THE ROLE OF THE LOCAL COMMUNITY WITHIN THE NATIONAL OCEAN POLICY: THE DECISION TO BUILD AN OCEAN OUTFALL IN REHOBOTH BEACH, DELAWARE

by

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ABSTRACT

This thesis explores a local community decision to build an ocean outfall in Rehoboth Beach, Delaware, as a coastal management decision designed to improve water quality in the impaired Inland Bays. Designating the Inland Bays as an impaired waterway led to a federal mandate for the Rehoboth Beach to reroute its wastewater effluent from the Inland Bays. The decision was made prior to the development and adoption of the National Ocean Policy, however, coordination and implementation of this policy could improve the process for addressing water quality conditions throughout coastal communities through ecosystem-based management and coastal and marine spatial planning.

This thesis examines the National Ocean Policy adopted by President Obama in 2010 and addresses the questions of how the local community can benefit from the implementation of the National Ocean Policy and how the National Ocean Policy can improve the capacity of the local community to manage its coastal environment. The National Ocean Policy will influence local projects. Development of regional planning bodies that include local communities and highlight the achievements of interagency actions will strengthen the capacity of local, state, regional, and federal collaboration. Streamlining regulations, assisting with the technical analysis of options, and applying a sense of urgency to overcome local politics and resolve conflicts would have benefitted Rehoboth Beach, Delaware, in its examination of effluent disposal options.

Chapter 1

INTRODUCTION

1.1 Coastal Community Ecosystem

At the heart of the negotiations for coastal management is the coastal community that carries the burden of providing for its few citizens and many tourists, balancing demands of multiple constituencies for limited space while continuing traditions that have contributed to its success. The size of a coastal community does not reflect the scope and magnitude of problems or the coordinated effort needed across federal and state agencies to address the implementation of multiple-use management solutions. The creation of an overarching national plan, regional plans and statewide directives still rely on the "positive participation" and capacity of local communities to comprehend, coordinate and implement these concepts into action (Cicin-Sain and Knecht 1998).

A coastal community is an integral piece in the management of recreational activities, commerce and trade, economic vitality and watershed management strategies (Orbach 2010). Recreational activities rely heavily on water quality and public access to beaches and fishing areas. Commerce and trade depend on opportunity and financing, available markets and transit routes. Economic vitality depends on tourism, the quality of amenities available, and a healthy market for goods and services. Watershed management strategies are challenged to provide competing economic and environmental benefits for a wide range of interested stakeholders. Coastal management strategies are based on an

inherent conflict; balancing environmentally sensitive areas with exceptional recreation designations (CCMP 1995).

The focus of this thesis will be on the power of a local community as it emerges within the National Ocean Policy. Using Rehoboth Beach, Delaware, as a case study, this thesis will examine the decision to build an ocean outfall as a method of implementing measures designed to improve water quality in the impaired waterways of the Inland Bays. This decision was the result of overlapping jurisdictional and legal requirements previously employed by the multiple state and federal agencies involved in coastal and watershed management issues. The new National Ocean Policy is designed to facilitate a more efficient federal, regional, state, and local collaboration throughout the implementation process. The impact that this policy will have on evaluating and implementing options towards improving water quality conditions could benefit local community decisions as it is intended to streamline the process and develop strong local leadership towards preserving the coastal habitat. The thesis will address these two questions: How can the local coastal community benefit from the implementation of the national ocean policy? And how can the national ocean policy improve the capacity of the local community to manage its coastal environment?

The first section will explore the nature of ecosystem-based management and the need for a comprehensive national ocean policy. The second section explores the challenges related to regional management and coordination between local, county and state interests. The third section will consider the history of the Inland Bays, and the challenges to create watershed management and coastal policies that improve water quality while balancing economic interests with protecting the environment. The fourth section describes the parameters involved in the decision made by Rehoboth to build an ocean outfall

as a mechanism of improving water quality in the Inland Bays estuary. Section five describes the evolution of a national ocean policy and how that relates to issues of water quality on a local level. The last section will make policy recommendations for implementing national ocean policy strategies, exploring the strength of the local community and its capacity to determine its own destiny.

1.2 History of Management Has Been Sector-by-Sector

Traditionally management strategies have been negotiated one sector at a time without a strategy for overlapping coordination (Leslie and McLeod 2007). In coastal communities, federal, state and local interests are not in alignment (Cicin-Sain and Knecht 1998). As well, in a local municipality, county and city interests may be influenced by desire for short-term economic or political gain without regard for the best interests of the coastal environment (Reimold 1995).

The situation was summarized by the Pew Ocean Commission, in 2003, in *America's Living Oceans: Charting a course for Sea Change, A Report to the Nation: Recommendations for a New Ocean Policy.*

> Reflecting the understanding and values of this earlier era, we have continued to approach our oceans with a frontier mentality. The result is a hodgepodge of ocean laws and programs that do not provide unified, clearly stated goals and measurable objectives. Authority over marine resources is fragmented geographically and institutionally. Principles of ecosystem health and integrity, sustainability, and precaution have been lost in the fray (Pew 2003).

Subsequent ocean policy commission reports have supported a strategy of ecosystem-based management. (Pew 2003, USCOP 2004, CEQ 2009).

> Ecosystem-based management (EBM) is intended to overcome the shortfalls of traditional, single-sector management. EBM is a comprehensive, integrated approach to managing people's impacts on the ocean with the goal of sustaining healthy seafood, clean beaches, and other ocean benefits (ELI 2009).

