentations and workshops.

- CMO staff participation. The first Conference on Coastal and Marine Spatial Planning hosted by the PRCZMP. First round of conferences on Marine Space: the conference agenda focused on submerged lands. Over 200 participants were in attendance, including stakeholders representing environmental groups and academia. Department of Natural and Environmental Resources (DNER) San Juan, PR, 2010.

- *Puerto Rico: the Integration of Marine Spatial Planning to Coastal Zone Management,* presentation at the First Marine Spatial Planning Conference. DNER, San Juan ,PR, 2010

- CMO staff participation. National Conference on Geographic Education, "Crossroad of Culture". National Council for Geographic Education. San Juan Puerto Rico, 2009

- *Zoning Submerged Lands: a workshop*. Universidad Católica, Departamento Ciencias Ambientales, Ponce, PR, 2009.

- *Underwater corridors: an option to avoid the fragmentation of marine natural habitats*. Poster session. Conferencia sobre Arrecifes de Coral. DNER, San Juan, PR, 2008.

- CMO staff participation. La Recopilación de Datos Ambientales. DNER, San Juan, PR, 2008.

- *Underwater corridors as an option to avoid the fragmentation of marine natural* habitats, presentation at the Universidad de Puerto Rico, Department de Geografía. Río Piedras, PR, 2008.

- Local Review of Coastal Wetlands. This intergovernmental workshop was convened by DNER CMO staff, and was attended by the planning offices of 22 coastal municipalities. Hotel Sheraton San Juan, PR, 2008.

- *Underwater corridors as an option to avoid the fragmentation of marine natural habitats*, presentation at the Association of American Geographers Annual meeting, Boston, Massachusetts, 2008.

- *Managing the Submerged lands of Puerto Rico.* Primer simposio sobre los Recursos Naturales. Poster sesión DNER, San Juan PR, 2007.

- *Zoning the Submerged Lands: a workshop* .Universidad Interamericana, Escuela de Leyes. Hato Rey, PR, 2007

- *Managing the Submerged Lands of Puerto Rico*, presentation at the 25th International Submerged Lands Conference. New Jersey, New York, 2006.

- CMO staff participation and presentation of *zoning the Submerged Lands: a workshop*. The PR Annual Boat show. Convention Center, Hato Rey, PR, 2006.

- *Managing the Submerged Lands of Puerto Rico*, presentation at the Cuarto Encuentro con el Bosque Guilarte, Bosque Estatal de Maricao, DNER, Maricao, PR, 2006.

Preparation of technical reports.

- *Distribución Geográfica de Humedales a ser designados Reservas Naturales.*
- *Informe Final sobre la Revisión Local de Terrenos Anegados .*
- *Atlas: Mapas para la Revisión Local de Terrenos Anegados .*
- *Plan Estratégico para la Conservación, Manejo y Restauración de Humedales Costeros en Puerto Rico 1er Borrador.*
- *Zoning Guidelines for the Submerged Lands of Puerto Rico.*
- *Plan para el Ordenamiento Territorial de los Terrenos Sumergidos de la Región Sureste de Puerto Rico.*

Educational outreach.

- Permanent exhibit of marine zoning maps open to the general public, covering natural reserves in Arecibo, Cabo Rojo, Guayama, Fajardo, and San Juan.
- Desembocaduras y Sistemas Ecológicos de los Ríos de Puerto Rico (set of four posters covering costa norte, noroeste, sur, sureste).
- Zoning the Submerged Lands (poster).
- Underwater corridors: an option to avoid the fragmentation of marine natural habitats (poster).
- The Integration of Marine Spatial Planning to Coastal Zone Management (brochure).

Summary of 2011-2015 Program focus

Building on the accomplishments of the 2006-2010 enhancement program, the 2010-2015 wetlands enhancement program incorporate activities that:

- Promote the planning and management of wetlands and submerged ecosystems (coral reefs and sea grass beds) as vital defensive measures to protect life and property against the consequences of climate change and sea level rise.
- Key natural systems, such as coral reefs, intertidal wetlands and other geomorphic features, function as physical barriers providing protection to coastal communities. Devising measures to protect, enhance and extend these protective features, through both natural and artificial means, will be a major program focus.

- Wetlands and submerged lands zoning is a key program enhancement activity that will be expanded from the south coast to other coastal sub-regions. Interagency consultation and coordination will be on-going to affect Planning Board endorsement of the zoning recommendations.
- Results of program outputs will feed into the Coastal and Marine Spatial Process and proposed Regional Ocean Partnership processes initiated by Puerto Rico and the U.S. Virgin Islands

Other projected program activities include:

- Preparation of status report on intergovernmental and stakeholders meeting related to the southern submerged lands plan.
- Elaboration of a strategic plan for wetland protection and conservation as a component of the sub-regional marine spatial plan for Puerto Rico.
- Creation of an MSP web data center to track effectiveness of management measures.

Resource Characterization

Problems and opportunities with regard to the enhancement objective

1. Direct and indirect threats to coastal wetlands, both natural and man-made

TABLE: THREATS TO COASTAL WETLANDS

Type of threat	**Severity of Impacts (H,M,L)**	**Geographic scope of Impacts (extensive or limited)**	**Irreversibility (H,M,L)**
Development/Fill	H	Extensive	H
Alteration of hydrology	No systematic data	No systematic locational data but occurring in some agricultural areas adjacent to wetlands	H
Erosion	M	Limited	H
Pollution	H	Extensive	H
Channelization	H	Extensive in riverine areas	H
Nuisance or exotic species	L (i.e. iguanas, alligators)	No systematic data	M
Freshwater input	M	No systematic location data but occurring in some agricultural areas adjacent to wetlands	H
Sea level rise	L (short-term); H (long-term)	Extensive along the entire coastal perimeter and off-shore islands	H

Other (see notes below)	H	Extensive damage to submerged lands from multiple sources	H

Supplementary information pertaining to identified threats (in above table)

- Development/filling

  Despite adoption of wetland preservation measures, threats to wetlands persist from trends in housing and condominium construction, including second home development at shorefront locations, the surge in recreational boating leading to the expansion of private marinas and clearing for illegal launching sites and parking areas for personal watercraft. Development is most pronounced in or close to the San Juan metropolitan area --- Carolina, Catano, Rio Grande and San Juan itself; the southwest coast focusing on Boqueron, and; the east coast from Fajardo to Humacao.

  Impediments to addressing these threats include (1) weakness in monitoring and follow-up on 404 permit conditions; (2) belief by the public that COE permit approvals automatically result in authorization to construct without requisite PR agency endorsements, and; (3) insufficient training of DNER Rangers with respect to identifying and reporting violations.

  Countering these weaknesses are (1) implementation of the MOU between ARPE and DNER, (2) joint filing of 404 permit applications with the COE; (3) improved efficiency of the permit review process within DNER which has improved the Department's oversight of development proposals, and; (4) the public education and outreach activities of DNER.

- Erosion

  As noted in prior Sec. 309 Assessments, erosion-induced sedimentation from the upper watersheds of the Cordillera Central is possibly the most critical threat to aquatic habitats. Among the primary causes of sedimentation are: The conversion of coffee cultivation from shade-grown to open sun cultivation, deforestation for crop cultivation, and over-grazing by livestock.

  Impediments to countering such threats are agricultural policies that emphasize more intensive agricultural practices. As a result farmers are encouraged to use earth-moving equipment to clear vegetation for planting. Under present laws, farming activities are exempt from permit requirements.

  Countering such impediments is the Governor's Executive Order authorizing the implementation of the Section 6217, nonpoint pollution program. Additionally, the interagency agreement between DNER and the EQB with respect to enforcement of EQB's regulation to control erosion and sedimentation at earth-moving activities (including sand extraction operations) evidences the intent the government to minimize erosion and sedimentation.

- Pollution

  The threat exists to varying degrees throughout the island's coastal zone. The major source of the threat to the wetlands resource and to near-shore aquatic ecosystems, especially coral reefs, is non-point pollution from pesticides and fertilizers; rural waste water discharges and, animal (poultry and livestock) wastes. Impediments to addressing these threats are lax enforcement of EQB regulations and the absence of incentives to improve waste management practices. The Executive Order of the Governor to implement the Section 6217 Coastal Pollution Control Program may ameliorate this situation.

- Channelization
  As noted in prior Sec. 309 Assessments, major flood control projects for the Rio Piedras, Rio Cibuco, and Rio Fajardo, could pose significant threats to coastal water quality and aquatic environment, including wetlands, as a result of sediment transport and deposition in near-shore aquatic ecosystems.

  Impediments to addressing the threats of channelization are countervailing policies emphasizing flood control; the location of many communities, including squatters, in high risk locations in riverine flood plains, and the lack of feasible relocation options for floodplain residents.

  However, channelization projects in Puerto Rico are undertaken jointly by DNER and the Corps of Engineers. Both agencies are responsive to the need for wetlands protection and their activities are designed so as to minimize threats or impacts to wetlands. Additionally, the Federal Consistency review process is an impediment to wetlands damage from channelization projects.

- Nuisance or exotic species
  The introduced green iguana (Iguana iguana) has become a pest present in virtually all coastal wetlands (invasive introduced-exotic species) whose impact is currently under study.

- Fresh water input
  Freshwater input is not significant in altering salinity levels in estuarine locations except in specific cases as in the Jobos area. Sediment loadings associated with fresh water inputs are particularly detrimental to fringing coral reefs in the marine environment.

- Sea level rise
  Projected MSL rise for the north coast of PR has been calculated to be an average 2.3mm/yr, and 1.8 mm/yr for the south coast. The sea level trends are based on a 30-year record from La Pocita and Magueyes Island tide gages. Using these projections, salinity impacts on selected estuaries and coastal freshwater habitats were forecast. A verified increase in salinity of a coastal lagoon was recorded in the Humacao Natural Reserve. DNER, in coordination with the USGS, EQB, SJBE, and university researchers, are continuing to monitor sea level rise in coastal waters.

  While the threats resulting from sea level rise are not readily apparent, the long term implications of climate change and global warming are predicted to significantly raise sea level elevations in the coming decades. This is a recognized threat to ocean islands worldwide. Given the concentration of Puerto Rico's population, infrastructure, and economic activity in the coastal zone, the submerged lands, intertidal wetlands, and reef systems, in addition to their ecological value, play a vital function in providing the "soft infrastructure" that protects life and property by buffering inland areas from the impacts of storm surge and other coastal hazards.

  The protection and extension of these natural systems is, therefore, of key strategic importance to the enhancement of the PR CZMP. Integrating these natural systems into the overall program for hazards management will be a significant program change in the 20011-2015 cycle.

- Other

Port and marina maintenance dredging, ship groundings, laying of submarine cables, poor anchoring practices and commercial and recreational fisheries activities pose growing threats to marine ecosystems.

2. Extent, status, and trends of wetlands in the coastal zone

Relevant information on the extent of protected wetlands in Puerto Rico before 2006 is included in the foregoing table. Actually, a total of 61,233.98 acres of wetlands are protected by federal and local government designations. The remaining wetlands acreage is distributed along private properties, altered wetlands, or wetlands remaining in their natural condition.

Table: Coastal habitats protected by federal and local government designations

Designation	Estuarine (acres)	Lacustrine (acres)	Marine (acres)	Palustrine (acres)	Riverine (acres)
State Forest	7474.57	0	413.67	447.86	0
State Forest- Buffer zone	15.60	0	.33	0	0
Marine Reserve	49.01	0	96.16	447.83	0
National Estuarine Research Reserve	1244.29	0	9.26	161.59	0
Natural Reserve	769.09	0	26.19	1169.61	7.22
Natural Reserve- Buffer zone	0	0	0	0	0
Natural Reserve- Marine extension	2437.50	0	1718.67	0	0
Wild Life Refugee	578.59	31	0	1.11	0
Conservation Trust of Puerto Rico	3363.25	0	17215.31	862.95	11.65
US Fish and Wildlife Service	2545,56	0	317.51	.03	0
*DNER acquired properties (2)	2138.50	0	40.83	291.10	0
TOTAL	**25,496.01**	**31**	**35,306.03**	**3,382.13**	**18.87**

* To be designated

While coastal development has been a persistent trend, statistically significant data on wetlands loss is not presently being compiled due to the limited budget that is available. Assistance of other agencies will be needed if this information is to be systematically compiled

Table: Trends in the restoration and protection of coastal habitats

Contextual measure	**Cumulative acres for 2004-2010**
Number of acres of coastal habitat restored using non-CZM or non-Coastal and Estuarine Land Conservation Program (CELCP) funds	No quantitative data
Number of acres of coastal habitat protected through acquisition or easement using non CZM or non-CELCP funds	(1) Military bases 2470.33 acres (2) Total wetlands 409 acres

(1)Military installations acquired through closing of U.S. Navy bases in Vieques and Ceiba;
(2) DNER's Natural Patrimony Division was created by Law 150 on Aug, 4, 1988 for the purpose of acquiring sensitive environmental areas for protection.

Wetlands acquisition: Since 2006 three properties with wetlands have been acquired.

- Finca Noya at Tortuguero (282 acres bought for $2.0 million)
- Finca Noya at Camuy (60 acres, appraised value around $3 million),
- Punta Tuna at Maunabo (67.2 acres expropriated value under litigation but valued at approximately $3.5 million)

Funding for acquisition was from non-CZM sources such as legislative assignments, royalties from the Conservation Trust, and funds from compensatory actions required by DNER Regulation No. 25.

.3. Ongoing or planned efforts to develop monitoring programs

DNER has processed 270 cases related to wetlands since 2006 (Source: Joint Permit Application records). However, quantitative change data resulting from the Joint Permit Application Process and the Federal Consistency Certification Process is not compiled in a separate data base. Within budgetary limits DNER intends to continue increasing its capabilities for tracking project review and permitting actions, and relating the effects of permit approvals to the wetlands inventory.

Table: Mapped habitat inventories in the Coastal Zone

Habitat type	**CMP has mapped inventory (Y or N)**	**Date completed or substantially updated**
Tidal Wetlands (a)	Y	1985
Beach and Dune (e)	Y	1982
Nearshore (d)	Y	2000
Other (*)		

(a) The FWS wetland maps for the base year (1985).
(e) DNER Geoinformatic Division (1987).
(d) NOAA's benthic mapping (2000).
(*) The DNER geoinformtic division holds an extensive inventory of natural resources distribution

Management Characterization

Effectiveness of management efforts to address those problems described in the above section

1. Approaches employed in addressing problems.

The significant changes that have occurred for each management category since the last assessment are indicated below:

Management categories	**Employed by state/territory (Y/N)**	**Significant changes since last assessment (Y/N)**
Wetland regulatory program implementation, policies, and standards	Y	Y
Wetland protection policies and Standards	Y	Y
Wetland assessment methodologies (health, function, extent)	Y	No systematic data
Wetland restoration or enhancement	Y	No systematic data

Programs		
Wetland policies related public infrastructure funding	N	No systematic data
Wetland mitigation programs and Policies	Y	No systematic data
Wetland creation programs and policies	N	No systematic data
Wetland acquisition programs	Y	No systematic data
Wetland mapping, GIS, and tracking Systems	Y	Y
Special Area Management Plans	Y	N (Conducted under Sec.306)
Wetland research and monitoring (Jobos NERR)	Y	Y
Wetland education and outreach	Y	Y
Other	N/A	N/A

2. <u>Significant changes since the last assessment</u>

a. Policy and program enhancements

- Ecosystem zoning

This work represents a significant change in enhancing program capabilities. It also provides a bridge for linking wetlands and submerged lands management to other priority program areas such as Ocean Resources and Coastal Hazards.

The experience gained as a result of the wetlands zoning effort provides the basis for identifying opportunities for incorporating submerged and intertidal wetlands into an overall strategic plan to protect Puerto Rico, and particularly its densely populated urban areas, from the threats posed by climate change and sea level rise. Accordingly, this is being proposed as an important component of the next Sec. 309 cycle.