The wisdom of applying a flexible management strategy that can oversee the complex marine environment and its estuaries is summed up in this definition from two hundred twenty-one scientists who agreed upon The Scientific Consensus Statement on Marine Ecosystem-based Management:

> Ecosystem-based management (EBM) is an integrated approach to management that considers the entire ecosystem, including humans. The goal of ecosystem-based management is to maintain an ecosystem in a healthy, productive and resilient condition so that it can provide the services humans want and need. Ecosystem-based management differs from current approaches that usually focus on a single species, sector, activity or concern; it considers the cumulative impacts of different sectors.
>
> Specifically, ecosystem-based management: emphasizes the protection of ecosystem structure, functioning, and key processes; is place-based in focusing on a specific ecosystem and the range of activities affecting it; explicitly accounts for the interconnectedness within systems, recognizing the importance of interactions between many target species or key services and other non-target species; acknowledges interconnectedness among systems, such as between air, land and sea; and integrates ecological, social, economic, and institutional perspectives, recognizing their strong interdependences (McLeod 2005).

Implementing EBM on a local level requires understanding, foresight, wisdom of leadership and political will. There is not one organization or agency that can oversee the planning, regulation, enforcement and implementation of the best management practices and consistently update to operate within the capacity of current technology. Building cooperation between agencies, and developing mechanisms capable of coordinating competing interests between

local and national priorities is a challenge (Orbach 2010). How can a local coastal community grasp the enormity of the marine ecosystem within its political boundaries and jurisdiction over local land use issues? Can addressing an issue such as water quality within the implementation of ecosystem-based management help local coastal communities build the capacity to develop policies, collaborate on coastal management issues and coordinate ecosystem-based management strategies? How can the local community engage interagency support during the evaluation of options and implementation of measures designed to improve water quality?

1.3 Multi-Dimensional Ecosystem-Based Management Decisions

Comprehensive land management plans developed for communities in the coastal zone need to modify land use practices to mitigate their effects on the marine environment. Coordinating the needs of both marine and land based activities requires a broader view in order to develop a management plans that consider the entire dynamic ecosystem. Human population in a small coastal community is transient, the tourist economy is seasonal, wildlife and marine life is migratory, requiring flexibility in management strategy. Nutrient loading, voluntary controls, regulatory actions, public and private lands draining into the watershed, bays, and tributaries, water quality, conservation practices, soil loss, sediment runoff, buffers, piping and drainage, absorption of soils, ground water, growth patterns and urban sprawl, agriculture, point source and non-point source pollution, air pollution, wastewater and the cumulative effect of all these activities converge in the coastal zone (PCS 2008, Leslie 2009).

A coastal ecosystem "provides opportunities for trade, recreation, tourism, research and education, and have considerable cultural, aesthetic and spiritual value (Leslie and McLeod 2007). Without a healthy functioning sustainable

ecosystem, many of these assets are compromised (Orbach 2010). As point source pollution is targeted and eliminated or mitigated, a growing awareness of non-point source pollution in the watershed and estuaries is a cause for concern (NEP 2010). As coastal development increases, land use issues, waste disposal issues and preservation issues clash while water quality deteriorates.

> Integrated analysis of numerous, multidisciplinary studies is critical to maximizing learning and ensuring adaptive management. This is particularly critical for examining the drivers that can destabilize and degrade an ecosystem (Orbach 2010).

Coordinating management of the ecosystem is a political challenge as the focus of management plans for each component of the watershed, wetlands, estuary, coastal zone and marine environments have different priorities, approaches and goals. The ecosystem is approached from an "environmentally sensitive, multiple use management perspective" based on human activities, an "ecosystem approach to resource management" based on species management or an "ecoregional management style" based on a specific place and its unique needs (Yaffee 1999). Coordination of management styles suitable to meet the needs and priorities of both land-based and marine-based activities while balancing economic and environmental goals is unique to each local area. A local community often lacks the capacity to assess its ecosystem, as well as understand its historical, present day and future use needs.

1.4 Jurisdictional Challenges in a Fluid Environment

Management of ocean resources is evolving into a complex overlapping multi-agency effort (CEQ 2009). The Exclusive Economic Zone (EEZ) extends from the mean low water mark out two hundred nautical miles, giving rights to the resources within those waters to each nation (UNCLOS 1982). Within those two hundred miles, in the United States, federal waters are defined as the waters

from three to two hundred nautical miles from the mean low water mark, while individual states generally have jurisdiction over the first three nautical miles into the ocean from the mean low water mark, and their inland seas. Jurisdiction over these waters has not been developed with over-arching consistency, but has been established on a sector-by-sector basis that has developed activity-by-activity. As each conflict arises, it has been solved on a case-by-case basis, not adhering to any cohesive ocean planning, creating a silo effect of uncoordinated coastal activities. Complex situations involving more than one agency have not been well coordinated with a comprehensive outlook on the whole ecosystem.

> ...some 20 federal agencies and more than 140 laws dictate how the ocean is used, and mandates frequently conflict. Coastal states can establish management plans for their waters, but sometimes state initiatives don't align well with initiatives of federal agencies. Meanwhile, some industries, such as energy companies, have their own plans — and the legal ability to lease areas of state and federal waters (Furlich 2010).

The impact of land-based activities on the marine environment has become increasingly detrimental, accounting for eighty percent of marine pollution (WWF 2010). Policies aimed at improving water quality have dominated the effort to lessen this impact through smart growth initiatives, promoting best management techniques, voluntary controls, and raising awareness about the impact of human activities on the marine environment (EPA Smart Growth 2009). Without a cohesive ecosystem based policy, these efforts have fallen short of their goals.

In a broad sense, water quality management is overseen by the Environmental Protection Agency, through the Clean Water Act:

> The Clean Water Act Section 320 directs EPA to develop plans for attaining or maintaining water quality in an estuary. This includes protection of public water supplies and the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife, and allows recreational activities, in and on water, requires that control of point and nonpoint sources of pollution to supplement existing controls of pollution (NEP 2010).

> The Clean Water Act (CWA) set a vision for all the waters of the United States to be fishable and swimmable. While we have certainly made progress toward that vision since 1972, we face challenges in attaining it completely; legacy pollution problems and new sources and contaminants are compounded by factors such as population growth, continued urbanization, and the effects of climate change (EPA-CW 2010).

The National Oceanic and Atmospheric Administration has jurisdictional influence with regards to water quality, from a different perspective:

> The National Oceanic and Atmospheric Association considers water quality in the coastal zone as a function of the upstream rivers and watershed, the capacity of the wetlands to provide protection from pollutants, and the cumulative impacts of human development (NOAA 2010).

Policies aimed at improving water quality have not succeeded because they have not fully incorporated the multitude of factors impacting the ecosystem (EPA 2011). However, an ecosystem-based management policy is challenged to create a cooperative plan that can be deemed successful as measured by indicators such as water quality.

> In 1972 when the CWA was enacted, traditional point sources were the dominant cause of pollution. Much of the progress made over the last 30 to 40 years has come by addressing those problems through broad, consistent implementation of national programs for municipal and industrial point sources, developing effluent guidelines, and significant federal, state, and local investments in water infrastructure. Despite our best efforts and many local successes, our aquatic ecosystems are declining nationwide. The

> rate at which new waters are being listed for water quality impairments exceeds the pace at which restored waters are removed from the list (EPA Clean Water 2010).

Efforts at coordination on a national level have been ongoing since the Stratton Commission in 1969, the Commission on Marine Science, Engineering and Resources. The National Oceanic and Atmospheric Administration was established after the report, capable of coordinating research, and implementation of management strategies for the marine environment. However, it too is hampered by laws, regulations and policies that strain coordination of effort and resources. The Pew Commission's report America's Living Oceans: Charting a Course for Sea Change, the U. S. Commission's report, An Ocean Blueprint for the 21st Century, and the Bush Administration's U. S. Ocean Action Plan have been joined by the Obama Administration's Final Recommendations of the Interagency Ocean Policy Task Force in emphasizing a coordinated effort that is imperative for managing marine resources (Upton 2010). Coordination and implementation of a National Ocean Policy can impact the local coastal communities by providing a broad framework that utilizes the collective scientific understanding as it applies to regional priorities, and provide an overarching guidance that is intended to expedite coastal management decisions.

The development and implementation of the newly adopted National Ocean Policy is designed to provide such assistance to local coastal communities, and encourage their capacity to actively participate in the framework of decision-making in the coastal zone. The policy relies heavily on regional participation and coordination. The next section will examine the concept of regional management and interagency collaboration.

Chapter 2

REGIONAL COORDINATION

2. Regional Coordination

It is widely recognized that the current system of addressing each issue in the marine environment separately has created a mosaic of agencies with overlapping jurisdiction. Reorganizing this system of management may be a successful long-term solution but closer at hand, and realistically feasible, is a coordinated interagency effort (Kuska 2005). This section will establish the need for interagency collaboration to build the capacity for regional management of watersheds, recognizing that voluntary efforts, and promotion of local initiatives and best management practices have not resulted in marked progress in water quality improvements in coastal environments.

President Obama's Interagency Ocean Policy Task Force, on July 19, 2010, provided this recommendation:

> No single agency can successfully resolve the complex and pressing problems facing the ocean, our coasts, and the Great Lakes. Successful stewardship will require an effective governance structure with sustained leadership and broad interagency coordination to effectively manage the many uses of these resources. A coordinated Federal effort, proactively guided by a senior-level interagency body, will ensure that the hundreds of domestic policies, laws, and regulations governing the management of the ocean, our coasts, and the Great Lakes are implemented in a meaningful way (CEQ 2010).

The same sentiment is echoed by the Environmental Protection Agency:

> There is no silver bullet – no single program or regulation will allow us to accomplish our goal. Carrying out all of these principles is where the true "coming together" must happen to address the primary stressors from multiple angles: smarter regulations, stronger partnerships, more balanced and coordinated compliance and enforcement, more integrated approaches to capitalize on synergies, improved communication with a broader audience, and greater leveraging of programs. Just as EPA will have to employ all of its tools, so too must all our partners—state, local, tribal, and federal—play their roles. (EPA Clean Water 2010)

Technological advances could contribute to this interagency transition, providing a platform of integrated information. The Mid-Atlantic Regional Association for Coastal Ocean Observing System is one of eleven regional associations that comprise the national system. The contribution towards presenting data in a usable format, flexible to each application, based on real time data, contributes an opportunity to understand ecosystem functioning and develop the capacity for ecosystem-based management. This informational immediacy enables the coordination and potential for integrating seventeen agencies. These agencies are National Oceanic and Atmospheric Administration (NOAA), National Aeronautics and Space Administration (NASA), Office of Naval Research (ONR), National Science Foundation (NSF), Arctic Research Commission (USARC), Army Corps of Engineers (USACE), Coast Guard (USCG), Department of Agriculture, Cooperative State Research, Education, and Extension Service (USDA), Department of Energy (DOE), Department of Interior (DOI), Department of State (DOS), Department of Transportation (DOT), Environmental Protection Agency (EPA), Food and Drug Administration (FDA), Geological Survey (USGS), Marine Mammal Commission (MMC), Bureau of Ocean Energy Management, Regulation, and Enforcement (BOEMRE), and the Office of the Oceanographer and Navigator of the Navy. Combining efforts and resources has the potential to develop a capacity for networking observations, which will enhance rapid response mechanisms. Accessing and managing a collective database provides an

opportunity to create predictive models with greater accuracy (IOOS 2011).

President Obama created a window of opportunity (Kingdon 1995) by adopting a national ocean policy based on regional management. The problem stream is identified with creating a viable ecosystem-based management plan. The policy challenges are involved with aligning interagency coordination essential to improving environmental conditions in the coastal zone. The political will to implement the solutions based on sound informational science can restore impaired waterways. These three factors, the problem, the policy and the political will combined with this emerging national ocean policy, can address deteriorating conditions in the coastal zone. Coordinating federal, regional, state, and local efforts through interagency efforts can address the challenges facing the coastal ecosystem.