- Zoning guidelines and zoning district delineation

The development of the methodology for ecosystem zoning and zoning district delineation also represents a significant change in enhancing czm program capabilities. Fragmented ecosystems in submerged lands lying between marine protected areas have been identified and linked as submarine corridors. Using zoning districts as a planning tool to protect biodiversity also points a direction to comprehensive ecosystem-based ocean management. Zoning maps, although not officially adopted, can now be used to facilitate coastal zone management. The methodology for marine ecosystem identification, evaluation, and classification can now be adapted for use by stakeholders and governmental agencies to:

--Minimize adverse impacts in siting proposed activities
--Facilitate the permit evaluation process

--Minimize stakeholder conflicts
--Promote economic sustainability

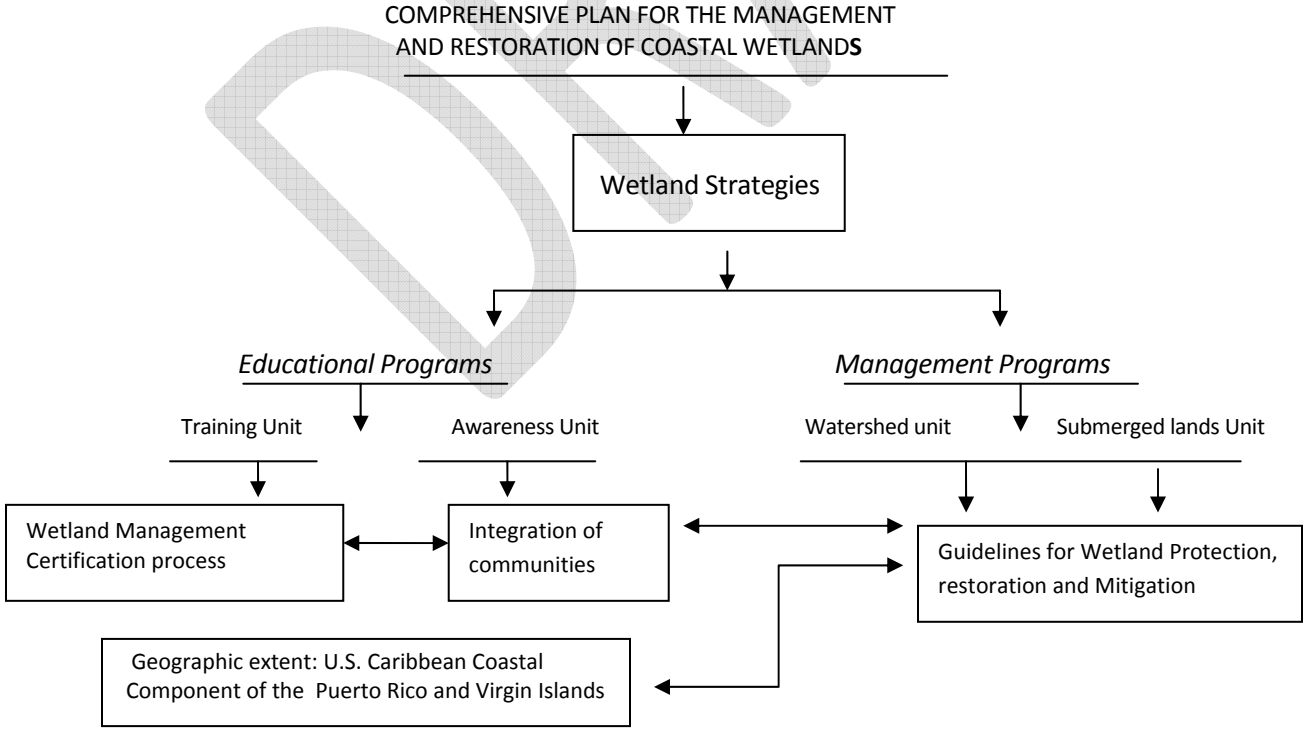
b. Cost
The work on the foregoing activities was funded entirely through the Sec. 309 program.

d. Outcomes and effectiveness of changes
The outcomes have been described in a foregoing section of this Assessment entitled "Summary of 2005-2010 Program Accomplishments".

The effectiveness of the zoning district proposals in affecting governmental decision-making remains to be determined. Efforts to have the guidelines and the methodology for zoning district delineation adopted by the Planning Board will be on-going during the next program cycle, as will the continuation of the districting process to the other coastal sub-regions of Puerto Rico.

It is notable that the decision to pursue a program of zoning submerged lands is consistent with new federal initiatives related to Ocean and Marine Spatial Planning and with the Presidential executive order 12345 of July 19 ,2010. That EO proposes a comprehensive ecosystem based approach to National Ocean, Coastal, and Great Lakes policy.

The Puerto Rico CMP is developing a multilayered strategy in which the wetlands component of the Sec. 309 program will focus on wetlands protection, preservation, remediation, and expansion of wetlands and related submerged ecosystems (sea grass beds and coral reefs). The dual objective will be ecosystem protection and the use these systems to minimize the socio-economic and physical impacts of sea level rise and coastal hazards as a result of climate change.
It is anticipated that the approach and results of this effort will, at some point, contribute to, and be integrated into, a Puerto Rico/Caribbean MSP Region Plan Draft. The following diagram conceptualizes how the process might evolve.



3. Habitat restoration

The CMP has not yet developed a restoration plan for tidal and intertidal wetlands and related ecosystems. Restoration measures will be pursued during the 2011-2015 program cycle as a key element in integrating these systems into a comprehensive coastal hazards management program.

As previously noted, coastal and intertidal wetlands together with offshore reef systems represent the "soft infrastructure" that acts as the first line of protection from storm surge and coastal flooding. Restoring and extending these protective ecosystems is, therefore, an important program change that is projected for the next program cycle.

Among the activities that will be undertaken as part of this effort are:

- Review maps of ecosystems components.
- Prepare overlays maps to investigate relationships between individual wetland components.
- Implement GIS-based procedures to generate maps to identify protection and restoration priorities

Priority needs and information gaps

Table: Priority needs and information gaps

Gap or need description	Type of need (regulatory, policy, data, communication and outreach)	Level of priority (h,m.l)
Benthic and wetland habitat characteristics and conditions	Data availability needs to be determined for specific coastal subregions	H
Planning Board commitment to the zoning of submerged lands	Policy basis exists for ecosystem protection; zoning regulations need to be extended to submerged lands	H
Cost effectiveness of restoration methods and options	Cost benefit assessment of restoration options for wetlands and related ecosystems	M
Outreach	See note below	L
Economic cost and benefit analysis	Cost and benefit estimates need to be developed for alternative uses	M

Note: Outreach and communication
DNER has consolidated its public education and community outreach resources under an Assistant Secretariat for Information and Education. While some outreach activities will be undertaken, similar to those performed in the 2006-2010 program cycle, the preponderance of this work will be conducted and/or coordinated through the 306 program.

Enhancement Area Prioritization

Rating

The wetlands enhancement area is rated High priority for both Sec. 309 funding as well as for other aspects of the PR CZM Program, and by the public response to the survey conducted by the DNER in formulating the 2011-2015 Sec. 309 strategies.

Prior assessment: High
Current assessment: High

Justification

Providing coastal protection:

Wetlands as well as reef systems represent an essential, low cost means of providing natural, low-impact infrastructure to minimize loss of life and property damage from climate change and sea level rise. Coastal and intertidal wetlands together with reef systems and other marine ecosystems offer the first line of defense against inland flooding from storm surge and hurricane driven waves from severe weather events.

Need to counter continuing threats to marine ecosystems:

Maintenance dredging of ports and marina facilities, ship groundings, laying of submarine cables, bad anchoring practices and commercial and recreational fisheries activities continue to pose significant threats to marine ecosystems along the coastal perimeter and in submerged lands within Puerto Rico's territorial waters.

Protecting coastal water quality:

Wetlands and marine vegetation filter sediments and other pollutants originating in upland areas and draining to the sea through nonpoint source runoff and through river and stream flow. The destruction of these critical ecosystems represents an increased threat to coastal water quality, with potential impacts to the recreational value of swimming beaches and coastal tourism, as well as to wildlife.

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COASTAL HAZARDS ASSESSMENT

Section 309 Enhancement Objective

Prevent or significantly reduce threats to life and property by reducing and eliminating development and redevelopment in high-hazard areas, managing development in other hazard areas, and anticipating and managing the effects of potential sea level rise.

Summary of 2006-2010 Program Accomplishments

During the 2006-2010 Sec. 309 cycle there were important significant program enhancement accomplishments under the Coastal Hazards enhancement category. PRCMP led the effort to collect important data and information to support modeling efforts to be used in coastal vulnerability assessments and formulating adaptation strategies (2011-2015). LIDAR imagery, updated aerial photography (2007) were partially funded by PRCMP. PRCMP strengthened partnerships with the Caribbean Coastal Ocean Observing Systems, Caribbean Tsunami Center, Puerto Rico Coastal Hazards Center and the Puerto Rico Seismic Network in an effort to improve knowledge about coastal hazards and potential impacts of climate variability and change on the coastal zone of Puerto Rico.

PRCMP funded a study to assess the role of coastal geomorphic features such as sand dunes in protecting coastal communities from coastal inundations. In coordination with CARICOOS, PRCMP -CMO RS-GIS unit modeled sea level rise projections and potential impacts on coastal areas. Ad Circ model was coupled with SWAN and Coulwave models to produce potential scenarios of storm surges inundation using different hurricane category pressures and winds as well as four different angles of surge penetration. PRCMP funded a public perception survey of climate change and coastal hazards for eight coastal municipalities located on the West coast of Puerto Rico. PRCMP used this information to raise public and decision makers awareness about coastal hazards and promote the adjustment of Commonwealth policies that need to be included as changes to the updated draft PRCMP.

Summary of 2011-2015 Program Focus

The 2006-2010 cycle of funding prepared PRCMP to undertake a major challenge: the Assessment of Puerto Rico's Coastal Zone Vulnerability to Climate Change and Sea Level Rise. During 2011-2015, PRCMP will finalize the coastal zone vulnerability assessment . The vulnerability assessment will serve as basis for the development of sectoral adaptation strategies iIn coordination with representatives, scienntists, and researchers from the universities of Puerto Rico (UPR-M, UPR-RP, UPR-CM, UPR-C, UMET, UTurabo, UInter), the International Institute of Tropical Forestry, USGS, USFWS. NOAA-NMFS. NOAA-NWS, USEPA, CARICOOS, CCRI, the San Juan Bay Estuary Program, JBNERR. The vulnerability assessment and adaptation strategies will be used to promote policy, regulatory, planning and building code adaptations.

Resource Characterization

Purpose: To determine the extent to which problems and opportunities exist with regard to the enhancement objective.

1. Characterize the level of risk in the coastal zone from the following coastal hazards:

(Risk is defined as: "the estimated impact that a hazard would have on people, services, facilities and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage." *Understanding Your Risks: Identifying Hazards and Estimating Losses. FEMA* 386-2. *August 2001)*

Type of Hazard	**General Level of Risk (H, M, L)**	**Geographic Scope of Risk (Coast-wide, Sub-region)**
Flooding	H	Coasts-wide
Coastal storms, including associated storm surge	H	Coasts-wide
Geological hazards (e.g. tsunamis, earthquakes)	L	Coasts-wide
Shoreline erosion (including bluff and dune erosion)	H	Sub-regions
Sea level rise and other climate change impacts	M	Sub-regions
Land subsidence	L	Sub-regions

2. For hazards identified as a high level of risk, please explain why it is considered a high level risk.

High Susceptibility to Coastal and Riverine Flooding.

The topography and location of communities in low lying drainage areas, along river floodways, and in coastal flood plains increases their vulnerability to loss of life and property damage during significant rainfall events. Many of the coastal communities most vulnerable to extreme rainfall events are located adjacent to rivers that originate in the central mountain range, carry runoff from large watersheds and discharge to the sea. Extensive areas of the coast are subject to storm surge generated by tropical storms and hurricanes. The greatest danger of flooding is that these events affect large areas of the coastal plain. Vulnerability to flooding has increased over past decades due to poor land use practices. Likewise, removal of vegetation in the upper reaches of watersheds has contributed to soil erosion, resulting in high sedimentation loads in water bodies. Sediment deposition has had the effect of reducing in-stream storage capacity during periods of high rainfall, thus aggravating flooding. Loss of vegetation and reduced infiltration of surface runoff as a result of building coverage and the use of impermeable materials has contributed to storm damage potential from high intensity rainfall events. Flooding is a frequent occurrence in Puerto Rico, often affecting highly developed and populated areas with resulting damage to private property and public infrastructure.

DNER/CMO was involved in the delineation and interpretation of the new FEMA flood maps in 2007. The

public review was conducted in 2008 and final adoption in 2009.The National Flood Insurance Rate Maps (FIRMs) prepared by FEMA represent the primary information source for delineating coastal areas subject to flooding. By overlaying the FEMA maps on existing aerial photography and projected land use maps, affected communities can be identified, and approximations of risk and vulnerability can be extrapolated.

Coastal Storms, including Associated Storm Surge

Large areas of the coast are subject to the impacts of storm surge generated by the passage of weather events. Storm surge has the effect of causing coastal erosion and destruction. Storm surge impacts are most severe in the south and east coasts due to the shallowness of the seabed and the west-northwest path of most hurricanes. Vulnerability to storm surge has increased due to poor land use practices. The elimination of coastal wetlands exacerbates this situation, since wetlands reduce storm surge impacts and during high rainfall events, wetlands reduce rates of runoff and retain surface flow, moderating flood risk.

In February 1992 the National Hurricane Center prepared the Storm Surge Atlas that mapped high velocity wave areas. The Coastal Hazards Center at the University of Puerto Rico is currently preparing a study, funded by a research grant from Sea Grant, that includes storm surge elevations associated with Category 1, 3, and 5 hurricanes. The study will assess the extent of exposure of coastal infrastructure to hurricane wind-forced surface gravity waves in the most important bays, ports, and harbors for Puerto Rico and the US Virgin Islands

Shoreline Erosion (Including Bluff and Dune Erosion)

Many factors cause shoreline changes on beaches around Puerto Rico: (1) human activities such as sand extraction, dams, and the presence of coastal structures; (2) lack of sand deposits in the nearshore area; (3) variability in the wave regime; (4) flood events of all magnitudes and frequencies; (5) the presence of submarine canyons; and (6) increase in tropical storm occurrence in the vicinity of the island. An analysis of coastal erosion and accretion had been carried out to verify the conclusions of a study of erosion rates based on historic aerial photographs. It had been anticipated that the analysis would provide the basis for a regulation by the Planning Board related to setbacks from the Maritime Zone. However, the results of the study were not supportive of a long-term erosion rate for the Island. Coastal erosion occurs in many parts of Puerto Rico. However, in coastal areas such as the shores of Guajataca and parts of Old San Juan, erosion rates are practically zero. Meanwhile, other beaches, such as in Loiza and Rincon, have been narrowing due to erosion. The process of coastal erosion can cause serious damage to terrain and structures. Some of the damage includes loss of the fertile layers of soil, loss of recreational value of some beaches and the undermining of buildings, houses, bridges, and roads. The magnitude of damage gives this hazard a high level of risk.

3. If the level of risk or state of knowledge of risk for any of these hazards has changed since the last assessment, please explain.

Sea level rise is considered a medium risk based on recent projects conducted in Puerto Rico and around the nation. However, there is growing concern about the increasing vulnerability of coastal communities to other hazards such as coastal flooding, erosion, and storms. Sea level rise is not yet acknowledged in

Commonwealth plans as a hazard due to the fact that there is no island-wide risk and vulnerability assessment for climate variability and change on which to base this conclusion.

4. Identify any ongoing or planned efforts to develop quantitative measures of risk for these hazards.

5. (CM) The table below identifies the number of communities in the coastal zone that have a mapped inventory of areas affected by coastal hazards. Where data is not available to report for this contextual measure, actions the CMP is taking to develop a mechanism to collect the data is described

Type of hazard	**Number of communities that have a mapped Inventory***	**Date completed or substantially updated**
Flooding	44/44	2007 FEMA Revised FIRMS
Storm surge	44/44	In progress by the Coastal Hazards Center of Puerto Rico (including SPOT storm surge elevations associated with Cat 1, 3, and 5 hurricanes)
Geological hazards (including Earthquakes, tsunamis)	0/44	DNER has GIS layers for earthquakes between 1824-1995 and 1989-2001
Shoreline erosion (including bluff and dune erosion)	0/44	In progress by the Coastal Hazards Center of Puerto Rico
Sea level rise	5**/44	2007
Great lake level fluctuation	N/A	
Land subsidence	0/44	
Other (please specify)		

*A *community* is a unit of local government, local governmental organization, or special unit of government (i.e. coastal municipalities). There are 44 coastal municipalities total. Puerto Rico has three FEMA communities, those that are autonomous municipalities (Puerto Rico, Ponce, Bayamon)

** Arecibo, Mayagüez, Ponce, Salinas and San Juan

Management Characterization

Purpose: To determine the effectiveness of management efforts to address those problems described in the above section for the enhancement objective.

1. Approach employed for addressing management categories, and; significant changes that have occurred since the last assessment:

Management categories ,	**Employed by state/territory** (Y or N)	**Significant changes since last assessment** (Y or N)
Building setbacks/ restrictions	Y	N

Methodologies for determining setbacks	Y	N
Repair/rebuilding restrictions	Y	N
Restriction of hard shoreline protection' Structures	Y	N
Promotion of alternative shoreline stabilization methodologies	N	N
Renovation of shoreline protection Structures	N	N
Beach/dune protection (other than setbacks)	Y*	N
Permit compliance	Y	N

Management categories	Employed by state/territory (Y or N)	Significant changes since last assessment (Y or N)
Sediment management plans	Y**	N
Repetitive flood loss policies, (e.g., relocation, buyouts)	N	N
Local hazards mitigation planning	Y	N
Local post-disaster redevelopment plans	N	N
Real estate sales disclosure requirements	N	N
Restrictions on publicly funded Infrastructure	N	N
Climate change planning and adaptation Strategies	N	N
Special Area Management Plans	Y	N
Hazards research and monitoring	Y	N
Hazards education and outreach	Y	N
Other (please specify)		

**There exist some restoration projects for beach/dune protection*
*** Project-specific by the Army Corps of Engineers and DNER under NEPA compliance*

2. Information for management categories with significant changes since the last assessment is provided below.
   a) Characterize significant changes since the last assessment;
   b) Specify if it was a 309 or other CZM-driven change (specify funding source) or if it was Driven by non-CZM efforts; and
   c) Characterize the outcomes and effectiveness of the changes.

3. (CM) Number of communities in the coastal zone that use setbacks, buffers, or land use policies to direct development away from areas vulnerable to coastal hazards is reported below. Where data is not available, actions the CMP is taking to develop a mechanism to collect the requested data is described.

Contextual measure	Number of communities
Number of communities in the coastal zone that are required to develop and implement land use policies to direct development away from hazardous areas that are approved by the state through local comprehensive management plans.	44
Number of communities that have approved state comprehensive management plans that contain land use policies to direct development away from hazardous areas. .	0

Priority Needs and Information Gaps

The table below identifies major gaps or needs (regulatory, policy, data, training, capacity, communication and outreach) in addressing each of the enhancement area objectives that could be addressed through the CMP and partners (not limited to those items to be addressed through the Section 309 Strategy). Where necessary, additional narrative describes major gaps or needs.