2.1 Restoration, Renovation or Revitalization as a Goal

Restoration as a goal for improving watershed management, water quality and impaired waterways is ambiguously defined due to confusion about comparisons to a time when conditions were idyllic and pristine. A prime example of this is the goals for the Chesapeake Bay Program. National efforts have focused on restoring the bay with regional management of the watershed, promotion of voluntary mechanisms, and restoration references that begin with unspoiled conditions present four centuries ago.

> We measure the current state of the Bay against the healthiest Chesapeake we can describe-the Bay Captain John Smith depicted in his exploration narratives from the early 1600s, a theoretical 100.
>
> But make no mistake, the Bay is still a system dangerously out of balance— the U.S. Environmental Protection Agency (EPA) lists the Chesapeake and its tidal tributaries as impaired. Health

> departments still caution people to stay out of the water for 48 hours after a heavy rain. Fish consumption warnings continue. Human health is at risk. And tens of thousands of jobs have been lost in fishing and related industries alone. A Bay Health Index of only 31 versus a score of 100 when Colonial settlers arrived is a sad testament to how we have treated a National Treasure (CBF 2010).

Nevertheless, the current Strategic Plan for the Environmental Protection Agency continues to categorize and emphasize actions towards improving water quality conditions as "restoration," using the standard of "fishable and swimmable."

> Watershed Restoration and Protection: Apply a watershed approach to restoring polluted waters across the country, including developing Total Maximum Daily Loads, implementing clean-up plans on a watershed basis, and promoting innovative, cost-effective practices like water quality trading and watershed permitting to restore and protect water quality (EPA Strategic Plan 2010).

In question is the effectiveness of current management techniques using a combination of regulatory and voluntary and incentive based programs that lack mechanisms for monitoring progress and enforcement. Implementing new strategies may involve creating attainable goals more closely related to revitalizing watersheds than "restoring" them. The EPA identifies the main sources of water degradation as agriculture, storm water runoff, habitat, hydrology and landscape modifications, municipal wastewater, and atmospheric deposition (EPA Clean Water 2010). Much of this pollution is a result of the activities of a growing population; the land will not be restored to its former condition even through application of smart growth principles and best management practices, if population pressure continues to increase. Revitalizing the watershed involves enhancing communities, stimulating economic vitality, implementing sustainable practices, and regional recognition for local

management programs able to create tangible water quality improvements even under scenarios of continuing population increase.

Focused short-term projects designed for impacting current conditions are replacing long range planning restoration objectives that allow business as usual conditions to persist. Local initiatives, such as the International Council for Local Environmental Initiatives (ICLEI), foster the relationship between local action and policy implementation, by assisting communities in plotting a plan of action designed by local stakeholders to complement current programs towards sustainability for the community (ICLEI 2011). For example, residents in Baltimore have formed the Harbor Health Initiative (HHI), designed to generate interest at the community level to create a fishable and swimmable Inner Harbor by 2020 (HHI 2011).

The Chesapeake Bay Program has rededicated its efforts towards tangible results for improving the functionality of its watershed. Some of the methods designed to have an immediate impact include creating bay-wide Total Maximum Daily Load (TMDL), a "pollution diet" for the entire bay. Within that diet are requirements for each local region to create a Watershed Implementation Plan (WIP). Each local region is empowered to meet the goals of its allotted pollution diet, complemented by stiffer pollution regulations, withholding of federal funding, and legislative backing, designed to guarantee improving conditions. Indicators that can be tracked, measured and monitored are posted daily, reinforcing the urgency to implement programs designed for immediate improvement (CBP 2010). This work, based on regional cooperation and collaboration, has the potential to redefine attainable goals that can revitalize communities and coordinate realistic expectations for watershed management strategy.

2.2 Moving Forward in an Uncertain Environment of Change

Climate change and the impact of increasing temperature, changing species distribution, changing ocean chemistry, rising sea levels, shifting weather patterns, and spreading exotic species is especially challenging in a coastal environment (OCRM 2010). Coastal communities face the uncertainty of managing unpredictable changes to the physical and biological landscape. In addition, collaborative interagency efforts may produce unexpected shifts in policy implementation.

> EPA will develop and implement a renewed strategy on green infrastructure to identify and target the next set of actions that need to be undertaken to promote and support green infrastructure practices. EPA will also develop a framework for encouraging and facilitating more integrated water management approaches at the state and local level, and will support solutions that reduce infrastructure costs and promote more efficient, regionally coordinated resource use. These more integrated solutions, ultimately, lead to long-term sustainability, community buy-in, better water quality, and more robust ecosystem services (EPA Clean Water 2010).

The burden will fall on the local community to create new avenues of implementation for integrated policy initiatives. The local community plays an essential role in ecosystem management.

> Unless local, onsite capacity is developed to maintain existing systems and initiate new ones without continual infusion of resources and expertise from outside, those systems are not likely to be durable over time. Capacity building means raising the abilities and awareness of in-country scientists through short-term efforts, such as training and mentoring, as well as through more long-term efforts, such as contributing to national databases, working with networks of professionals, and establishing long-term cross-institutional partnerships (Orbach 2010).

Recognizing this, the Environmental Protection Agency "will expand existing partnerships and develop new, locally-based partnerships, and implement tools and policies that will foster tailored approaches" (EPA Clean Water 2010). The tailored approach allows for flexibility on a local and regional level as the physical, political, and management landscape continually changes.

Local management strategies are limited by their jurisdictional boundaries, and the differences between jurisdictional and hydrological boundaries. However regional strategies that incorporate the efforts of a wider community surrounding the natural boundaries of an ecosystem can be implemented, as in watershed management. In the southern portion of Delaware, the Inland Bays provide just that opportunity for a cooperative program of regional management and local involvement. This thesis will investigate the challenges faced by the local community of Rehoboth, Delaware, as it implemented measures designed to improve the impaired waterways of the Inland Bays. The process highlights the need for a cohesive interagency platform of information and guidance from federal and state agencies in order to address the ecosystem and its management needs. The next section will examine the history of settlement in the Inland Bays, and the contribution that has made to degradation of the habitat and deteriorating water quality conditions. The strategies and mechanisms for improving water quality in the Inland Bays that have developed over time will also be discussed.