Gap or need description	Type of gap or need (regulatory, policy, data, training, capacity, communication & outreach)	Level of priority (H,M,L)
Address climate variability and change, such as sea level rise, implications on hazards	Data: currently no Commonwealth-wide risk and vulnerability set exists for sea level rise. Because of this, it is difficult to encourage local governments and other agencies to integrate SLR into their plans. Policy/Capacity: Also needed in order to address SLR as a hazard in the Commonwealth Hazard Mitigation Plan	High
Institutional arrangement to support inter-agency collaboration and coordination	Institutional issues with respect to agency roles and responsibilities could impede program success. A great deal of inter-agency collaboration, particularly between DNER/CMO and PB staff will be required to formulate and implement effective and enforceable policies and measures. Additionally, at key points the top levels of DNER, PB, and representatives of the	High

	Governor's office will need to be involved in the review of issues and policy directions since the resolution of coastal hazard vulnerability issues go well beyond technical considerations. Without senior level involvement and support, technical staff will find it difficult to move program recommendations to the implementation stage.	
A comprehensive coastal hazards and geomorphic feature database	In order to make informed policy recommendations and develop adaptation projects comprehensive data on multiple hazards is needed. Additionally necessary is a GIS database of key geomorphic features and wetlands that provide protection to coastal communities from natural hazards.	High
An island-wide adaptation strategy	This collaborative document will use the vulnerability analyses to identify potential, feasible mechanisms for adoption, such as policies, laws, regulations, measures, and private sector and civil society actions for Puerto Rico. It is anticipated that this strategy will identify other potential gaps and needs for the future.	High

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Enhancement Area Prioritization

1. Level of priority of the enhancement area for the coastal zone (including, but not limited to CZMA funding)?

High _X_
Medium _____
Low _____

Justification of priority given for this enhancement area.

During recent decades there has been an increase in the demand for space in coastal lands to construct second homes and tourism related facilities. Many shoreline hardening structures, groins, and breakwaters affected littoral processes increasing vulnerability and coastal communities exposure to coastal hazards. Activities in the upper reaches of river basins also have an impact on erosion changing the sedimentation patterns in the coast by reducing sediment inputs into the system. In Puerto Rico there are 8,431 hectares classified as coastal barriers. These are principally in the southwest and northeast sides of the island. These are fragile coastal areas and natural systems vulnerable to increasing sea levels, and exposure to storms, floods, and natural hazards. The PRCZMP has adopted coastal hazard policies as part of the body of the coastal resources management plan. However, there is a need to further define specific policies and management strategies to address current and potential impacts associated with climate change, sea level rise, and associated coastal hazards in light of new knowledge and model projections. A local NGO, *Cuidadanos del Karso¸* commissioned a study to estimate the potential impact of rising sea levels on five municipalities in Puerto Rico. By modeling three different scenarios (1m, 2m, and 3m SLR) they found that major infrastructure is threatened such as flood control projects, freight and passenger ports and marinas, major roads, the international airport, agriculture, aquifers, and communications infrastructure. Therefore, due to the significant threat of coastal hazards and climate variability in the Commonwealth and the resulting need for community resiliency guidance, this enhancement area is considered a high priority.

2. Will the CMP develop one or more strategies for this enhancement area?

Yes

Why a strategy will be developed for this enhancement area.

Projected sea level rise impacts threaten to greatly exacerbate the vulnerability of Puerto Rico's already at-risk coastal resources. Also, FEMA approved the Commonwealth Multi-Hazard Mitigation Plan, and local mitigation strategies do not address sea level rise. There is a need to advance sea level rise adaptation and vulnerability analyses through action at the Commonwealth and local level. An assessment and strategy will be developed that will lay a foundation for integrating SLR adaptation into Puerto Rico's land use planning framework and for identifying SLR as an issue that affects hazards in future mitigation plans. A model for simulating future SLR and coastal hazard impacts will be identified and guidance will be developed for all levels of government and PR society to incorporate hazard data into their local plans, regulations, projects, policies, special area management plans, and post-disaster redevelopment plans.

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PUBLIC ACCESS ASSESSMENT

Section 309 Enhancement Objective

Attain increased opportunities for public access, taking into account current and future public access needs, to coastal areas of recreational, historical, aesthetic, ecological or cultural value.

Summary of 2006-2010 Program Accomplishments

During the 2006-2010 Sec. 309 cycle there were significant program enhancement accomplishments. These included devising procedures for identifying and evaluating coastal access sites, networking with local and commonwealth agencies in conducting an island-wide signage program, implementing enforceable policies with respect to public access objectives, conducting outreach activities targeted to local government entities, and strengthening program effectiveness through Collaborative Agreements (MOUs) with coastal municipalities. Representative activities and milestones are specified below as indicative of program accomplishments.

- Posters, brochures and access guides for the northwest section of PR were prepared and distributed for the municipalities of Isabela, Quebradillas, Camuy, Hatillo, Arecibo, Barceloneta, Manati.

- Aerial and terrestrial photos were taken to nurture the CZMP coastal municipalities' inventories data bank.

- Co-participant in the study "Present State of Conditions of the Municipal Beaches and State Public Beaches of PR", commissioned by the DNER Interagency Beach Board.

- Development of the Coastal Camping and Kayak Trail Recreational area at Pozuelo , Jobos Bay, Guayama.

- Public access evaluation and study was conducted for the San Juan Metropolitan areas of Ocean Park- Punta Las Marias Sector as required by Regulation and Permits Administration.

- The Isabela municipality approved and signed Collaboration Agreement with DNER-CZMP.

- The Barceloneta municipality approved and signed Collaboration Agreement with DNER-CZMP

- Edition of the bilingual PRCZMP CD "" Uses and Resources of Puerto Rico Coast, "" Coastal Resources Uses and Conflicts. Aerial and terrestrial photos of 309 Public Access task were used to complete CD.

- Access guides and posters were prepared and distributed for the Municipalities of Vega Baja, Vega Alta, Dorado, Toa Baja, Cataño, and San Juan.

- Evaluation of "Coastal Erosion Assessments" for the public beaches and access sites for Toa Baja, Levittown and Dorado public beach sectors.

- Evaluation and approval of the PRCZMP Federal Consistency Application for the Mayaguez Linear Waterfront Park.

- Access guides were prepared and distributed for the municipalities of Carolina, Loiza, Rio Grande, Luquillo, Fajardo and Ceiba

- Access guides were prepared and distributed for the municipalities of Naguabo, Humacao, Yabucoa, Maunabo, Patillas, and Arroyo.

- Collaboration Agreement was approved and signed by the DNER-CZMP and municipality of Toa Baja

- Inventories and surveys were undertaken for the South West Segment for the Municipalities of Guayama, Salinas, Santa Isabel, Juana Diaz, Ponce, Peñuelas, Guayanilla, Yauco, Guánica and Lajas.

- Co-participant in the PRCZMP Coastal Areas Sites Signage System.

Summary of 2011-2015 Program Focus

Building on the accomplishments of the 2006-2010 enhancement program, 2011-2015 enhancement activities represent program changes that:

- Foster urban waterfront park acquisition, enhancement and development to promote public access while simultaneously contributing to economic development;
- Encourage the incorporation of coastal parks and promenades into community plans providing public access at the community level while protecting upland areas from storm surge and other coastal hazards;
- Strengthen community resilience in confronting the potential impacts of climate change by using coastal parks and open space as protective infrastructure from coastal hazards.

Program activities will include: The systematic assessment of urban waterfronts and small boat harbors in non-metropolitan coastal municipios; identification of opportunities for the development and/or enhancement of waterfront parks for both public access and as protection against coastal hazards, and; selecting one or more pilot municipios, demonstrating how regulatory and programmatic measures can be used to acquire, improve, and maintain public access sites to meet current and future demand.

Technical assistance to coastal municipalities will be the principal means of accomplishing program objectives. Project implementation will continue to be vested at the local level with concurrence from the

Planning Board.

Resource Characterization

Problems and opportunities with regard to the enhancement objective.

1. Threats and conflicts to creating and maintaining public access in the coastal zone:

TABLE: THREATS AND CONFLICTS

Type of threat or conflict causing loss of access	**Degree of threat (H M L)**	**Description of trends and/or statistics that characterize the threats and resultant impacts on coastal access**	**Type(s) of access affected**
Private residential development (including conversion of public facilities to private use)	M	Residential shorefront development on the main island has slowed significantly due to the economic recession. The two exceptions are Vieques and Culebra where second home and retirement homes are being constructed in coastal locations.	Public access continues to be constrained due to limitations on vehicular parking, and the absence of facilities at outlying beach locations. Gated communities in urban areas also act to discourage public access.
Non-water dependent commercial/industrial uses of the waterfront (existing or conversion)	M	Over the long-term, waterfront industrial use is being replaced by hotel and condominium development. Near-term, all waterfront development is in a downturn due to credit and other financial constraints to new development. Mayaguez and Aguadilla have initiated major waterfront development projects. But few changes have occurred in most non-metropolitan coastal municipalities.	The net effect of the displacement of waterfront commercial/industrial use by residential and open space uses has been to increase opportunities for public access, although on a limited scale since provision for public access is generally a low priority in the reuse conversion process.
Erosion	M	This is a localized problem resulting from storm events and oceanographic conditions.	Not a significant island-wide impediment to access. However, localized shoreline impacts can be severe.

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Sea level rise	L	No near-term evidence, but significant long-term potential threat.	Poses a long-term threat to beach and coastal recreational uses and to shorefront properties.
Natural disasters	H	Major threat to coastal communities and to regional beach recreational facilities with potentially severe economic impacts on tourism sector.	Result in destruction of public beach facilities, piers and marinas.
National security	L	A positive trend with transfer of military bases to the PR government.	Result in net increase in public access, most recently at the former Roosevelt Roads Navy Base in Ceiba.
Encroachment on public land	H	Encroachment problems continue to persist in Vieques and Culebra and in key south coast locations such as Parguera and the perimeter of the Jobos NERR	Illegal construction on public domain lands poses a major access and environmental threat. Addressing illegal construction in the maritime-terrestrial zone will be a costly, legally contentious, long-term process.

2. Emerging issues that are starting to affect public access or seem to have the potential to do so in the future.

There are no new issues that threaten to adversely affect public access. However, with economic recovery, it can be anticipated that development pressures on waterfront land will intensify. Development pressures will be most pronounced along the northeast coast as well as in areas such as Culebra and Vieques where the conversion of military bases to civilian use has resulted in an upsurge in tourism, and retirement and second home construction.

3. (CM) Public perception of access availability to coastal recreational opportunities.

Findings on public perception of coastal access availability have been obtained primarily from surveys conducted for the 2008-2013 SCORP.

The CMP lacks the resources for conducting systematic surveys of this nature. However, based on information from multiple sources such as SCORP and DNER's environmental education and outreach program, the CMP has the capability of assessing local and regional demand for coastal recreational access.

A key finding, elaborated on below, is that coastal recreational access in unevenly distributed around the Island and that the lower socio-economic strata have the least opportunities for such access. The greatest potential for increasing coastal access is by concentrating on expanding opportunities in urban communities around the coast. The new program focus addresses these issues.

TABLE: ASSESSING PUBLIC DEMAND

Contextual measure	**Survey data**
Number of people that responded to a survey on recreational access to coastal locations	No user surveys have been conducted by DNER/CMO. The 2008-2013 SCORP conducted a recreational demand survey based on telephone interviews with 551 households (approx. same number of persons).
Number of people surveyed that responded that public access to the coast for recreation is adequate or better	The 2008-2013 SCORP conducted interviews with 551 households in ten regions of the island including Vieques and Culebra. Approx. 50% felt rec. opportunities had improved in last 5yrs.
Type of survey conducted (i.e. phone, mail, personal interview, etc.) by SCORP.	Telephone interviews with households; meetings with two focus groups (one with NGOs; one with local officials)
Geographic coverage of the survey.	Island-wide in ten regions of the island including Vieques and Culebra
Year the survey was conducted.	Household survey and focus groups in 2007-2008

4. Characterization of the demand for coastal public access within the coastal zone, and the process for periodically assessing public demand.

While there is no current indication of wide spread public dissatisfaction with existing access opportunities, the most recent SCORP user demand survey highlighted a number of significant findings. Among major concerns expressed by respondents were:

- Lack of accessibility to regional recreation facilities
- Absence of public transportation
- Limited availability of parking
- Shortage of facilities for people with disabilities
-

Other survey findings:

- 51 percent of respondents engage in recreational activity in their local communities
- 49 percent of respondents engage in aquatic or beach related activities
- 50 percent believed that opportunities for outdoor recreation had improved between 2005 and 2008

The SCORP findings emphasized the need to provide recreational opportunities "at a community level", as well as the importance of providing recreational opportunities to all strata of the population. Given the severity of Puerto Rico's ongoing economic problems, constraints on government spending for capital projects are likely to preclude any near-term expansion of regional recreational projects along the coast.

5. Data on public access availability.

The information provided on the table below is based on the best available data. The CMP is continuously adding to our data base through the Department's geo-coding and mapping program.

TABLE: PUBLIC ACCESS AVAILABILITY

Types of public access	**Current number(s)**	**Changes since last assessment (+/-)**	**Data source**
(CM) Number of acres in the coastal zone that are available for public access (total acres in the cz and acres avail. For public use)	Aprox.885,625 acres	Areas zoned as Public Coastal Accesses or Beaches by PRPB. Change is not statistically significant sin last assessment	PRCMP RS-GIS and updated CZM program document
(CM) Miles of shoreline available for public access (report both the total miles of shoreline and miles available for public access)	Puerto Rico's shoreline, including off shore islands is 462 miles of which 131 miles of beach are available for public access (public domain)		CMO Cartographic data base (GIS) and special DNER surveys.
Number of State/County/Local parks and number of acres	There are 15 Commonwealth	No statistically significant change	Regional surveys conducted by CMO and

	managed public beaches covering 1500 acres. Larger cities such as Ponce and Carolina operate their own beach facilities. Some of the island's 43 coastal municipios have developed small beach sites that cater to local needs.		Public Access component of Sec. 309 Program. SCORP
Number of public beach/shoreline access sites	Fifteen full service public beach sites; two large municipal beach sites; approximately 300 small municipal access sites	No statistically significant change	Regional surveys conducted by CMO, Public Access component of Sec. 309 Program. DNER Regional Offices Beach Cleanup activities
Number of recreational boat (power or non-power access sites)	60 boat access sites	No statistically significant change	As above, SCORP
Number of designated scenic vistas or overlook points	87	None	SCORP and CMO data base
Number of State or locally designated perpendicular rights-of-way (i.e. street ends, easements)	Approx. 250	Data unavailable	Planning Board
Number of fishing access points (i.e. piers, jetties)	One (1) fishing pier designated in Humacao; numerous fishing villages have multi-use piers and jetties.	None	CMO data base
Number and miles of coastal trails/boardwalks	Three (3) miles in Piñones/ Loiza, Ponce, Aguirre Forrest/ Guayama	Two (2); Isabela, coastal pedestrian and bicycle trail, and the Mayaguez boardwalk and lineal park	CMO data base, SCORP
Number of dune walkovers	Three(3) dune walkovers all in Piñones		CMO data base
Percent of access sites that are ADA compliant access	Two (2) at Luquillo and Boqueron	Approx. 10 percent of major beach facilities	CMO data base

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Percent and total miles of public beaches with water quality monitoring and public closure notice programs	All Commonwealth and municipal beaches	No change	Environmental Quality Board, Beach Water Quality Monitoring program
Average number of beach mile days closed due to water quality concerns	None at major regional facilities	No change	Environmental Quality Board; seasonal records

Supplementary Information Pertaining to Resource Characterization

The following material is intended to supplement and provide a fuller context for the information presented in the foregoing tables that have been prepared in conformity with the July 2009 NOAA Guidelines. While the text may replicate earlier Sec. 309 assessments, all quantitative information has been updated to reflect current conditions.

1. Public Access to Beaches and Shorefront

   a. Coastal Beach and Recreational Facilities: Parks in Puerto Rico that provide access to the coast are owned and/or managed by Commonwealth agencies, local governments or, in a few cases, by the Conservation Trust.

      - The National Parks Development Company (NPDC) has recently been incorporated into the PRDNER. The NPDC had developed a full complement of recreational support facilities at 15 public beaches covering about 1500 acres along some 33 kilometers of the best beaches on the Island. No new regional recreational facilities have been developed in the period 2006-2010.

      - As a result of military base closing in Culebra, Vieques, and at Roosevelt Roads, and the subsequent transfer of significant areas of beachfront property to the Commonwealth government, there is the possibility of new public recreational beach development in the future.

      - Regardless of tenure or management arrangements, all of Puerto Rico's 150 kilometers of beach are accessible to the public since they are in the public domain. The great majority of these beaches lack changing and sanitary facilities, and have little or no space for vehicular parking. Thus, while access is open, the absence of associated infrastructure limits their utility.

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While most large public beaches are managed by the Commonwealth, there are a few exceptions:

- The city of Ponce has developed an integrated public beach, boardwalk and park facility at the La Guancha Coastal port area and a recreational complex at Las Cucharas with a hotel, Water Park and other amenities.

- The municipality of Carolina has managed the operation of the Isla Verde Beach during the past decade. In the period 2006-2010 the municipality invested approximately $2 million in a beach nourishment program for its 1,000 meter shoreline.

Some of the island's 43 coastal municipios have developed small beach facilities that cater exclusively to local needs and take advantage of unique physical attributes that require minimal investment. These largely undocumented micro-projects, in the aggregate, enhance coastal access in many of the small towns around the island. For example, the reconstruction of Vega Baja's Puerto Nuevo Beach, waterfront road and boardwalk occurred in 2009-10.

The Sec. 309 Public Access program has provided support to a number of these local efforts through advice on integrating funding from multiple sources to maximize project results, including the use of 306a funding of small construction projects. DNER's expertise on coastal hazards can also provide local municipal councils on building setbacks and elevations to minimize vulnerability to coastal flooding.

b. Boat Ramps: DNER conducts an active program of boat ramp construction for recreational fishing and boat launching, funded in part by the US FWS.