Chapter 3

BALANCING THE INTERESTS OF ECONOMIC DEVELOPMENT AND RECREATIONAL ACTIVITIES IN THE INLAND BAYS

Coastal communities are caught in a tenuous balance between economic and environmental interests. The recreational amenities that attract tourism are in direct conflict with the expansion of economic endeavors. Careful consideration of limited resources and wise management of fragile ecosystems can hamper economic vitality of a coastal region. At the same time, the region is reliant on the health and vitality of the coastal environment to generate economic opportunities.

> Coastal tourism is inherently controversial. At the same time that coastal tourism fosters economic relationships between industry producers and tourist consumers, the process has shown itself to be an enormously potent force in transforming the natural environment and the lives of people who are neither part of the business of tourism nor a member of the community of tourists. The coastal zone is a scarce resource prized not only by those who engage in and profit by tourism, but also by those with personal residences near the sea, and those who find employment in fishing, aquaculture, maritime shipping, nuclear energy, and national defense, among other industries. Congestion and competition in the coastal zone frames the characterization and the resolution of tourism issues. Coastal tourism problems and opportunities are therefore properly debated as "multiple-use" or "multiple-value" conflicts (Miller 2009).

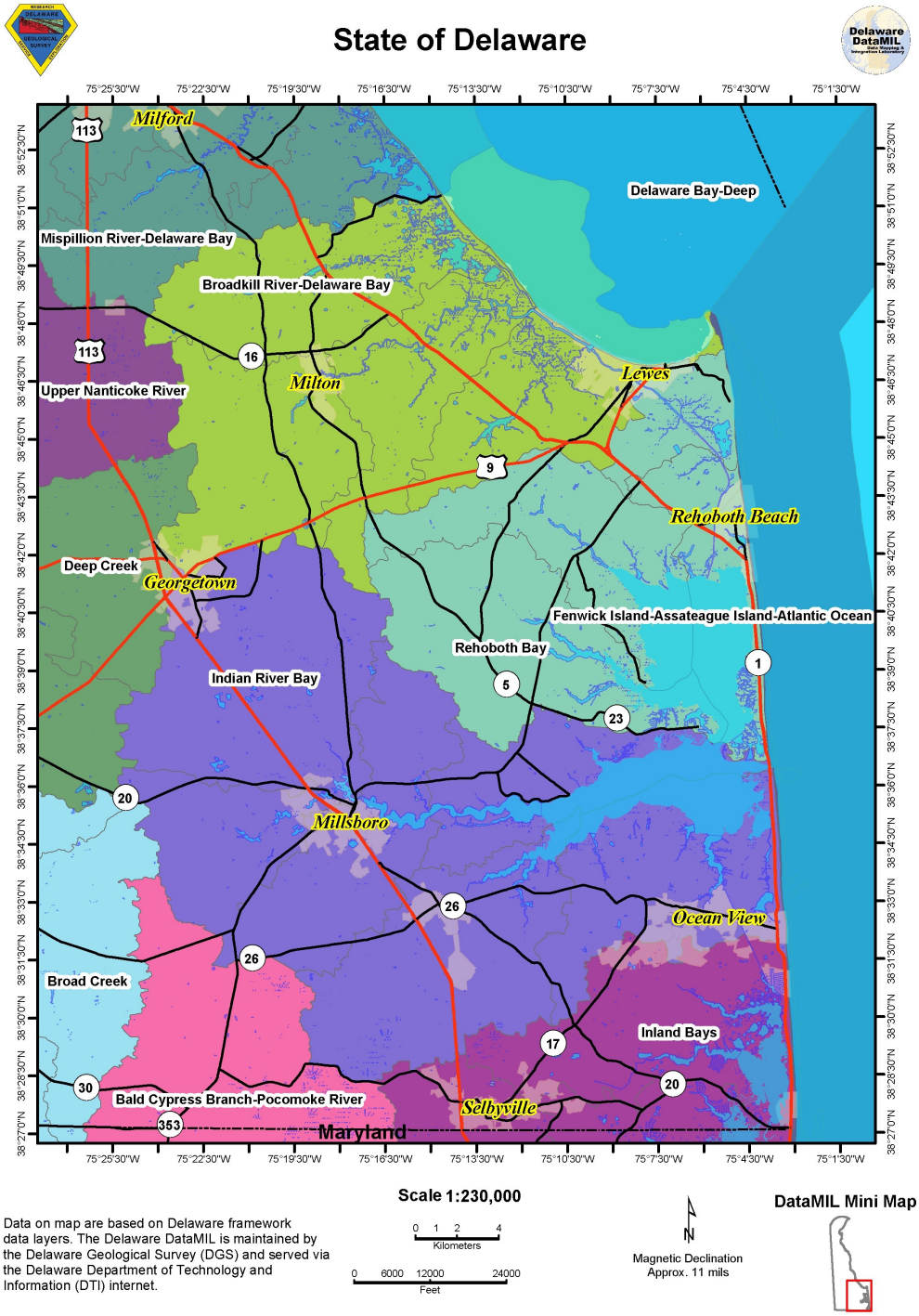
Delaware has a history favoring the environment over economic development, in the coastal zone, protecting its coastline with the passage of the

Delaware Coastal Zone Act in 1971. The opening line of the Coastal Zone Act states: "It is hereby determined that the coastal areas of Delaware are the most critical areas for the future of the State in terms of the quality of life (CZA 1971)."

The act completely banned development of any new heavy industry, protecting one hundred fifteen miles of shoreline, including the Delaware Bay, the Atlantic Ocean and the Inland Bays. This landmark decision successfully established a permanent haven for "camping, fishing, boating, swimming, surfing, crabbing, birding, picnicking, canoeing, kayaking or just lying in the sun (Peterson 2009)."

The Inland Bays continue to be a popular tourist destination and an economic driver for the state. Recreational amenities include bird watching, boating, clamming, crabbing, fishing, hiking, kayaking, sailing, swimming, and visiting the beach (PCS 2008). It is estimated that five million people visited Delaware in 1995, 78% of them intending to enjoy the beach and outdoor recreation activities. Travelers to the state of Delaware in 1992 spent nearly $900 million dollars (Martin 1996).

This section will focus on the Delaware Inland Bays and examine the history of water quality degradation in the region, and subsequent efforts towards restoration and pollution regulation. Examining the history of the bays and nature of development patterns may give some insight into the current water quality conditions brought on by the tradeoffs between economic development and environmentally sustainable practices.



Map 1: The Inland Bays Watershed, Delaware. DataMIL 2011.

3.1 History of Settlement and Development in the Inland Bays

The coastal region of Delaware is the entire state with twenty-eight miles of shoreline along the Atlantic Ocean and three hundred and eighty one miles of tidal shoreline. The rivers and their tributaries in Delaware either drain directly into the Atlantic Ocean, or into the large estuarine bays that dominate the coastal ecosystem; towards the west lays the Chesapeake Bay and towards the east lays the Delaware Bay. The "coastal strip," four miles in width, is protected from industrial development through zoning established by the Coastal Management Program (OCRM 2011).

Sussex County, Delaware, located in the southern third of the state, includes Delaware's entire Atlantic Ocean shoreline. In the southeast corner of Sussex County is a network of bays known as the Inland Bays. The Inland Bays include Indian River Bay, Rehoboth Bay and Little Assawoman Bay. The Inland Bays cover a region of thirty-two square miles; its watershed covers an area of three hundred and twenty square miles. The Indian River Bay is a shallow drowned river valley. Rehoboth Bay and Little Assawoman Bays are considered shallow coastal lagoons. Narrow barrier islands separate the Atlantic Ocean from the Bays. Indian River Bay is connected to the Atlantic through the Indian River Inlet. Rehoboth Bay is connected to the Ocean through Indian River Bay to the south and through the Lewes and Rehoboth Canal Delaware Bay to the north. Little Assawoman Bay drains to the ocean through the Assawoman Bay canal and the Ocean City Inlet in Maryland (CIB 2008).

Access from the Inland Bays to the ocean was intermittent and unreliable throughout its history. Shifting shoals and storms reorganized the shoreline creating temporary discharge points. High tides and storm surges opened up

inlets, freshwater flora and fauna dominated when the bays were enclosed. Sediment cores taken from the bays have revealed extensive freshwater system remnants as well as signs of an environment dominated by saltwater (DNREC 1993).

The Inland Bays supported a population of 30,000 by 1810. As population increased in the late 1800s, the construction of millponds, ditching and dredging practices were common. Common practices in this era were practices of filling in wetlands, building dams to provide power to mills, and farming techniques that led to erosion, excessive sedimentation runoff and abandoned farmland. These practices accelerated sediment accumulation in the Inland Bays, salt water intrusion upstream and bay widening. It is estimated that 62% of the natural wetland landscape has been lost and altered in this way (DNREC 1993).

Permanent jetties were built in 1940, through the Indian River Inlet, creating a dramatic shift in the Inland Bays. The opening, scoured by the constant tidal influence of the ocean, deepened to its present depth of ninety feet, in water that had previously been only two to four feet deep. The amplitude of tidal flow into the bays erodes upstream habitats. Increasing erosion affects light penetration and water quality. The once diverse fresh/brackish/salt water system is now predominantly a saltwater habitat. Freshwater habitats, essential as nursery grounds for some fisheries, have disappeared. Nesting sites for species of piping plovers, diamond back turtles, herons, egrets, black ducks, and pelicans have disappeared as human habitation has intruded on nesting grounds. Populations of bay-scallop, oysters, soft clams, striped bass, shad and herring have disappeared.

Initially, the human population in the Inland Bays tended to be migratory and seasonal, with the summer influx of plentiful fish, oysters and clams. Temporary fish camps were found in abundance. This slowly gave way to permanent summer settlements as the area gained popularity, and have now become year round residences.

By 1930 the region had a population of 60,000. However, the Inland Bays became isolated from the ocean for a whole five years, a freshwater system complete with flora, fauna, flooding and mosquitoes displaced the marine environment. In 1940 a new channel was dredged and stabilized, the Inlet was permanently opened to the ocean, and firmly established as an estuary (DNREC 1993).

There were 120,000 people living in the Inland Bays region by 1990; the region dominated by the poultry industry, and modern agriculture using fertilizers, pest controls and irrigation techniques. It is estimated that population in the area triples during the summer tourism season. The negative impact on the water quality in the Inland Bays can be attributed to the sheer numbers of people as well as the lack of well managed centralized sewage systems (DNREC 1993).

According to the U S Census Bureau, by 2006 there were 68,992 people living in the Inland Bays Watershed (Humphries 2007). Estimates project the population to increase to 181,197 by 2020 (Falk 1999). The population for Sussex County grew from 175,687 in 2005, to 196,945 in 2010 with projections of 216,160 by 2015, 235,431 by 2020, and 308,690 by 2040 (DPC 2010). The majority of people in Sussex County live within the Inland Bays Watershed. Managing the current and expected rate of growth will require a coordinated

effort between state transportation plans, County land-use policies and coastal management strategies (Martin 1996).

A broader approach to the issue of improving water quality needs to account for the impact of non-point pollution (NEP 2010), and a multi-faceted management plan to mitigate the accumulated effects of a growing population, point-source pollution elimination (CWA 1972), and inherent poor planning from previous generations (DNREC 1993).