- As of 2010, 60 public boat-launching ramps exist island-wide, a majority of which provide access to salt water. Program expansion has responded to a major upsurge in public demand for recreational boating and fishing facilities. A new fishermen's boat ramp, dredging and breakwater is being designed at Arecibo marina channel entrance funded by USFWS

- In the past 5-year period newly constructed facilities include the Humacao fishing pier, the Cataño, Toa Baja and Cabo Rojo boat ramps and trailer parking facilities.

- During 2007-2008, new public access boat ramps were built by DNER at El Combate, Cabo Rojo, Isla de Cabras, Toa Baja, and Cataño. Three

additional USACE-funded projects are currently being permitted for La Parguera; Caño Tiburones, and Aguadilla.

- DNER has designed three more public projects for coastal boating access: Caño Tiburones (Arecibo), Aguadilla breakwater (Aguadilla), and Piñones (Loiza).

c. Scenic Vistas. Redevelopment of industrial waterfronts to include coastal promenades with vistas of the harbor and adjacent waterways has occurred in Old San Juan, Ponce and Mayaguez. These metropolitan centers have the resources and administrative capabilities that are lacking in many of the smaller coastal municipalities.

Smaller urban centers possessing sheltered harbors and visual attributes can similarly benefit by creating seaside parks and promenades. Such development, particularly in high vulnerability locations, should be designed to mitigate potential damage from coastal hazards. Working with smaller municipalities to realize these potentials is proposed as an integral part of the 2010-2015Sec. 309 strategy for enhancing public access to the coast.

d. Rights-of-way: The principal measure for providing public-rights-of-way to the shore continues to be Planning Board Regulation Number 17 which requires that all new shoreline development projects provide access to adjacent coastal areas. There is no current count of the number of these rights-of-way around the island, nor is there any record of how r-o-w,s are maintained. The tendency is to be reactive rather than proactive in response to complaints. There is an obvious need to improve management oversight over the r-o-w process in coastal subdivisions.

This can most effectively be done on a local level. CMO, working through the Sec. 309 program is in a position to provide technical assistance and information to municipal officials, and encourage local community-based organizations to take a proactive role in seeing that these public access-ways are identified and remain unrestricted for public access.

e. Fishing Piers: Most of Puerto Rico's 92 artisanal fishing communities have piers. However, island-wide, few new piers have been constructed for recreational fishing. This is especially true on the north coast where high wave energy and lack of protected inlets limit the potential for recreational fishing. New fishing piers, seaside observation decks, and improvement of small boat harbors are being proposed as part of the new public access strategy for 2011-2016.

g. Access for the Disabled: New public beach facilities are designed to meet the requirements of the ADA. Older facilities are slated for modification as funds are made available. An estimated 5-10 percent of public beaches provide facilities for the disabled.

h. Boardwalks/Walkways: A wide variety of pedestrian access ways, including dune-walk-over's, exist in Puerto Rico. They vary from small seaside promenades in coastal municipios to the very extensive waterfront walks in Old San Juan and Ponce.

- Aguadilla, Arecibo, Arroyo, Guánica, Cataño, Mayaguez, Ponce, Naguabo, Santa Isabel, Aguada, Toa Baja, Luquillo, Fajardo and San Juan have pedestrian promenades along their waterfronts.
- DNER has constructed some elevated walkways and dune cross-overs in beach and mangrove areas, most notably in the Piñones area, the Aguirre Coastal State forest and, the Jobos Bay NERR.

i. Refuges: Two wildlife refuges have been formally designated in Puerto Rico, one in Boqueron in the southwest, and the other, the Caño Martin Peña in the San Juan area, and part of the San Juan Bay Estuarine System. The latter incorporates an elevated jogging platform that follows the waterway and fringing mangroves through the heart of the most heavily urbanized area of metropolitan San Juan. The Boqueron refuge, replete with signage provided by DNER, directs visitors to piers, observation towers, and walkways that provide manifold experiences of coastal and marine ecology.

j. Other Recreational Boating Facilities: As reported by the U. S. Coast Guard, in 2010 there were 60,652 registered boats in Puerto Rico, of which 59,295 were recreational vessels. While Puerto Rico does not have any public marinas, the rapid growth of recreational boating has induced the establishment of 40 private marinas, boat yards, and boating clubs that can accommodate about 10,000 vessels in the water and on racks. Almost 16,492 jet-skis have been sold in Puerto Rico during recent years. The increase in operation of personal watercraft (jet skis) has raised safety concerns at public beaches. Accordingly, pursuant to the Marine Safety Law (Law 48 of 1986, as amended by Law 430 of 2005), DNER, through the Commissioner of Navigation, has installed 31 kilometers of buoys at 47 of the most popular beaches to separate boaters from encroaching on swimming areas.

2. Demand for Public Access

The ever-increasing popularity of water-related recreation by residents is in addition to the demand generated by non-resident tourism. Public access to the beach is a fundamental right in Puerto Rico as contrasted with other Caribbean locations. Awareness of access

rights-of–way, as well as the availability of facilities, has been significantly improved by the signage program implemented under the Sec. 309 program.

3. Impediments to Providing Access

The most significant impediments to increasing public access to the coast are:

- A shortage of funding at both the Commonwealth and municipal levels for land acquisition, and for new facility construction;
- While Regulation 17 may require public easements at subdivisions adjacent to the sea, there is a lack of local resources for parking, sanitary facilities, and solid waste collection at designated access points.

Management Characterization

Effectiveness of management efforts to address those problems described in the above section.

1. Approaches employed in addressing problems.

For each management category the significant changes that have occurred since the last assessment are indicated in the table below:

Management categories	**Employed by state/territory (Y or N)**	**Significant changes since last assessment (Y or N)**
Statutory, regulatory, or legal system changes that affect public access	Y	Y
Acquisition programs or policies	Y	N
Comprehensive access management planning (including GIS data or database)	Y	N
Operation and maintenance programs	Y	N

Alternative funding sources or techniques	Y	N
Beach water quality monitoring and pollution source identification and remediation	Y	Y
Public access within waterfront redevelopment programs	Y	Y
Public access education and outreach	Y	Y
Other (please specify): Maritime infrastructure	Y	N
Public Access Enhancement	Y	Y

2. The management categories with significant changes since the last assessment are elaborated upon below:

- Characterization of significant changes since the last assessment;
- Determination if it was a 309 or other CZM-driven change (specify funding source) or if it was driven by non-CZM efforts;
- Outcomes and effectiveness of the changes.

a. Regulatory Programs.

No significant changes have occurred in regulatory programs affecting coastal access since the adoption of the Maritime Zone Regulation (Reg. 4860, 1992) that was incorporated into the PRCZMP through the RPC process.

b. Acquisition Programs.

The withdrawal of the Navy from Vieques and the 2004 closing of the Roosevelt Roads Navy Base at Ceiba, has resulted in the transfer of major waterfront holdings from the federal to the commonwealth governments. A reuse plan for the former Roosevelt Roads base is being prepared by a special commission, but no recommendations for the future use of the holdings have been made public.

Although DNER has successfully competed for and accessed federal funds from the Fish and Wildlife Service Coastal Program and from the CELCP program of NOAA, no significant public acquisitions of waterfront properties have occurred in the period 2005-2010.

c. Operation and Maintenance Programs.

DNER's regional offices though beach brigades and private contractors engaged by local governments conduct regular beach cleaning activities at the most popularly used beaches, as well as in major tourist areas. Limited support for O&M activities is provided by the CMO through the 306 program. The O&M program has slowly evolved since the last assessment and now represents a significant source of local support for the Sec. 309 public access program.

d. Innovative Funding Techniques.

All funding for public access is provided through standard budgetary processes. Fee income from camping and similar charges reverts to the general fund. No innovative measures for increased funding for public access have been proposed.

e. Public Education and Outreach.

Under the regular Sec. 306 program, DNER has consolidated its public education and community outreach resources under an Assistant Secretariat for Information and Education. The outreach staff of the Ranger Corps and the Marine Safety education staff of the Commissioner of Navigation continue to function independently. The consolidation promotes more efficient coordination and scheduling of educational and outreach activities and permits more effective use of personnel and audio-visual equipment available for that purpose.

f. Coastal Water Quality.

Water quality sampling, testing and monitoring is under the jurisdiction of the Environmental Quality Board, with funding provided by the U.S. Environmental Protection Agency. Water quality test results are published quarterly and made available to the public through local media. To provide broad oversight on beach conditions the legislature established the State Beach Management Board (Junta de Playas). Membership included EQB, DNER, Navigation Commission, Tourism Company, National Parks Company, Commonwealth Police Department and the Ranger Corps.

2. Preparation of printed access guides

During 309 Public Access task funding, aerial and terrestrial inspections, local surveys and interviews were conducted to complete the following documents:

- West Segment Access Guide for the municipalities of Aguadilla, Aguada, Rincon,Anasco, Mayaguez and Cabo Rojo

- Northwest Segment Access Guide for the municipalities of Isabela, Quebradillas, Camuy, Hatillo, Arecibo, Barceloneta and Manati.
- North Segment Access Guide for the municipalities of Vega Baja, Vega Alta, Dorado, Toa Baja, Catano, San Juan.
- Northeast Segment Access Guide for the municipalities of Carolina, Loiza, Rio Grande, Luquillo, Fajardo, Ceiba.
- Southeast Segment Access Guide for the municipalities of Naguabo, Humacao, Yabucoa, Maunabo, Patillas, Arroyo.
- South Segment inventories are being conducted to complete the South Segment for the municipalities of Guayama, Salinas,Santa Isabel , Juana Diaz, Ponce, Penuelas , Guayanilla, Yauco, Guanica, Lajas

During the first year of the 2011-20015 program cycle, a Comprehensive Island wide Access Guide will be prepared. This will identify access sites as well as opportunities and conflict areas for the 43 municipalities.

Priority Needs and Information Gaps

1. Governmental commitment for proactive access program.

Puerto Rico's tourism industry is highly dependent on maximizing public access to the coast. However, there is no formal commitment on the part of the executive or legislative branches to implement a public access program other than though enforcement of the Maritime Zone Regulation (Reg. 4860) and PRPB Regulation 17. While the potential exists for carrying out a plan that combines federal, local, and private resources that would increase accessibility to the coast, such an initiative has not received official support, nor have funds for land acquisition been made available from the legislature on a regular basis.

2. Public funding.

Although the Natural Heritage Program has been assigned some resources by the Legislative Assembly with which to acquire critical environmental lands, such funding is not regularly replenished, and cannot be relied upon for implementing a long-term acquisition program that enhances public access to the coast.

3. Local government involvement in CZMP.

No overall program has been developed whereby municipal governments participate in coastal zone planning and management despite having obtained increased planning authority under the Municipal Reform Act and, more recently, as a result of the Permit Process Reform Act (Dec.1. 2009). Nevertheless, as a result of the Sec. 309 coastal access program there have been examples of specific project agreements with municipios for public access facility development, as well as cooperation in implementing the coastal access signage program. The Sec. 309 coastal access program for 2010-2015 builds on these relationships by providing local government with measures and procedures for enhancing coastal access by innovative funding and acquisition measures.

Enhancement Area Prioritization

Rating.

Prior assessment: HIGH

Current assessment: HIGH

Justification

Justification for assigning a high priority to public access is borne out by the most recent SCORP, the results of CMO staff findings, and by the public response to the survey conducted by DNER in formulating the 2011-2015 Sec.309 program.

The past work done under the access component of the Sec. 309 program has laid the basis for a more integrated island-wide public access program working with the Department of Recreation and Sports.

The publication of brochures showing beach access is a major advance in building public awareness of beach and coastal resources. This work will be completed during first year of the next Sec. 309 iteration. Results will continue to be posted at the Coastal Zone Division section of the Department of Natural and Environmental Resources web site.

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OCEAN RESOURCES ASSESSMENT

Section 309 Enhancement Objective

Planning for the use of ocean resources within the Puerto Rico territorial waters and submerged lands beneath them.

Resource Characterization

Purpose: To determine the extent to which problems and opportunities exist with regard to the enhancement objective.

1. In the table below characterize ocean resources and uses of Commonwealth concern, and specify existing and future threats or use conflicts.

Resource or use	**Threat or use**	**Degree of Threat**	**Anticipated threat**
Mangroves	Direct and indirect impact from development of public and private infrastructure, land based sources of pollution, water quality degradation	M	Loss of resource area and reduction of system's capability to adapt to sea level rise
Estuaries	Shoreline modification, water quality degradation, land bsed sources of pollution	M	Urban and agricultural loadings
Coral Reefs and associated benthic communities	Coral reefs , benthic habitats, Increase in Sea Surface Temperature, water quality degradation.	M- H	Loss of live coral cover due to land based sources of pollution, sedimentation, climate change; bleaching and increased disease, vessel groundings and anchor damage, oil spills.

Seagrass	Coastal development water quality degradation; boat scaring; shoreline change, oil spills	L-M	Coastal Development, boater Impacts, land based sources of pollution, reduced light penetration resulting in loss of areal extent; oil spills
Fisheries	Loss of habitat, overfishing	M	Loss of habitat due to land based sources of pollution, climate change impacts on coral reefs, overfishing
Sea Turtles	Coastal development, light pollution, shoreline hardening, loss of nesting areas due to beach erosion	M	Loss of nesting areas associated to coastal development, shoreline hardening and beach erosion
Marine Mammals	Boating, water Quality, oil spill risks	L-M	Impacts to marine mammals by boating activities or oil spills

2. Describe any changes in the resources or relative threat to the resources since the last assessment.

Coral Reefs and associated benthic communities

Threats to coral reef ecosystems have increased due to land based sources of pollution, bleaching and mortality associated to diseases. During 2005, live coral cover was severely impacted by increased sea surface temperatures and disease. Coral reefs have been declining for he past decades. NOAA's Coral Reef Conservation Program has been instrumental in providing greater understanding of the threats to coral reefs.

Seagrass resources

Puerto Rico has abundant seagrass resources. There has been an increases in seagrass coverage between Vieques and the main island of Puerto Rico. In the past dredging at the Port of Las Americas (Ponce) and the navigation channel of EcoElectica Power Plant facilities. These dredging activities impacted benthic habitats consisting of seagrass beds and hard bottom habitats. Seagrass habitats are directly impacted by dredging activities or boat propel scaring or indirectly by reduced light penetration caused by increased sedimentation or burial from dredging activities.

General

Although there are policies and regulations providing protection of ocean resources, permitting allows for development-related impacts to coastal and marine resources. The U.S. Army Corps of Engineers, Fish and Wildlife Service, National Marine Fisheries Service and DNER are the key agencies making decisions about these resources uses and protection. Climate variability and change may be the greatest threat to these resources. Recreational boating is greater in Puerto Rico Northeast area with approximately 75% of the 60,000 registered boats.

Management Characterization

Purpose: To determine the effectiveness of management efforts to address those problems described in the above section for the enhancement objective.

1. For each of the management categories below, indicate if the approach is employed by the state or territory and if significant changes have occurred since the last assessment:

Management categories Employed

Management categories	Employed by State/Territory (Y/N)	Significant changes since last assessment (Y/N)
Comprehensive ocean management plan or system of Marine Protected Areas	Y	N
Regional comprehensive ocean management program	N	N
Regional sediment or dredge material	N	N

management plan		
Intra-governmental coordination mechanisms for Ocean management	Y	Y
Single-purpose statutes related to ocean Resources	Y	Y
Comprehensive ocean management statute	N	N
Ocean resource mapping or information system	Y	Y
Ocean habitat research, assessment, or monitoring programs	Y	Y
Public education and outreach efforts	Y	Y

2. For management categories with significant changes since the last assessment provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference rather than duplicate the information.

a) Characterize significant changes since the last assessment;
b) Specify if it was a 309 or other CZM-driven change (specify funding source) or if it was driven by non-CZM efforts; and
c) Characterize the outcomes and effectiveness of the changes.

Single-Purpose Statutes Related to Ocean Resources

The Commonwealth of Puerto Rico enacted Law 147 on July 15, 1999. DNER framework act (Law 23, 1972) establishes the mandate and responsibilities of DNER over territorial waters and submerged lands. Fisheries regulation was amended in 2010. Amendments include clarification of marine species permanent or seasonal closures, penalties. No CZM changes have taken place.

Ocean Resource Mapping or Information System

PRCMP developed and maintains its Remote Sensing and GIS unit. This system is integrated to DNER's GIS and to the newly developed Government-wide Information System. This Island-wide system serves spatial data and metadata to support resource management. There has been an increased use of GIS for mapping coastal and estuarine habitat.

Ocean Habitat Research, Assessment, or Monitoring Programs

Coral reef, coastal habitats and geomorphic features and estuarine monitoring efforts at DNER, EQB, JBNERR, and the San Juan Bay Estuary Program have expanded. NOAA's Biogeography program and CaRA-CARICOOS routinely meet with PRCMP Director and staff as well as UPR scientists to identify data collection, information processing and management needs.

Public Education and Outreach Efforts

There has been an increase in CAMA programs to educate public.

Caribbean Region Ocean Partnership

In the islands of the Caribbean, all communities are coastal. Puerto Rico's coastal communities are highly dependent upon the ocean and its resources to support dynamic ecosystems, clean waters, working waterfronts, interstate commerce, tourism, recreation, navigation, energy, and healthy, disaster resilient communities. A need exists for the development of a comprehensive regional ocean partnership (ROP) plan for the U.S. Caribbean territories to manage coastal and marine ecosystems as they respond to natural processes and anthropogenic activities. Effective communication, coordination, and cooperation among the regional stakeholders are necessary to develop sustainable management plans specific to regional territories and nations, and for the Caribbean region as a whole, that aim to reduce existing and anticipated conflicts among stakeholders. By way of written intent from the Governors, Puerto Rico and the U.S. Virgin Islands are committed to advancing coastal and marine spatial planning (CMSP) in alignment with the Ocean Policy Task Force. Regional organizations such as the Caribbean Fisheries Management Council, SeaGrant, CaRA-CARICOOS, and the Caribbean Coral Reef Institute support this PRCMP initiative. PRCMP, the U.S. Virgin Islands and The Nature Conservancy have partnered to seek funding to initiate the development of the ROP initiative.