3.2 Water Quality Management in the Inland Bays

Given the state's focus on protecting recreational activities, water quality is of utmost importance. However, deteriorating water quality conditions persist as settlement of the coastal region lacked planning, and coordination between land management and water quality management has not been able to improve conditions within the watershed. Establishing pollution controls and expanding to regulate non-point pollution loads now forms the basis for watershed management and conservation management plans (EPA WQS 2011).

In the Inland Bays region, there are no records of water quality measurements before 1950. Deteriorating conditions in the Inland Bays have been formally documented since Governor Peterson commissioned "Environmental Study of the Rehoboth, Indian River, and Assawoman Bays" in 1969. In 1983, the report *Decisions for Delaware: Sea Grant Looks at the Inland Bays* prompted the formation of a Governor's task force on the Inland Bays. The task force produced *Protecting Delaware's Inland Bays: Charting a Course for Change*, identifying fifteen environmental issues. Top priority was given to eutrophication, nitrate contamination of ground waters, bacterial contamination of shellfish, adverse effects of dredging and saltwater intrusion.

The poorly flushed Inland Bays system is particularly vulnerable this contamination; the average depth is a mere four feet (Martin 1996).

> Increasing levels of pollution are continuing to degrade the habitat as population in the watershed increases. The Inland Bays are threatened by ever increasing impacts from anthropogenic sources. Since the late 1950s, multiple-use activities, which endanger the ecosystem, have emerged. These uses include industrial water supply, wastewater disposal, commercial and residential development, agricultural practices, and various recreational uses and their related support systems. Much of the bays' pollution is attributed to non-point sources, since direct discharges are relatively few and are stringently regulated (Falk 1999).

Degradation of the water quality in the watershed can be attributed to a variety of sources. In Sussex County, 250,000 pounds of fertilizer were used in 2005, much of which runs off into the tributaries and winds up in the Inland Bays. While 13,000 private septic systems have been converted to central sewer lines since 1990, there are still 1800 septic systems permitted in the inland bays watershed in 2008, many in uncertain working order. The percentage of impervious surfaces in the watershed continues to increase as population and economic development continue to rise. Visitors, bathers and residents in the region are not always aware of the best management practices, such as disposing of pet waste, waste from their young children, and proper trash disposal (Bason 2010).

The degradation appears as nuisance algae growth, choking dead end canals that have very little or no tidal flow. Low oxygen levels have been documented throughout the summer months, and can compromise water clarity and lead to fish kills. Excessive bacteria levels at Bay beaches force beach closures and posted shellfish warnings. The main sources of pollution are identified as agriculture, urban land use, storm water and wastewater (PCS

2008). Through the Clean Water Act, point source pollutants are systematically being eliminated; non-point source pollution is being addressed through implementation of the newly developed pollution control strategy. However, changes are slow to be implemented as existing land-use practices are resistant to better management strategies and resources to provide economic incentives for better waste management are dwindling (PCS Fact Sheet 2008).

Declining water quality conditions in the Inland Bays challenge existing policies and highlight the need for collaboration between federal, state and local policies in order to implement an ecosystem-based approach capable of improving water quality. Upon taking office, Colin O'Mara, Secretary of the Department of Natural Resources and Environmental Control, declared "Improving water quality of our bays and local waterways is among our highest priorities as a state" (Rain Gardens 2010).

Water quality issues are an effective mechanism for challenging the conflicts between agencies contending with separate responsibilities. Combining their efforts could facilitate their ability build towards positive results. A coordinated regulatory approach respects the nature of the ecosystem, and the complexity water quality degradation. Federal programs are designed to facilitate a cooperative approach to management in the coastal zone using a combination of mandatory regulations, incentives, guidelines, and voluntary controls.

3.2.1 Legal and Regulatory Management Mechanisms

Coordinated efforts between the state and the Center for the Inland Bays are designed to improve water quality conditions that are continuing to deteriorate in the poorly circulating bays. The mechanism of restoring water quality targets reduction of nitrogen and phosphorus entering the impaired

waterway through establishing, regulating and enforcing a Total Maximum Daily Load (TMDL). A TMDL is a combination of allocation for the point source and non-point loads as well as a margin of safety. A TMDL quantifies the ecosystem's capacity for nutrient attenuation (DNREC 1998). A Total Maximum Daily Load, or TMDL, is a calculation of the maximum amount of a pollutant that a water body can receive and still safely meet water quality standards (EPA 2011). It is hoped that simply reducing the nutrient load will be sufficient to restore water quality, however, it is proving far more difficult. It can be considered an improvement if the water quality ceases to worsen, and is stabilized, although at an impaired level.

Despite these efforts, very little regulatory action has been taken to enforce these recommended measures. Implementation lags behind the standards established by the Clean Water Act, and recommendations have failed to facilitate coordinated action. The physical makeup of the Inland Bays combined with the long residence times of the groundwater pathways of discharge (Kasper, et al 2010), historical patterns of human occupation, settlement, and agricultural practices continue to degrade the water quality conditions found in today's Inland Bays. Local actions are needed to facilitate improvements and compliment state regulatory actions, and could contribute to the success of revitalizing an ecosystem balance through conservation measures, wider spread use of best management practices, and improved awareness of the human impact on the natural environment.

Efforts to improve water quality conditions by the State of Delaware through the Governor's office began in 1969 with Governor Peterson's Environmental Study of Rehoboth, Indian River and Assawoman Bay. The Sussex County River Basin Water Quality Management Plan, Coastal Sussex

Water Quality Management Plan and the Inland Bays Study group led up to the *Decisions for Delaware: Sea Grant Looks at the Inland Bays* report (???), as well as Delaware's Comprehensive Water Resources Management Planning Program. A Governor's task force in 1984 published *Protecting Delaware's Inland Bays: Charting a Course for Change*. The Inland Bays were designated by the state as "Waters of Exceptional Recreation or Ecological Significance" in 1985 (CIB 1995).