Priority Needs and Information Gaps

Using the table below, identify major gaps or needs (regulatory, policy, data, training, capacity, communication and outreach) in addressing each of the enhancement area objectives that could be addressed through the CMP and partners (not limited to those items to be addressed through the Section 309 Strategy). If necessary, additional narrative can be provided below to describe major gaps or needs.

Gap or Need description		
Staff training to assess coral damage	Training	H
Inventory of viable offshore renewable energy sites	Policy	H
Coral reefs and associated communities mapping and monitoring	Data and information processing	H
Long-term monitoring of coastal habitats and biodiversity	Capacity building: data collection and analysis	H
Policy and regulations	Regulatory and enforcement	M-H

7. Level of priority is the enhancement area for the coastal zone (including, but not limited to, CZMA funding).

High
Medium: X
Low

Justification for level of priority given for this enhancement area.

Coastal managers and stakeholders consulted ranked ocean resources as a medium-high priority. Most stakeholders indicated that this enhancement category needs priority attention yet, most agreed that there were higher priority needs in Puerto Rico. The PRCMP recognizes that Ocean Resources and the proposed work and requested funding to develop the Caribbean Regional Ocean Partnership will enable Puerto Rico to comprehensively address issues such as energy facility siting, aquaculture, marine debris, and certain aspects of climate change. This work is proposed to be developed following the guidelines issued by the White House through the Executive Order of President Obama (July 2010).

8. Will the CMP develop one or more strategies for this enhancement area?

Yes
No X

Why a strategy will not be developed for this enhancement area.

The PRCMP will not develop a comprehensive strategy for this enhancement although it is recognized as the ideal coastal and marine spatial planning framework to address multiple threats to ocean resources in Puerto Rico.

The Governments of Puerto Rico and the U.S. Virgin Islands have agreed to pursue the development of the U.S. Caribbean Regional Ocean Partnership. Funding may limit the extent to which regional cooperation progresses. Both jurisdictions recognize the need for a coordinated perspective on the mapping, monitoring, and management of marine corridors.

PRCMP actively participates at several Federal and Commonwealth initiatives to map, monitor, and manage coral reefs and associated communities. Improving knowledge abut ocean resources through mapping and monitoring activities is critical to developing baseline data and information to support ecosystem management. This is particularly important in the face climate variability and change, which has the potential to severely impact Puerto Rico's ocean and coastal resources.

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MARINE DEBRIS ASSESSMENT

Section 309 Enhancement Objective

Marine debris reduction through management activities, taking into account current and future distribution trends.

Resource Characterization

As much as 80% of marine debris comes from land, according to the United Nations Environmental Program. In Puerto Rico voluntary groups annually record marine debris data as part of the international coastal cleanup activities. These data will be useful to guide management decisions based on local distribution trends.

NOAA defines marine debris as any manmade object discarded, disposed of or abandoned that enters the coastal or marine environment. It may enter directly from a ship, or indirectly when washed out to sea via rivers, streams and storm drains. In the last four decades, the world's dependence upon natural materials has been largely replaced with synthetics.

The management and disposal of solid waste in Puerto Rico has long been a challenge. The problem is intensified by the limited disposal space available on an island community and Puerto Rico's delicately balanced ecosystem. Puerto Rico residents generate more waste than people living on the mainland, and recycling rates in the Commonwealth are lower. Much of Puerto Rico's solid waste ends up in one of island's 32 landfills, most of which do not comply with Commonwealth and federal landfill requirements. The solution is a comprehensive and integrated solid waste management plan that calls for a reduction in the amount of solid waste generated, an increase in the recycling rate, the use of waste to produce energy, and the proper and efficient management of all landfills.

The Solid Waste Authority and the Environmental Quality Board are the local agencies with

DNER Regional Offices through their Beach Maintenance Brigades conduct weekly cleanups. Statistics from the 2010 International Beach Cleanup Day show that 12,659 volunteers worked together to collect more than 198,858 pounds from our beaches, lakes, and waterways.

1- Sources and Impacts of marine debris in the coastal zone:

Source of marine debris	Extent of Source (H,M,L)	Type of Impact (aesthetic, resource damage, user conflicts, other)	Significant Changes since the last assessment (y or n)
Land based- Beach/shore litter	H	Aesthetic, resource damage, user conflicts	Y
Land based- dumping		Aesthetic, resource damage, user conflicts	N
Land based-storm drains and runoff	H	Resource damage, non-point contamination	N
Land based- Fishing related (e.g. Fishing line, gear)	L	Aesthetic, resource damage, user conflict	Y
Ocean based- derelict fishing gear	L	Resource damage, user conflict	Y
Ocean based derelict vessels	M	Resource damage	Y
Ocean based- Vessel based(cruise ship,cargoship,general vessel)	H	Aesthetic, resource damage, non-point contamination	Y
Hurricane /storm	H	Resource damage	Y
Other	N/A	N/A	N/A

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Supplementary information Pertaining to Resource characterization

Voluntary groups and programs

- **Vida Marina, Caribbean Center for the Reduction of Aquatic Debris, University of Puerto Rico**. Collection of microscopic particles of anthropogenic origin (fragments of plastic, paint, rustships, pieces of synthetic thread, etc.). Currently working on the analysis of a series of samples that were taken on the Puerto Rico Coast on February 2009 from the OSV/Bold.

- **Monofilament Recovery and Recycling Program of Puerto Rico, University of Puerto Rico.** Implementation of the first monofilament recovery and recycling program in Puerto Rico. The Agricultural extension program will construct and install 45 monofilament recovery stations through Puerto Rico at various high volume fishing

spots with the help of volunteers. All the lines collected will be shipped to a monofilament recycling compound.

- **ACC's Plastic Division (formerly APC)** in conjunction with the **Center for Marine Conservation** (is researching ways to identify effective methods to reduce litter through reduction and improved waste handling,with the support of the plastic industries) , launched the National Model Communities Program on six targeted communitieswith a particular kind of marine debris problem .One of the six targeted communities is Pinones in Puerto Rico. Hundreds of visitors frequent small restaurants in the area leaving large amounts of trash that is creating a threat to several endangered species and the largest mangrove forest remaining in Puerto Rico.

- **Marine Reserve Tres Palmas.** They a have established a marine waste handling disposal project. The objective is oriented to restore existing coral reefs habitats by eliminating waste through an educational awareness program for schools andvoluntary work.

- **Amigos de Amoná, Inc. a non-profit based organization.** Implemented the Mona Channel Marine Debris Removal (2004).One of their goals was to remove the marine debris objects that affected marine life on Mona Coastal Habitats. During the expeditions 30 volunteers donated 1,363 hours of labor to survey 26.5 Km of coastline. They removed 3,235 Kg.(7117.0 lbs) marine debris classified as fishing gear (48%), plastics (13%), glass(14%), metal (8%), and others (17%) . Additionally a conservation guide was developed for visitor and boaters.

- **Scuba Dogs, Inc.** a non-profit organization that coordinates the International Coastal Cleanup Days in Puerto Rico.

  http://www.scubadogssociety.org/default.htm

Management Characterization

Purpose: To determine the effectiveness of management efforts to address those problems described in the above section for the enhancement objective. 1. For each of the management categories below, indicate if the approach is employed by the state or territory and if significant changes have occurred since the last assessment:

Management categories	**Employed by state/territory** (Y or N)	**Employed by local governments** (Y, N, Uncertain)	**Significant changes since last assessment** (Y orN)
Recycling	**N**	**Y**	**N**

requirements			
Littering reduction programs	**Y**	**Y**	**N**
Wasteful packaging reduction programs	**N**	**N**	**N**
Fishing gear management programs	**Y**	**N**	**N**
Marine debris concerns in harbor, port, marine, & waste management plans	**Y**	**N**	**N**
Post-storm related debris programs or policies	**Y**	**Y**	**Y**
Derelict vessel removal programs or policies	**Y**	**N**	**N**
Research and monitoring	**Y**	**Y**	**N**
Marine debris education & outreach	**Y**	**Y**	**Y**
Other (Derelict trap retrieval programs)	**Y**	**Y**	**Y**

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Governmental

Two Commonwealth agencies: Solid Waste Authority and the Environmental Quality Board have the local responsibility for managing the Island's solid waste.

Marine Debris

- Derelict vessel removal and cleanup is coordinated by NOAA, USACE and DNER.
- PRCMP supports DNER Regional Offices and Beach Maintenance Brigades that conduct weekly cleanups at Puerto Rico's 434 miles of coastline.
- National Parks Company maintains and conducts routine cleanups of 12 public beaches under their administration.

- Municipalities such as Carolina conduct routine maintenance of public beaches under their administration.

Priority Needs and information Gaps

Table: Priority needs and information gaps

Gap or need description	**Type of need (regulatory, policy, data, communication and outreach)**	**Level of priority (H,M,L)**
Wasteful packaging reduction programs	Raise awareness of biodegradable disposable products	H
Educational awareness	Voluntary monitoring activities and training.	H

Enhancement area prioritization

What level of priority is the enhancement area for the coastal zone (including, but not limited to, CZMA funding)?
High
Medium X
Low

Briefly explain the level of priority given for this enhancement area.

Agency partners and stakeholders place a medium priority for the marine debris enhancement category for the island. Solid waste management in Puerto Rico is an important and very complex issue for the Island Commonwealth of Puerto Rico. Marine debris must be integrated in the Comprehensive Solid Waste Management Plan developed by the Solid Waste Authority. PRCMP will continue supporting ongoing efforts and will coordinate with the Solid Waste Authority the inclusion of this category as part of the comprehensive plan. However, at this point PRCMP will not develop an enhancement area strategy for marine debris.

The resulting accumulation of organic and other debris materials along the beach finally drifts with the ocean currents affecting the marine life. It is important to raise user's awareness about the resulting impact of the disposal of waste and storm waters that empty into hydrographic features. Marine debris pollution is a global problem, unfortunately is not confined to a single Hemisphere.

An effective to enhance the marine debris area requires active participation from the Puerto Rico Solid Waste Authority, Puerto Rico Environmental Quality Board, Puerto Rico Tourism Company, Puerto Rico Ports Authority, PRCMP, SeaGrant, NGOs, coastal municipalities and stakeholders. This initiative may be pursued as part of the Puerto Rico component of the Caribbean Regional Ocean Partnership and the Coastal and Marine Spatial Planning processes.

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Aquaculture Assessment

Section 309 Enhancement Objective

Development of procedures and policies to evaluate potential siting of aquaculture facilities in the coastal zone to enable the Commonwealth of Puerto Rico to formulate, administer, and implement strategic plans for marine aquaculture

Resource Characterization

Purpose: To determine the extent to which problems and opportunities exist with regard to the enhancement objective.

1. Generally characterize the private and public aquaculture facilities currently operating in your state or territory.

Type of existing aquaculture facility	Describe recent trends	Describe associated impacts or use conflicts
Companies with permits to culture fish in the PR territorial waters (1)	Aquaculture production decreased from 205.0 metric tons in 2001 to 166.0 in 2005	Conflicts sometimes occur when commercial fishermen and aquaculture ventures compete for the same space. Most of the mariculture systems require deeper waters (depths greater than 100ft) Concern: pathogens associated to cultured fish and potential impacts on adjacent marine communities.
" Marine fish culture" (2)	Decreasing due to permit problems and local fish producers when product is sold in local markets.	Conflicts between the commercial fishermen and the marine aquaculture industry occur when aquaculture products drive prices down and impact commercially harvested

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		seafood products.
" freshwater fish on land (3)	Aquaculture production increased from 209 metric tons in 2001 to 251.o in 2005.	Discharge of low quality water and solid
Freshwater fish hatcheries (4)	Not available	Discharge of low quality water and solid
	Not available	Discharge of low quality effluent runoff, and the introduction of exotic organisms to fresh and marine waters.

Puerto Rico private and public aquaculture facilities operating during the 2001-05 time period.

(1) Snapper farm, Inc. engages in open ocean aquaculture operation in the United States. It raises and harvests cobia and other species of marine fish in submerged open ocean cages. The company was founded in 1998 and was based in Culebra, Puerto Rico. In May 2002, the first offshore aquaculture enterprise in Puerto Rico was launched by Snapperfarm, Inc. and by August they began stocking two Ocean Spar Sea Station cages, one with 12,000 cobia and the other with 4,000 mutton snapper juvenile fish, in the waters off of the island of Culebra. The firm ceased operations in Puerto Rico and moved to Panama. Firm representatives are trying to resume operations in Puerto Rico.

Ocean Harvest Inc. – Humacao. Ocean Harvest Aquaculture Inc. is an aquaculture company focusing on development of warm water fish species for food.

Borinquen aquaculture Inc.- Rincon

(2) C-Quest is the oldest continuously operating marine hatchery and farm facility in the world. Located on the South shore of Puerto Rico, C-Quest is located on 52 acres of beach front property with ample crystal clear water from the Caribbean Sea. Salinas , P.R

(3) Caribe Fisheries produces quality ornamental fish and aquaculture products. In addition they provide international consulting services to the aquaculture industry. Lajas , PR.

(1) Maricao- Government managed hatchery by the DNER.

The table bellows summarizes general trends in the aquaculture industry from 2001-05.

Aquaculture Production (*) in Puerto Rico by Environment 2001-2005

Environment	**2001**	**2002**	**2003**	**2004**	**2005**
Freshwater	209.0	217.0	200.0	251.0	251.0
Marine & Brackish	205.0	225.0	69.0	166.0	166.0

Aquaculture by products (*)

Products	**2001**	**2002**	**2003**	**2004**	**2005**
Crustaceans	212.0	233.0	173.0	206.0	206.0
Freshwater fish	202.0	209.0	96.0	211.0	211.0

(*)Metric tons

Source: FAO Fisheries and Aquaculture Information and Statistics Service. 2007.
Available at: http://www.fao.org/fi/statist/FISOFT/FISHPLUS.asp

List of Ornamentals distributed by in Puerto Rico

Olive Dottyback	Pseudochromis	olivaceus
Redheaded Goby	Elacatinus	puncticulatus
Katy's Goby	Gobiodon	sp.
False Skunk Clownfish	Amphiprion	akallopisos

Sailfin Molly	Poelcilia	velifera
Sunrise Dottyback	Pseudochromis	flavivertex
Percula	Amphiprion	percula
Orange Skunk	Amphiprion	sandaracinos
Blackline Fangblenny	Meiacanthus	nigrolineatus
Mozambique Fangblenny	Meiacanthus	mossambicus
Cinctus Goby	Cryptocentrus	cinctus

MANAGEMENT CHARACTERIZATION

Effectiveness of management efforts to address those problems described in the above section.

1. Approaches employed in addressing problems.

For each of the management categories the significant changes occurred since the last assessment
are indicated in the table below:

MANAGEMENT CATEGORIES	Employed by State/Territory (y or N)	Significant Changes since last assessment (Y or N)
Aquaculture regulations	Y	Y
" Policies	Y	Y
" Program guidance	Y	N
Research, assessment, monitoring	N	N
Mapping	N	Y

Aquaculture education & outreach	Y	Y
Other (please specify)	N/A	N/A

2. Significant changes since the last assessment

a. Aquaculture Regulations

The Puerto Rico Planning Board joint regulations include zoning districts that regulate quaculture developments. Zonification of the marine environment helps us comply with the new National Ocean Council policy. This policy encourages development of aquaculture projects.

b. Aquaculture Policies

On March 31, 1999 the Puerto Rico Senators enacted Project 581, requesting the designation of 75 acres of land from the Land Authority, for the development of aquaculture projects. There has been no change in the aquaculture industry as a result of the enactment of this policy.

c. Mapping:

Marine zones for the culture of fish in open ocean cages have been identified in the 100-200 ft depth zone around the PR shelf. These marine zones have been prioritized in order of preference in the following order; West, East, South and North coasts. The priority preference is based on the sea and wind condition zones used by the NOAA-NWS .Potential areas for marine fish culture in Puerto Rico have been identified:

- West coast: 5 areas
- East coast : 2 areas
- South coast : 5 areas
- North coast : 5 areas

a. Aquaculture education & outreach

Sea grant and the Universities of Humacao and Mayaguez, conduct research and educational activities for aquaculture development.

Priority Needs and information Gaps

Table: Priority needs and information gaps

Gap or need description	Type of need (regulatory, policy, data, communication and outreach)	Level of priority (H,M,L)
Benthic habitat characteristics and conditions	Areas of the PR shelf lacking benthic habitat maps should be prioritized for mapping.	H
Aquaculture development.	Monitor emerging issues surrounding aquaculture programs.	M

Priority Needs and Information Gaps

Using the table below, identify major gaps or needs (regulatory, policy, data, training, capacity, communication and outreach) in addressing each of the enhancement area objectives that could be addressed through the CMP and partners (not limited to those items to be addressed through the Section 309 Strategy). If necessary, additional narrative can be provided below to describe major gaps or needs.

Gap or need description	Type of gap or need (regulatory, policy, data, training, capacity, communication & outreach)	Level of priority (H,M,L)
Monitoring of ornamental fish imports and exports	Regulatory, monitoring and enforcement	M
Exotic-invasive species in Puerto Rico	Data, monitoring, capacity bulding, enforcement	_M

Invasive Lionfish Control and Management — This is an issue of special concern to DNER, Puerto Rico coastal and marine resources managers , marine ecologists and fishermen. NGO's, and fisheries officials throughout the Caribbean and Gulf of Mexico have discussed strategic approaches to address lionfish ecological impacts; control strategies and Lionfish local and regional management.

Enhancement Area Prioritization

11. What level of priority is the enhancement area for the coastal zone (including, but not limited to, CZMA funding)?

High
Medium X
Low

12. Will the CMP develop one or more strategies for this enhancement area?

Yes
No X

Briefly explain why a strategy will or will not be developed for this enhancement area.

Small scale coastal aquaculture may pose a real environmental risk, especially in the discharge of low quality effluent and runoff, and the introduction of exotic organisms and pathogens to fresh and marine waters. The effort to re-build or stabilize our coastline from sea level rise events will change the salinity regimes in our bays and estuaries potentially displacing fishing grounds. During November 2010, The NOAA Aquaculture Program and Coral Reef Conservation Program hosted the first in a series of invitational workshops aimed at developing environmental guidelines and standards for aquaculture operations sited near coral reef ecosystems. This day and half long workshop focused on several key goals, including: exchanging available information (e.g., research, monitoring results, model output), identifying knowledge gaps, reviewing permitting procedures, and identification of key elements for development of regional best management practices. Private firms, University researchers, PRCMP, USACE, NMFS and EPA presented their views and concerns on the subject on issues such as: coral reef ecology, aquaculture research and monitoring, best management practices, and environmental standards.

PRCMP envisions that an aquaculture strategy may be devised in coordination with NOAA's Aquaculture Program, private firms that have shown interest in developing marine cage culture as well as other aquaculture projects, local communities and relevant stakeholders under the proposed Coastal and Marine Planning process for Puerto Rico.

Energy & Government Facility Siting Assessment

Section 309 Enhancement Objectives

Adoption of procedures and enforceable policies to help facilitate the siting of energy and Government facilities, and energy-related and Government activities that may be of greater than local significance

Resource Characterization

Purpose: To determine the extent to which problems and opportunities exist with regard to the enhancement objective.

1. In the table below, characterize the types of energy facilities in your coastal zone (e.g., oil and gas, Liquefied Natural Gas (LNG), wind, wave, Ocean Thermal Energy Conversion (OTEC), etc.) based on best available data. If available, identify the approximate number of facilities by type.

Type of Energy Facility	**Exists in CZ** (# or Y/N)	**Proposed in CZ** (# or Y/N)	**Interest in CZ** (# or Y/N)	**Significant changes since last assessment** (Y or N)
Oil and gas facilities	Y	Y	Y	N
Pipelines	Y	Y	Y	N
Electric transmission cables	Y	Y	Y	N
LNG	Y	Y	Y	Y
Wind	N	Y	Y	N
Wave	N	N	Y	N
Tidal	N	N	Y	N

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Current (ocean, lake, river)	N	N	Y	N
OTEC	N	N	Y	N
Solar	N	N	Y	N

2. Please describe any significant changes in the types or number of energy facilities sited, or proposed to be sited, in the coastal zone since the previous assessment.

Oil and gas facilities have not change dramatically. Changes in the number of facilities sited during the past 5 years have been the reactivation of the San Juan power plant in the Metropolitan area and the explosion of the Caribbean Petroleum (CAPECO) storage facility at Cataño. In total there are 6 major power plants located in Puerto Rico's coastal zone. Three of the power plants are located on the Northern coast: San Juan, Palo Seco, Cambalache and three on the Southern coast: Ecoelectrica and Costa Sur (Guayanilla), AES (Guayama) and Aguirre (Salinas).

The explosion, two-day long fire, and subsequent oil spill at CAPECO's petroleum tank farm created a dangerous situation that impacted the adjacent wetlands and waterbodies; the environmental impacts continue to pose a threat to human health and the environment. This facility is right in the middle of a densely populated community and the cleanup continues.

PREPA has proposed to build a LNG pipeline from EcoElectrica's terminal and storage facilities at Guayanilla (Southern Coast of Puerto Rico) to Palo Seco and San Juan power plants on the northern coast. Environmental Impact Statement and permitting processes continue.

3. Does the state have estimates of existing in-state capacity and demand for natural gas and electric generation? Does the state have projections of future capacity? Please discuss.

Puerto Rico Electric Power Authority (PREPA) generating capacity is 5,264MW, of which, 507 MW are produced at the natural gas fired: EcoElectrica and 454 MW are produced at the coal fired Applied Energy System co-generator. There are long term purchases agreements with co-generators. PREPA's generating capacity provides a 50%-75% reserve margin over peak electricity demand to ensure reliabilityAs a result, the authority had an approximately 48% reserve margin over 2007 peak demand in September despite a fire in December 2006 that took the four Palo Seco units out of service. The units provide 728 megawatts (MW), or 15% of installed capacity of 4,878 MW. Power purchased from two cogeneration plants increases total dependable capacity (including Palo Seco) to 5,839 MW. The $1.7 billion investment in the next five years will replace about 265 MW of generating capacity with more efficient units, and convert other units from higher cost fuel oil to natural gas. PREPA's move away from dependence on fuel oil began with the purchased power contracts for the cogeneration units on the southern shore of Puerto Rico.

Natural gas stored in a Eco Electrica's terminal fuels one of the two cogeneration units, which began operating in 2000. The other cogeneration unit, which began operating in 2002, was designed to burn coal very efficiently. Equivalent availability at these two units has improved to 94%-96% from startup levels of near 80%. Equivalent availability for the entire system improved to 85% in 2007 (before the Palo Seco fire), up from 72% in 1995, as a result of investments in plant operation and communication. The absence of significant seasonal variations in demand results in a relatively high load factor of 77%-80%, which affords PREPA less flexibility to schedule maintenance. Therefore, the authority must have greater total reserve capacity than other utilities in the U.S. to cover generating unit outages.

Despite the necessary excess capacity, the base rate is just 5.79 per kWh. If PREPA can reduce fuel costs, rates will be much more in line with those in the mainland U.S.. The dependence on oil-fired generating plants increased the average residential monthly electric bill to $80.48 in fiscal 2006-2007, $95.00 in 2007-2008, and $86.45 in 2008-2009, compared with $68.00 in 2004-2005 and $58.00 in 2003-2004. In fiscal 2009, purchased power accounted for 4.06 cents and fuel costs accounted for the remaining 11.68 cents of the total 21.53 cents per kWh residential rates. PREPA envisions an 80% reduction on oil burning for electric power generation and a reduction of 60% on GHG emissions associated to the proposed conversion of power plants to burn natural gas and wind power generation.

4. Does the state have any specific programs for alternative energy development? If yes, please describe including any numerical objectives for the development of alternative energy sources. Please also specify any offshore or coastal components of these programs.

There are four major wind power facilities proposed by private firms at: Guayanilla, Santa Isabel, Arecibo, and Naguabo. Government is also considering waste-to-energy facilities to be built on the Northern Coast of Puerto Rico to address the solid waste disposal issue and also generate electric power.

5. If there have been any significant changes in the types or number of government facilities sited in the coastal zone since the previous assessment, please describe.

No major changes in the types or number of government facilities sited in the coastal zone since the previous assessment. Construction of the Ports of the Americas at Ponce has greatly slowed down . Energy facilities identified in previous sections are proposed under Public-Private Partnerships or by private firms.

Management Characterization

Purpose: To determine the effectiveness of management efforts to address those problems described in the above section for the enhancement objective.

1. Does the state have enforceable policies specifically related to energy facilities? If yes, please provide a brief summary, including a summary of any energy policies that are applicable to only a certain type of energy facility.

The Puerto Rico Island-wide Land Use Plan adopted the PRCMP (1978) as its coastal land use plan. Island-wide policies establish general policies that apply to energy- related facilities:

"To avoid the unnecessary loss of options for future use of these resources resulting from the establishment of new activities from authorizing subdivisions"(Policy 17.04) In the case of power plants, this policy would call for avoiding the loss of options that would result from residential development.

PRPB Island-wide Land Use Plan Policy 4.00 indicates that industries should be concentrated in those areas most appropriate for industrial uses, and at the same time, to promote the most intensive use possible of such lands.

PRPB Policy 4.03 calls to identify and reserve sites for industrial facilities (including Energy facilities). PRPB Policy 8.01 excludes lands of major agricultural productivity, floodable areas (PRPB 11.00), and important natural or critical environmental resources (PRPB 16.00).

2. Please indicate if the following management categories are employed by the State or Territory and if there have been significant changes since the last assessment:

Management Categories	**Employed by state/territory (Y or N)**	**Significant changes since last assessment (Y or N)**
Statutes or regulations	Y	Y
Policies	Y	PRPB policies
Program guidance	PRPB policies	PRPB policies
Comprehensive siting plan (including SAMPs)	N	N
Mapping or GIS Y	Y	Y (pr.gov GIS)

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Research, assessment or monitoring	UPR	Y
Education and outreach	Y	Y

3.

NOAA: For management categories with significant changes since the last assessment provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference rather than duplicate the information.
a) Characterize significant changes since the last assessment;
b) Specify if it was a 309 or other CZM-driven change (specify funding source) or if it was driven by non-CZM efforts; and
c) Characterize the outcomes and effectiveness of the changes.

PRPB land use policies guide energy and government facility siting as well as any other land uses and activities development. The PRPB led the streamlining process that resulted in the 2009 Permits Law, the establishment of the Integrated Permit System and Joint Permit Regulations guiding future permit processes and coastal development. Two new agencies were and a Board were created by Law 161 to replace the former ARPe (Regulations and Permits Administration): OGPe (Permits Management Agency) and OIGPe (Permits Comptroller Agency).

The Department of Natural and Environmental Resources Department in coordination with the Energy Affairs Administration and the Solid Waste Authority have coordinated efforts to increase environmental compliance, natural resources conservation, recycling, reuse of solid wastes and energy efficiency at government facilities and will continue serving as advisory agencies with regulatory power..

Priority Needs and Information Gaps

Using the table below, identify major gaps or needs (regulatory, policy, data, training, capacity, communication and outreach) in addressing each of the enhancement area objectives that could be addressed through the CMP and partners (not limited to those items to be addressed through the Section 309 Strategy). If necessary, additional narrative can be provided below to describe major gaps or needs.

Gap or Need Description	**Type of gap or need** (regulatory, policy, data, training, capacity, communication & outreach)	**Level of priority** (H,M,L)
Resource information in territorial waters and	Data	H

submerged lands		
Assess potential impacts to coastal habitats and wildlife from renewable energy development	Data, policy, capacity, regulatory communications	H
Planning for siting of alternate sources of energy (wind, solar, OTEC) to minimize impacts to coastal habitats, wildlife and coral reefs	Data, capacity, policy, planning, regulatory	H

9. Priority Level
    High
    Medium X
    Low

10. **Will the CMP develop one or more strategies for this enhancement area?**
    Yes
    No: X

Briefly explain why a strategy will or will not be developed for this enhancement area.

PRCMP has consulted partner agencies, experts and stakeholders regarding the priority level of the Energy and Government Facility siting enhancement area. Most stakeholders indicated that this enhancement category also needs priority attention yet, most agreed that there were higher priority needs in Puerto Rico. The PRCMP has identified that energy facility siting and ocean resources can be addressed through the proposed Puerto Rico component of the Caribbean Regional Ocean Partnership between Puerto Rico and the U.S. Virgin Islands. This work is proposed to be developed following the guidelines issued by the White House through the Executive Order of President Obama (July 2010).

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Cumulative and Secondary Impacts

Section 309 Enhancement Objective
Development and adoption of procedures to assess, consider, and control cumulative and secondary impacts of coastal growth and development, including the collective effect on various individual uses or activities on coastal resources, such as coastal wetlands and fishery resources.
Resource Characterization
Purpose: To determine the extent to which problems and opportunities exist with regard to the enhancement objective.
1. Identify areas in the coastal zone where rapid growth or changes in land use require improved management of cumulative and secondary impacts (CSI) since the last assessment. Provide the following information for each area:

PRCMP and Federal and Commonwealth agency partners recognize the importance and connectivity of watersheds, coastal and marine systems. The entire islands of Puertp Rico, Culebra and Vieques are considered interconnected coastal systems.

2. Identify sensitive resources in the coastal zone (e.g., wetlands, waterbodies, fish and wildlife habitats, critical habitat for threatened and endangered species) that require a greater degree of protection from the cumulative or secondary impacts of growth and development. If necessary, additional narrative can be provided below to describe threats.

Sensitive resources	**CSI threats description**	**Level of threat (H,M,L)**
Wetlands (Island-wide)	Wetland loss from changes in hysdrology and draining associated to agricultural practices	H
Coastal habitats and estuaries	Habitat loss and changes resulting from altering hydrology by diversion of rivers and construction of dams	M-H
Aquifers and ground water supply	Pollution and lowering of potentiometric levels	M
Beaches (Island-wide)	Erosion	M
Coral Reefs	Loss of fringing reefs due to land based sources of pollution (i.e. sedimentation)	H

Seagrass	Water quality degradation, dredging and scarring from negligent boat operation	M-H

Management Characterization

Purpose: To determine the effectiveness of management efforts to address those problems described in the above section for the enhancement objective.

1. For each of the management categories below, indicate if the approach is employed by the state or territory and if significant changes have occurred since the last assessment:

Management Categories	**Employed by state/territory** (Y or N)	**Significant changes since last assessment** (Y or N)
Regulations	**Y**	**N**
Policy	**Y**	**N**
Guidance	**Y**	**N**
Management Plans	**Y**	**Y**
Research, assessment, monitoring	**Y**	**Y**
Mapping	**Y**	**Y**
Education and Outreach	**Y**	**Y**

2. For management categories with significant changes since the last assessment provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference rather than duplicate the information.
a) Characterize significant changes since the last assessment;
b) Specify if it was a 309 or other CZM-driven change (specify funding source) or if it was driven by non-CZM efforts; and
c) Characterize the outcomes and effectiveness of the changes.

Prior to the 2004 amendment of the Puerto Rico Environmental Policy Act cumulative and secondary impacts analysis were not required under the environmental impact analysis and environmental assessments. During the Section 309 cycle 2001-2005, PRCMP funded the

development of a method for assessing cumulative and secondary impacts. The model was used to produce assessments for seven of the special planning areas designated through the PRCMP adoption The Puerto Rico Environmental Quality Board examined several methods for determining cumulative and secondary impacts, including the method developed by PRCMP and integrated the requirement of analyzing cumulative impacts through the amended Environmental Policy Act.

Priority Needs and Information Gaps

Using the table below, identify major gaps or needs (regulatory, policy, data, training, capacity, communication and outreach) in addressing each of the enhancement area objectives that could be addressed through the CMP and partners (not limited to those items to be addressed through the Section 309 Strategy). If necessary, additional narrative can be provided below to describe major gaps or needs.

Gap or need description	**Type of gap or need** (regulatory, policy, data, training, capacity, communication & outreach)	**Level of priority** (H,M,L)
Training on direct, cumulative and secondary impact analysis	New Permit Management Agency staff	**H**
Alternate methods for treating wastewaters on areas not connected to PRASA systems	Management options and techniques, policy and regulatory needs	**H**
Ground water, aquifer, recharge areas and wetlands interactions	Monitoring, modeling	**H**
Comprehensive land use planning	Regulatory and policy	**H**
Long-term assessment of status, health and trends of habitats and water quality	Data and capacity	**H**
Identifying critical areas within watersheds vulnerable to pollution .	Requiring that maps and models of critical areas are considered at the new Permits Management Agency	**H**

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Enhancement Area Prioritization
3. What level of priority is the enhancement area for the coastal zone (including, but not limited to, CZMA funding)?

High
Medium: X
Low

Briefly explain the level of priority given for this enhancement area.

The PRCMP, partner agencies and stakeholders participating at public hearings for the new Permits System and Law 161 Joint Permit Regulations have pointed out the need to ensure that environmental analysis are conducted by trained personnel at the new Permits Management Agency. The new agency begun operations on December 2010. PRCMP will not develop an enhancement area strategy for this cycle but will provide support to OGPe and seek to establish agreements and MoUs to ensure PRCMP enforceable policies implementation.

SPECIAL PLANNING AREA MANAGEMENT

Section 309 Enhancement Objective

Preparing and implementing special area management plans for important coastal areas

The Puerto Rico Coastal Zone Management Program defines Special Planning Areas as "important coastal resource areas subject to serious present or potential use conflicts, and, therefore, requiring detailed planning." Eight Special Planning areas were adopted as part of the PRCMP in 1978.

As established by the Coastal Zone Management Act (1972, as amended) "Special Area Management Plans provide for increased specificity in protecting natural resources, reasonable coastal-dependent economic growth, improved protection of life and property in hazardous areas, including those areas likely to be affected by land subsidence, sea level rise, or fluctuating water levels of the Great Lakes, and improved predictability in governmental decision making."

In 1978 PRCMP identified 26 candidate areas for designation as natural reserves. In 2010, DNER has submitted 35 recommendations for natural reserve designation and 34 have been approved by the Puerto Rico Planning Board (PRPB). The Puerto Rico Legislature has also adopted via special statutes 7 natural reserves although not all are coastal or marine reserves.

DNER's recommendation for designation of the Northeast Corridor as a natural reserve has been approved by the PRPB. The announcement of the designation of the Northeast Corridor and a new Special Planning Area initiated the Public review period. PRPB will conduct the official public hearing on January 18th, 2011.

Resource Characterization

Purpose: To determine the extent to which problems and opportunities exist with regard to the enhancement objective.

1. Identify geographic areas in the coastal zone subject to use conflicts that can be addressed through special area management plans (SAMP). Also include areas where SAMP have already been developed, but new issues or conflicts have developed that are not addressed through the current plan. If necessary, additional narrative can be provided below.

SAMP title	**Status** (new, revised, or in progress)	**Date approved or revised**
1. All Mangrove Areas SPA	COMPLETED	1978
2. Boca de Cangrejos (Piñones) SPA	COMPLETED	1978
3. Pandura-Guardarraya SPA	Pending	1978
4. Jobos Bay SPA	Draft management plan under review	1978
5. Southwest SPA	Subdivided into 3 segments: Guanica, La Parguera, Boqueron-Cabo Rojo. La Parguera SPA: COMPLETED Guanica: Under review by PRPB Boqueron-Cabo Rojo: Under review by PRPB.	1978
6. Isabela SPA	COMPLETED. Public hearings were conducted. Pending approval by PRPB	1978

	and adoption by Governor.	
7. Laguna Tortuguero SPA	COMPLETED	1978
8. Vieques SPA	Draft management plan completed and will be submitted for DNER and PRPB technical review	1978
9. Northeast Corridor SPA	Natural Reserve recommendation submitted by DNER. SPA designed by PRPB. Public review period: ongoing.	2010 pending final adoption by PRPB and Approval by Governor once Public Review process and official hearings are completed.

2. For management categories with significant changes since the last assessment provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference rather than duplicate the information.

a) Characterize significant changes since the last assessment (area covered, issues addressed and major partners);
b) Specify if it was a 309 or other CZM-driven change (specify funding source) or if it was driven by non-CZM efforts; and
c) Characterize the outcomes and effectiveness of the changes.

Special Planning Areas management plan provide effective tools for public and private development guidance. PRCMP funds the development of SPA management plans under Section 306 as active management tasks. The original intent of the SPA (PRCMP 1978) remains. SPA usually serve as transitional areas where the intensity and magnitude of development is reduced as land uses approach core protection areas designated as natural reserves. SPA management plans usually identify best management practices per land use category and may include recommendations for new natural reserve designations or natural protected areas boundaries expansion. Once adopted by the PRPB and approved by the Governor SPA management plans are adopted as part of the Island-wide Land Use Plan. Policies established through SPA management plans are integrated as aprt of Muncipal Land Use Plans which also need to be revised and approved by the PRPB.

Priority Needs and Information Gaps

Using the table below, identify major gaps or needs (regulatory, policy, data, training, capacity, communication and outreach) in addressing each of the enhancement area objectives that could be addressed through the CMP and partners (not limited to those

items to be addressed through the Section 309 Strategy).

Gap or need description	**Type of gap or need** (regulatory, policy, data, training, capacity, communication & outreach)	**Level of priority** (H,M,L)
Strategies to address conflicts between competing land uses and resource users.	Improve communication and outreach skills to improve conflict resolution	H
Effective management tools to imrpove coastal resources protection in privately owned areas.	Policy, regulatory, conflict resolution strategies.	H
Education and Outreach	Training and strategies development	H
Marine Protected Areas Planning	Training in monitoring, surveillance, and enforcement	H
Long-term monitoring of coastal and marine ecosystems, habitats and species (potential climate change impacts on MPA refugia)	Training in data collection, monitoring, data analysis	H

Enhancement Area Prioritization

5. What level of priority is the enhancement area for the coastal zone (including, but not limited to, CZMA funding)?

High
Medium: X
Low

Briefly explain the level of priority given for this enhancement area.

Special planning areas (SPA) have been used since 1978 forintegrated coastal areas and resources management in Puerto Rico. Urban sprawl and conflicting uses have resulted in a 24% coastal population to coastline ratio. PRCMP designated SPA have been used as effective mechanisms to address conflicts and promote sustainable uses and the protection of critical habitats and wildlife. PRCMP has funded SPA planning as a Section 306 active management activity. New challenges include adapting to the new Permit System created by Law 161 of 2009 and its associated Joint Permit Regulations.

6. Will the CMP develop one or more strategies for this enhancement area?

Yes
No X

Briefly explain why a strategy will or will not be developed for this enhancement area.

Although Federal and Commonwealth agencies' partners and stakeholders recognize the importance of sound sub-regional and watershed planning there were other enhancement areas identified as higher priorities. No new SMA management strategies will be proposed during this cycle. PRCMP will continue supporting planning and active management efforts at the 8 designated areas and the new Northeast Corridor SPA .

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.*PROGRAM ENHANCEMENT STRATEGIES*

WETLANDS STRATEGY

1. Issue area

No change in program designation is proposed. Wetlands Strategies will continue to be one of the high priority areas under sec. 309 programs. The section 309 Program Strategy assigns a high priority to enhancing protection of coastal wetland habitats as well as providing important non-structural protection to coastal communities against inundations.

2. Program change description

As previously stated in the Assessment, the wetland strategy component of the sec.309 enhancement program for 20010-15 will focus on activities designed to achieve the following outcome:

- Preparation of a Strategic Plan for the Management and Restoration of Coastal wetlands as a component of the Sub Regional Coastal and Marine Spatial Plan (SRMCSP).

This projected program change represents a no-cost response to the threat of mismanagement of wetlands for agricultural and other uses which could adversely affect wetland and related ecosystems. The Wetland Strategic plan is to be jointly signed for implementation by the PRPB, the Lands Authority and DNER. The focus of both plans represents a step in achieving a closer integration of local planning with centralized policy objectives. It represents an opportunity to develop procedures for guiding overall coastal management policies into community land use plans and voluntary restoration programs in the U.S. Caribbean.

This projected program change builds on the work that has been conducted during the 2005-2010 Sec.309 program period during which: (1) a wetlands inventory of areas identified as candidates for natural reserve designation was completed as part of a Legislative mandate required by Law 314. (2) zoning districts for submerged lands were delineated along the south coast, and; (3) technical and professional reports and presentations related to marine and coastal zoning were widely distributed together with educational outreach materials.

3. Program Scope and Phasing

In the first two years of program funding the wetlands strategy component will be devoted to consolidating previous work on coastal and marine zoning. Concurrently a Strategic Plan for the Management and Restoration of Coastal Wetlands will be edited. The succeeding years will focus on measures and guidelines to enhance the protection of coastal wetlands, a major component of the overall PRCZMP objectives.

4. Needs addressed

The strategy for the wetlands component addresses the following needs:

- Promote the conservation of wetlands through sustainable development activities.
- Governmental commitment for implementing wetland protection policies.
- Wetlands and benthic habitat inventory update.
- Development of a coastal habitat restoration and monitoring plan.

5. Benefits to the Coastal program

- Improved achievement of watershed management
- Improved protection and restoration of wetlands
- Assist local governments in decision making with respect to achieving significant goals:

  Select the best environment to proposed activities
  Reduce permit evaluation time frame
  Prevent conflict between stakeholders
  Provide economic activities were they are needed

6. Likelihood of success

A five –year period is a reasonable time frame for the accomplishment of a project of this nature that requires intergovernmental and consolidating working relationships with other levels of government.

Effective coordination with local coastal planning officials was established as part of the past 309 program cycle, laying the basis for further collaboration between CMO and local entities.

Strategic Work Plan

Five year Program Budget: $ 492,519

Year 1-2 Activities , Outcomes, and Budget

Activities

A. Initial year would be devoted to a consolidation of the past cycle of work. This would include:

- Coordinate and evaluate the potential timetable and procedures to incorporate marine and coastal zone districts as part of the island wide Land use Plan with the Planning Board

- Coordinate the design of a data management Center.

- Coordinate the coastal component development of the Coastal and Marine Spatial Planning Conferences.

- Initiate the development of a Strategic plan for the Conservation, Management and Restoration of coastal wetlands

B. Development and implementation of the Educational Program of the Wetlands Conservation, Management and Restoration Strategic Plan

- Coordinate meetings with relevant stakeholders and intergovernmental agencies to evaluate documented opinions on potential wetlands use and integration of best management practices.

- Coordinate educational activities:

Outcomes:

- Status report of the potential incorporation of marine and coastal zone districts as part of the Planning Board island wide use Plan.
- Technical report of the Educational program (draft)
- Marine Spatial planning conferences .
- Creation of the Data Management Center.

Budget:

- Personnel $ 108,470.00
- Supplies: $ 6,500.00
- Travel $ 5,000.00
- Conferences $10,000.00
- Contracts: $15,844.00
- Publications $40.000.00
- Total: **$**185,814.00

Years 3-5 Activities, Outcomes, and Budget

Activities:

- Strategic plan for the Conservation, Management and Restoration of wetlands (continued)

  1- Development of guidelines for the Management Program of the Strategic Plan.

  2- Integration of intergovernmental agencies (NCRS, USFWS, COE), private sector and stakeholders into multidisciplinary efforts to promote technical evaluation of potential use

of wetlands, and socioeconomic development through sustainable use of resource characteristics and limitations.

3- Synthesize knowledge of watershed characteristics and wetland protection programs into a Strategy for wetland protection and restoration based on developed goals.

4- Coordination of educational and management activities.

- Operation and maintenance of an information and data management Center.

- Coordination of marine spatial planning conferences (2013-14-15).

Outcomes:

- Technical report of management program.
- Educational and management activities.
- Strategic Plan for the Management and restoration of wetlands (Final draft)
- Marine Spatial Planning Conferences.
- Operation of the data management center.

Budget:

Personnel	$162,705.00
Travel	$ 7,500.00
Conferences	$15,000.00
Contracts	$85,000.00
Supplies	$6,500.00
Publications	$30,000.00
Total	$306,705.00

Fiscal and Technical needs

No additional fiscal or technical needs would be required.

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COASTAL HAZARDS STRATEGY

I. Issue Area(s)

NOAA: As envisioned during the 2008 proposed update of the previous cycle of the PRCMP 309 Strategy, the proposed strategy for 2011-2015 and associated implementation activities will support the following (high or medium) priority enhancement areas (*marked by x)*:

O Aquaculture
O Energy & Government Facility Siting
X Coastal Hazards
O Ocean/Great Lakes Resources
O Special Area Management Planning
O Cumulative and Secondary Impacts
X Wetlands
O Marine Debris
X Public Access

II. Program Change Description

A. Type of program changes

NOAA: The proposed strategy will result in, or implement, the following type(s} of program changes *(check all that apply):*

o A change to coastal zone boundaries;

X New or revised authorities, including statutes, regulations, enforceable policies, administrative decisions, executive orders, and memoranda of agreement/understanding;

O New or revised local coastal programs and implementing ordinances;

X New or revised coastal land acquisition, management, and restoration programs;

X New or revised Special Area Management Plans (SAMP) or plans for Areas of Particular Concern (APC) including enforceable policies and other necessary implementation mechanisms or criteria and procedures for designating and managing APCs; and,

X New or revised guidelines, procedures and policy documents which are formally adopted by a state or territory and provide specific interpretations of enforceable CZM program policies to applicants, local government and other agencies that will result in meaningful improvements in coastal resource management.

B.

NOAA: Describe the proposed program change(s} or activities to implement a previously achieved program change. If the strategy will only involve implementation activities, briefly describe the program change that has already been adopted, and how the proposed activities will further that program change. (Note that implementation strategies are not to exceed two years.)

Coastal hazards was designed as a priority program area under Section 309 in 2006. Greater public awareness was achieved after the devastation to the Gulf Coast states wrought by hurricanes Katrina and Rita. The issue of coastal hazards remains high in the level of public awareness in Puerto Rico as more information is disseminated nationally and in the Gulf-Caribbean region. Designation of coastal hazards as a priority program area provides an opportunity to continue what previously had been an important component of the CZMP. Early in the history of the PRCZMP, a broad program, focusing on

coastal hazards and mitigation actions was developed. DNER, through the CZMP, was the agency point of contact working closely with FEMA in coastal flood area delineation, and was an active partner in hazard mitigation planning following presidentially declared natural disasters. However, the responsibility for mitigation planning was transferred to the Emergency Management Agency in January 1994, as part of the reorganization of government agencies. Nevertheless, responsibility for identifying coastal hazards and evaluating the Island's vulnerability remains in DNER. A special unit created by law exists in the DNER to coordinate with FEMA and with the PREMA.

The proposed strategy will lay the foundation for a long-term, comprehensive effort for addressing coastal hazards over a multi-year period. It anticipates that DNER through the Coastal Management Office will be a catalyst in initiating activities by other agencies as the need for programmatic initiatives is demonstrated through the Section 309 coastal hazards program. Outlined below are programmatic strategies that will be implemented over the next five years.

The first two years of the program (September 2010-2012) will focus on developing a Sea Level Rise and Coastal Hazards Vulnerability Assessment as part of the Puerto Rico Island-wide Climate Adaptation Strategy.

The project will conduct risk and vulnerability analyses, develop climate variability and change adaptation strategies, recommend standards and design considerations for modifications of natural and man-made features in coastal high hazard areas, foster networking and interagency collaboration and implementation, and effectively communicate these hazard analyses and adaptation strategies through an education and outreach plan.

III. Need(s) and Gap(s) Addressed

NOAA: Identify what priority need the strategy addresses, and explain why the proposed program change or implementation activities are the-most appropriate means to address the priority need. This discussion should reference the key findings of the assessment and explain how the strategy addresses those findings.

Projected global sea level rise impacts threaten to greatly exacerbate the vulnerability of Puerto Rico's at-risk coastal resources. The Coastal Hazards Enhancement Area Assessment identified a need to address climate variability and change, such as sea level rise, at the territory level since there currently does not exist a Puerto Rico-wide vulnerability assessment or adaptation strategy. This strategy will develop a methodology to complete the risk assessment for climate variability and change. Specifically needed to advance work in this issue area is a comprehensive coastal hazard and geomorphic feature database that can be used to assess risks to the coasts. There is an increasing need to identify coastal features that provide current protection to coastal communities. These vital and important tasks, as well as the updating of the coastal barriers inventory are critical components of a coastal hazards strategy to build coastal resilient communities.

IV. Benefit(s) to Coastal Management

NOAA: Discuss the anticipated effect of the program change or implementation activities including a clear articulation of the scope and value in improved coastal management and resource protection.

This strategy will have two principal effects. First, it will lay the groundwork for the completion of a statewide sea level rise risk assessment and adaptation strategy that will encourage the designation of climate variability and change, specifically sea level rise, as an issue that affects hazards in Commonwealth plans, such as hazard mitigation plans, development projects, local mitigation strategies, civil society activities, etc. Through networking and inter-agency collaboration this valuable information may be translated into adoption at different levels of society. Second, the project will provide much needed data in a usable format, the Coastal Hazards Database, to guide future planning and project development.
The general work plan for 2011-2015 is organized around three principal coastal hazard programming areas:

- Risk and vulnerability analyses
- Climate variability and change adaptation strategies
- Recommend standards and design considerations for modifications of natural and man-made features in coastal high hazard areas
- Networking and interagency collaboration and implementation
- Education and outreach

Within each programming area a series of specific work activities will be conducted. The scheduling of the work will, in part, be dependent on inputs from other agencies and partners. As a result, the work plan may be subject to significant modification in response to evolving circumstance over which DNER has no control.

V. Likelihood of Success

NOAA: Discuss the likelihood of attaining the proposed program change and implementation activities. The state or territory should address: 1) the nature and degree of support for pursuing the strategy and the proposed change; and, 2) the specific actions the state or territory will undertake to maintain or build future support for achieving and implementing the program change, including education and outreach activities.

On the basis of repeated experience with coastal floods, hurricanes, and related events, the Commonwealth has a healthy respect for coastal hazards and their consequences, and, over time, has initiated significant mitigation measures including large-scale relocation. DNER's strength lies in its knowledge base of coastal conditions and its past work in mitigation planning. Comprehensive Hazard Mitigation Plans have been prepared and updated after each national disaster declaration pursuant to Section 409 of the Federal Disaster Assistance Act, as amended. Additionally, this project is centered around multi-stakeholder collaboration and will have project partners with great technical resources, such as the Caribbean Coastal Ocean Observing System (CariCOOS), the Caribbean Tsunami Center, The Coastal Hazards Center of Puerto Rico, the Puerto Rico Seismic Network, Puerto Rico Sea Grant, the National Weather Service, and the Puerto Rico Emergency Management Agency.

CMO is cognizant of constraints to successful program outcomes which may be enumerated as follows:

1. Resource availability

Program resources, both personnel and budgetary, must be adequate to the task. Because the budget is limited, an effort must be made draw on parallel resources in other agencies and project partners, both Commonwealth and Federal. This will require both skill and experience on the part of the task leader and

careful direction and support from CMO management. Fortunately, through the NOAA Coastal Management Fellowship Program we are guaranteed a graduate fellow for two years of the project to serve as a co-project manager with the CMO Director.

2. Diversity of stakeholder interests

Stakeholder opposition to new design standards on coastal setbacks, building elevations, designation of high vulnerability areas, building prohibitions, and other adaptation strategies are likely to create political impediments to the enactment of measures. Any opposition needs to be countered by effective outreach and public education. There needs to be maximum dialogue with stakeholders in the formative phase, from the beginning of the vulnerability assessment to the formulation of adaptation strategies. Without active stakeholder involvement, political opposition could be formidable.

3. Access to senior level decision makers

At key points, the top levels of DNER, PB, and representatives of the Governor's office will need to be involved in the review of issues and policy directions since the resolution of coastal hazard vulnerability issues go well beyond technical considerations. Without senior level involvement and support, technical staff will find it difficult to move program recommendations to the implementation stage.

VI. Strategy Work Plan

NOAAA: Using the template below, provide a general work plan that-includes the major steps necessary for achieving the program change and/or implementing a previously achieved program change. The plan should identify significant projected milestones/outcomes, a schedule for completing the strategy, and budget estimates. If an activity will span two or more years, it can be combined into one entry (i.e., Years 2-3 rather than Year 2 and then Year 3). While the annual outcomes are a useful guide to ensure the strategy remains on track, OCRM recognizes that these benchmarks may change some over the course of the five-year strategy due to unforeseen circumstances. The same holds true for the annual budget estimates. If the implementation activities for the proposed program change, describe those in the plan as well. Further detailing of annual tasks, budgets, benchmarks, and work products will be determined through the annual award negotiation process.

Total 5 Year Budget: $410,000
Final Outcome(s) and Products: Identification of an assessment methodology to analyze climate variability and change impacts to Puerto Rico and to determine the most vulnerable communities and infrastructure/ assets; analysis and prioritization of adaptation strategies; a GIS/Remote Sensing Coastal Hazards Database; a draft vulnerability assessment and adaptation strategy.

The general work plan for 2011-2015 is organized around five principal coastal hazard programming areas:

- Risk and vulnerability analyses
- Climate variability and change adaptation strategies
- Recommend standards and design considerations for modifications of natural and man-made features in coastal high hazard areas
- Networking and interagency collaboration and implementation
- Education and outreach

Within each programming area a series of specific work activities will be conducted. The scheduling of the work will, in part, be dependent on inputs from other agencies and partners. As a result, the work plan may be subject to significant modification in response to evolving circumstance over which DNER has no control.

1. Year 2011 (started in 2010)

   Risk and vulnerability analyses

   The objectives and outcomes are to:
   - Work together with multiple agencies and stakeholders to integrate existing coastal hazard and climate variability/change information to assess Puerto Rico's current vulnerability
   - Work with partners to project through computer models possible future scenarios for Puerto Rico's coasts and the most vulnerable regions to these future impacts
   - Using U.S. Census data and information (Census tracks-Tiger files) identify coastal communities currently or potentially vulnerable to coastal hazards, sea level rise as part of the Island-wide Climate Change Adaptation Strategy.
   - Using PRCZMP aerial photography, satellite imagery, and GIS (and previous studies) identify key geomorphic features and wetlands that provide protection to coastal communities from natural hazards.
   - Field validate the information through community visits, GPS data collection and interviews to key members of local communities.
   - Develop and maintain the GIS Coastal Hazards database.
   - Using CMO GIS facility, overlay the new FEMA flood maps and results from DNER/PRCMP-CMO and UPR-CaRA efforts onto existing land use maps and aerial photos to identify and prepare quantitative assessments of potential damage in high vulnerability areas.
   - Update the coastal barriers inventory identified as part of the Coastal Barrier Improvement Act of 1990 (CBIA, P.L. 101-591; 104 Stat. 2931) that included in the System additional areas along the Great Lakes, Puerto Rico, among other. CMO seeks to update and identify additional key coastal geomorphic features providing natural protection to coastal communities.
   - Coordinate surveys and public perception analysis on issues such as climate change, sea level rise, and coastal hazards. (44 municipalities)
   - Based on findings, estimate quantitative impacts for different event scenarios
   - Submit findings to PlBd and/or other appropriate agency or technical committee.

   Budget: $115,000

2. Year(s): 2011-2012

   Climate variability and change adaptation strategies

   The objectives and outcomes are to:

   - Identify and assess existing adaptation strategies being employed for the islands of Puerto Rico

- Through stakeholder engagement select, evaluate, and prioritize adaptation actions. Create feasibility matrices for the adaptation actions identified to develop policy recommendations for local, commonwealth, federal, civil society, and private sector actors. Example of adaptation recommendations would be standards and design considerations for modifications of natural and man-made features in coastal high hazard areas.
- Draft an adaptation plan document with implementation and maintenance recommendations to be distributed amongst elected and appointed officials for endorsement.

Budget: $45,000

3. Year(s): 2011-2013

<u>Recommend standards and design considerations for modifications of natural and man-made features in coastal high hazard areas</u>

Focus of technical studies will be the review and assessment of design standards for natural and man-made features in areas subject to coastal flooding. This would lead to new CZMP guidelines.

- Natural features: Focus on preserving and restoring the protective functions of natural shoreline features, such as beaches, dunes, and wetlands (coral reefs, sea grasses, and mangrove systems). Standards and guideline pertain to such actions as dune construction (cross-section and elevation), beach nourishment, constructed wetlands, dredging and dredge spoil disposal, and shorefront stabilization.
- Man-made features: Initial focus will be on DNER facilities and OCRM-funded projects. This would include elevations for roads and trails within natural reserves; guidelines for piers, boat launching facilities, shelters, and related infrastructure, as well as design criteria for the construction of DNER-funded and Sec.306A-funded facilities to be constructed in the coastal zone.

Annual Budget: $120,000

4. Year(s): 2011-2015

<u>Networking and interagency collaboration and implementation</u>

Early in the history of the PRCMP, a broad program, focusing on coastal hazards and mitigation actions was developed as part of the CMP. Responsibility for mitigation planning was transferred to the Emergency Management Agency in January 1994 as part of the reorganization of government agencies. While responsibility for identifying coastal hazards and evaluating the Island's vulnerability remained in DNER, the subject was dropped as a program task under Sec. 306 and 309. Nevertheless, a special unit, created by law, exists in the DNER to coordinate with FEMA and with the PREMA. This unit will provide the bridge for furthering collaboration in hazards work between DNER/CMO and other key Commonwealth and federal agencies.

The objectives of the interagency networking and collaborative effort are to achieve:

- Concurrence on risk and vulnerability analyses. The technical work on risk and vulnerability, and assessments of potential for personal injury and property damage should be prepared by DNER/CMO as a Sec. 309 work activity. However, to establish the creditability of the findings, the work should be reviewed and agreed to by a technical inter-agency and stakeholder committee. Participation should include representation from the Planning Board, COE, UPR, NOAA/NWS, and Dept. Public Works.

- Participation of DNER/CMO in hazard mitigation planning following presidential declared disasters. The role of DNER in disaster mitigation planning needs to be reviewed to determine the studies and technical support that DNER and the CMO can provide as inputs to post-disaster planning and mitigation. Given DNER's island-wide role in operating pumping stations to alleviate flooding, its experience with coastal erosion, and its lead role in coastal zone management, a strong case should be made for the inclusion of DNER on the Federal-Commonwealth Post Disaster Hazard Mitigation Teams.

- Collaboration with the Planning Board in the establishment of setback lines and the modification of PB Regulations 13 and 17 for compliance with new FEMA guidelines. The Planning Board has the basic responsibility for directing future public and private development and redevelopment away from hazardous areas, including the high hazard areas delineated as FEMA V-zones and areas vulnerable to inundation from sea level rise. However, the technical expertise for exercising this guidance lies with DNER and the CMO. Therefore, a mechanism has been set up to facilitate this collaboration.

- Coordinating the implementation of the Climate Variability and Change Adaptation Strategy. Due to many sectors, infrastructure, and Puerto Rico assets being impacted by climate and coastal hazards a successful adaptation plan should be implemented by numerous agencies, departments, and stakeholders. PRCZMP will coordinate the drafting of such a strategy but its implementation is highly dependent on the will of senior level decision makers and funding levels at each of the participating agencies and organizations.

Annual Budget: $60,000

5. **Year(s):** 2011-2015

<u>Education and outreach</u>

The long-term resolution of coastal hazard issues will require an examination of infrastructure, economic impacts, and financial considerations, as well as the identification of private sector parties-at-interest, such as banks and insurance companies. It will be essential to enlist private sector support and cooperation in all implementation and public education programs.
The objectives of the work on education and outreach are to:

- Provide technical assistance to local governments Outreach activities related to coastal hazards is a key and continuing activity, especially in providing advice and technical support to coastal municipalities in integrating hazard mitigation into their Territorial Plans.

- Prepare brochures, maps and other educational information dealing with (1) risk and vulnerability findings; (2) new FEMA maps and building guidelines; (3) sources for assistance in retrofitting; etc

- Convene regional meetings to exchange information with NGOs, Academia, research institutions, the media, and local officials on coastal flooding problems and implications for planning and regulatory measures. Emphasis should be on opening up avenues of communication between local representatives and citizen groups, and central government agencies. Such meetings, convened by DNER, could be co-hosted with Planning Board, FEMA.

- Media workshops and meetings. Raise awareness of coastal hazards, climate variability and change, among the media. A main objective of the outreach strategy will be to effectively communicate hazard science, local impacts, and strategies with media outlets throughout the island and the mainland so as to support accurate reporting and communication to local officials and the public.

Budget: $70,000

VII. Fiscal and Technical Needs

A. Fiscal Needs: If309 funding is not sufficient to carry out the proposed strategy, identify additional funding needs. Provide a brief description of what efforts the applying agency has made, if any, to secure additional state funds &om the legislature and/or other sources to support this strategy.

The requested funding combined with the funding from the NOAA Coastal Services Center's Coastal Management Fellowship should be sufficient to carry out the proposed strategy. Due to the current budget crisis in the Commonwealth, efforts have not been made to secure funds from the legislature to support this strategy.

B. Technical Needs: If the state does not possess the technical knowledge, skills, or equipment to carry out the proposed strategy, identify these needs. Provide a brief description of what efforts the applying agency has made, if any, to obtain the trained personnel or equipment needed (for example, through agreements with other state agencies).

5- *Year Budget Summary by Strategy*

At the end of the Strategy section, please include the following budget table summarizing your anticipated Section 309 expenses by strategy tor each year.

Strategy Title	Year 1 Funding	Year 2 Funding	Year 3 Funding	Year 4 Funding	Year 5 Funding	Total Funding
Risk and vulnerability analyses	75,000	X	X	X	10,000 (publication)	85,000
Climate variability and change adaptation strategies	25,000	30,000	60,000	X	10,000 (Publication)	125,000

Recommend standards for modifications of natural and man-made features in coastal high hazard areas	X	X	45,000	35,000	15,000	
Networking and interagency collaboration and implementation	15,000	15,000	15,000	15,000	15,000	
Education and outreach	X	X	X	10,000	20,000 Conferences and publications)	
TOTAL	115,000	45,000	120,000	60,000	70,000	410,000

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Public Access Strategy

1. Issue Area

No change in priority program designation is proposed. public access to the coast will continue to be one of the high priority areas under the Sec. 309 program. The Section 309 Program Strategy for the period 2011 - 2015 assigns a high priority to enhancing public access to the coast as a means of improving the quality of life particularly in urban areas, minimizing community vulnerability to coastal hazards, and contributing to sustainable economic development.

2. Program Change Description

As previously stated in the Assessment, the coastal access component of the Sec. 309 Enhancement Program for 2011-2015 will focus on activities designed to achieve the following outcomes:

- Improve public access through statutory, regulatory, and programmatic measures;
- Identify opportunities to acquire, improve, and maintain public access sites to meet current and future demand using innovative funding and acquisition techniques;
- Foster the development and/or re-development of urban waterfronts to promote public access while contributing to economic development.
- Strengthen community resilience in confronting the potential impacts of climate change by incorporating provisions for coastal parks and promenades into community land use plans, thus increasing public access at the local level while protecting upland areas from storm surge and other coastal hazards.

This focus represents a significant opening to achieving closer integration of local planning with centralized policy and planning objectives. With the passage of the Autonomous Municipios Act and the Permit Process Reform Act local government is assuming increasing responsibility for land use planning and zoning.

A major component of the overall CZMP consists of "Guiding Development". Previously, implementation of development guidance has largely been at the centralized governmental level. Redirecting program activities to achieve closer cooperation with local planning efforts represents a new and significant program change.

It represents an opportunity to develop procedures for integrating overall coastal management policies into community land use plans through the Sec. 309 enhancement program. It also represents an opportunity to implement CZMP objectives through other federal/local funding programs such as the Community Development Block Grant Program.

This projected program change builds on the work that has been conducted during the 2005-2010 Sec. 309 program period during which: (a) existing coastal access sites were identified; (b) published brochures of coastal access sites were widely distributed; (c) technical assistance on signage and related matters was provided to some local governments through MOUs.

2. Program Scope and Phasing

The first year of program funding for the coastal access component will be devoted to consolidating previous work with respect to the publication of regional inventories and formalizing MOUs with selected coastal municipalities. The succeeding years will focus on measures to enhance the recreational potential of urban waterfronts, as well as on demonstrating the mitigation potential of urban waterfront development to reduce community vulnerability to coastal hazards. The program will also inventory and assess the recreational potential of small boat harbor

enhancement. Since the original 1978 coastal zone program explicitly excluded urban areas, this represents a significant extension in the coverage of the PRCZMP.

This work would be carried out in a series of phases.

Phase 1. This initial phase would be devoted to an island wide reconnaissance and inventory of non-metropolitan urban waterfronts and harbors and an assessment of the potential benefits of redeveloping and/or upgrading waterfront recreational uses. At the same time, the vulnerability of coastal access and coastal recreation facilities would be evaluated. Emphasis would be on using coastal access planning to reduce vulnerability to coastal hazards and to demonstrate that development of urban waterfronts for public recreation could contribute to overall economic growth and development.

Phase 2. Phase 2 could be devoted to ranking the various municipalities in terms of scale, opportunities, resource requirements, estimate of successful outcome, availability of local partners, etc.

Phase 3. This would be devoted to: (a) selection of one or more pilot projects based on agreement with the municipio and/or local NGOs; (b) joint work between CMO and local entity on preparation of a project management plan, including design of an organizational structure for implementation, and; (c) assessing funding sources from both federal, Commonwealth and private sectors.

Among potential candidate municipalities having urban shorefronts are Arecibo, Arroyo, Aguadilla, Rincon, Guanica, Santa Isabel, Salinas, Juana Diaz, Humacao, and Naguabo.

The principal role of the CMO's staff would be in inventory, evaluation, and presentation of the relevant information; networking with local officials and community groups, and; providing policy guidance and technical assistance as requested.

3. Needs Addressed

The strategy for the public access component addresses the following needs:

- Provides an urban component to the CZMP;
- Improves the quality of urban life;
- Enhances coastal access to the poorest strata of the population;
- Contributes to economic well being;
- Raises awareness of potential effects of climate change and how public infrastructure design can minimize community vulnerability to coastal hazards.

4. Benefits to Coastal Program

This program enhancement component provides opportunities for increasing physical and visual access to the coast thereby improving the quality of urban life in many of the island's smaller and poorer communities. Simultaneously it would expand the universe of stakeholders at the community level actively involved in coastal area planning and management.

5. Likelihood of Success

A five-year period is a reasonable time frame for the accomplishment of a project of this nature that involves networking arrangements with other agencies and consolidating working relationships with other levels of government.

During the past Sec. 309 program cycle contact was established with officials in many coastal municipalities, thereby laying the basis for further collaboration between the CMO and local entities.

As a result of the regional inventories of coastal access sites the CMO staff has a backlog of current information on the physical characteristics of all the coastal municipios including maps, photographs, and descriptive assessments. Much of this information will feed into the new cycle of work.

6. Strategic Work Plan

Five-year Program Budget

$785,750

Year 1 Activities, Outcomes and Budget

Activities:

Initial Year 1 activities would be devoted to a consolidation of the past cycle of work. This would include preparation and publication of a bi-lingual island-wide report on coastal access sites and additional MOUs with selected municipalities for CMO-provided technical assistance. Year 1 activities would also be devoted to a rapid reconnaissance and characterization of the non-metropolitan coastal municipalities with respect to quality and condition of their urban waterfronts, and; initial screening of candidate areas offering greatest potential for successful program results.

Outcomes:

1. Bi-lingual island-wide report with maps, photos and descriptive materials on coastal access sites.
2. Draft MOUs with selected municipalities covering technical assistance on public access enhancement and development.
3. Reconnaissance findings on characteristics of urban waterfronts in coastal municipalities.
4. Methodology for screening potential project sites and leveraging federal program funding for the planning, design and construction of public park and recreational projects that enhance public access to the coast.

First Year Budget:

- Personnel: $125,000
- Printing and publication: $25,000
- Travel: $7,150
- TOTAL: $157,150

Year 2-3 Activities. Outcomes and Budget

Activities:

Year 2 and 3 of the program would be devoted to an assessment of development opportunities for urban waterfront enhancement in the coastal municipalities and evaluation of project potentials. Using specified criteria, a screening process would be established to identify candidate municipalities and projects.

Outcomes:

1. Report describing the characteristics of the waterfronts and harbors of Puerto Rico's non-metropolitan municipalities.
2. Working paper on criteria for selection of candidate communities for pilot programs; application of methodology for screening potential project sites.
3. MOUs providing technical assistance for project planning to selected coastal municipalities.
4. Coordination with Planning Board to develop an infrastructure funding program and schedule for coastal park and recreational facilities and related hazard mitigation uses that protect inland areas from coastal hazards; networking with Commonwealth and federal agencies to review funding assistance availability and criteria for funding eligibility and approval.

Two/Three Year Budget: $314,300

Estimated Annual

- Personnel: $130,000
- Printing and publication: $20,000
- Travel: $7,150
- TOTAL: $157,150 per/year

<u>Year 4-5 Activities, Outcomes and Budget</u>

Activities:

Year 4 and 5 of the program would be devoted to the identification of one or more pilot projects and working with the candidate municipality and local community organizations on project design and obtaining authorization for project implementation .

Outcomes:

1. Technical assistance to local planning entities in developing specifications and design of pilot projects.
2. Identification of potential funding sources and technical assistance in preparing grant and loan applications and related documentation.
3. Recommended implementation schedule.

Four/Five Year Budget: $314,300

Estimated Annual

- Personnel: $135,000
- Printing and publication: $15,000
- Travel: $7,150
- TOTAL: $157,150 per/year

7. Fiscal and Technical Needs

No additional fiscal or technical needs would be required. Sufficient staff and consultant capabilities exist within CMO and DNER to accomplish all aspects of the proposed program strategy.

FIVE YEAR BUDGET SUMMARY OF ENHANCEMENT AREA STRATEGIES

The following budget table summarizes anticipated Section 309 expenses by strategy tor each year.

Program Area Strategy	Year 1 Funding	Year 2 Funding	Year 3 Funding	Year 4 Funding	Year 5 Funding	Total Funding
Wetlands	92,907	92,907	102,235	102,235	102,235	492,519
Coastal Hazards	115,000	45,000	120,000	60,000	70,000	410,000
Public Access	157,150	157,150	157,150	157,150	157,150	785,750
TOTAL	**365,057**	**295,057**	**379,385**	**319,385**	**329,385**	**1,688,269**

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ATTACHMENTS

1. **PRCMP Performance Measures System : Contextual Measures**

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