These combined interests led to the National Estuary Program to include the Inland Bays as one of its twenty-eight estuaries. Congress established the program in 1987, to improve water quality, habitat restoration and protection where the rivers meet the sea. National Estuary Programs assist coastal regions with creating plans to protect and restore habitat, focusing on water quality and bringing attention to the entire watershed (NEP 2010). The program provides guidance and oversight for evaluating the performance of management strategies. Each estuary is required to create and implement a Comprehensive Conservation and Management Plan (NEP 2007).

> Each of the 28 National Estuary Programs was charged with developing and implementing a Comprehensive Conservation and Management Plan (CCMP), which establishes priorities for activities, research, and funding for the estuary. The CCMP serves as a blueprint to guide future decisions and actions and addresses a wide range of environmental protection issues including water quality, habitat, fish and wildlife, pathogens, land use, and introduced species to name a few. The CCMP is based on a scientific characterization of the estuary and is developed and approved by a broad-based coalition of stakeholders (NEP-CCMP 2011).

In Delaware, the Center for the Inland Bays was established in 1994 to oversee development and implementation of the Comprehensive Conservation

and Management Plan.

> However, neither the State nor the county created laws, regulations, or ordinances to further the actions called for in the CCMP. To many concerned with the Inland Bays, the CCMP was a weak document that was going to collect dust on many bookshelves. The center decided to initiate a program that could generate the political will to implement tough policies needed to reduce nutrient loading (Bunting 2001).

One of the goals of the CCMP was to reduce the nutrient load in the Inland Bays and restore estuarine habitat (CCMP 1995). The comprehensive tool developed for implementation of the CCMP is known as the Pollution Control Strategy (PCS), finalized in 2008. Its goal is to establish a framework for regulatory action and achieve the TMDL goals imposed by the state, while respecting the restriction of heavy industry in Delaware's coastal zone.

> These regulations have been developed to accomplish two key goals. They have been designed to promote improvement of the environment within the coastal zone while also providing existing and new industries in Delaware's coastal zone with the flexibility necessary to stay competitive and to prosper – all while adhering to the edicts and nuances of one of the most original and innovative environmental and land use statutes in the world (PCS 2008).

The Pollution Control Strategy suggests actions on a local level suited to the Inland Bays that will bring the region into compliance with the Clean Water Act, the Environmental Protection agency and the state mandates to restore the impaired waterways.

> I find that the [Pollution Control Strategy] PCS sets forth a careful balancing of the twin pressures on the Inland Bays, land development within the Inland Bays that add more [Onsite wastewater treatment and disposal system] OWTDSs and nitrogen and phosphorus pollution on one side and the [Clean Water Act] CWA's and state law's requirement to end the water pollution of

the Inland Bays on the other (Haynes 2008)

As work began, a schedule was laid out to accomplish a Pollution Control Strategy, to implement mandated TMDL levels. A Tributary Action Team was formed to participate in the creation of the document. The project was expected to take one year. Issues encountered that first year are well documented (Bunting 2001). The effort to create the PCS was underestimated, as it took ten years to bring the project to completion. The final Pollution Control Strategy was adopted in 2008 (PCS 2008). Now, in its third year of implementation, there has not been rapid progress.

The first phase of the plan relies heavily on the promotion of vegetative buffers, which are effective barriers to nutrients entering the watershed, as well as providing stability from erosion and protection against flooding. The current county regulation calls for a fifty-foot buffer zone; the Pollution Control Strategy recommended a one hundred foot buffer (PCS 2008). With support from developers and farmers, the County has not seen fit to increase buffer width, citing State interference with county home rule.

Encouraging the building of water quality buffers and educational efforts to raise awareness within the Inland Bays watershed would greatly enhance the functioning of the ecosystem (Bason 2010). The effectiveness of building buffers is scientifically sound (MacKenzie 1999) and has been utilized in the Chesapeake Bay, targeting pollution control (BayTAS 2011). However, voluntary measures suggesting these buffers be built may need tougher reinforcement through state initiatives, legislative action or interagency actions.

> For years, various governmental and private entities have encouraged the use of voluntary practices in order to reduce nutrient loading into the Indian River, Indian River Bay, Rehoboth

> Bay, Little Assawoman Bay and their tributaries (the Inland Bays) such that water quality standards are achieved in support of their designated uses. While reducing pollutant loads to an extent, these attempts have not resulted in the desired outcome of controlling pollution and improving water quality (PCS 2008).

The requirement to build vegetative buffers between Inland Bays and new developments was recently challenged in court, by Sussex County. The presiding judge ruled that the issue of requiring buffers is a zoning issue, and the state legislature has given that authority to county governments, not the Department of Natural Resources and Environmental Control. The Pollution Control Strategy must therefore be coordinated through the county comprehensive land use plan, according to the judge (Cape 2011). The success fate of the Pollution Control Strategy in achieving the TMDL may well rest in the hands of the county council and state legislature.

Management strategies in the Inland Bays are reflected in the Chesapeake Bay due to its proximity and estuarine similarities. Executive Order 13508 has bolstered the strength of the Chesapeake Bay Program, and renewed efforts to improve water quality, with an urgency and infusion of well-funded programs (CBEO 2011). The program is borrowing the concept of a pollution control strategy, implementing an enforceable "pollution diet" to cap the nitrogen, phosphorous and sediment entering the bay throughout the watershed, which spans six states and the District of Columbia. These strategies will include daily reporting, source tracking, holding municipalities accountable for measurable reduction targets, and harsh penalties for non-compliance. The Chesapeake Bay Program is ambitiously coordinating the efforts of the Environmental Protection Agency, Department of Agriculture, Department of Commerce, Department of Defense, Department of Homeland Security, Department of the Interior, and the Department of Transportation. Together, they are determined to adopt stronger

management strategies in order to achieve tangible and immediate results. This heavy-handed method of regulatory enforcement may establish new standards that could alter pollution control efforts in watershed management for the whole country (CBP 2010).

3.2.2 Voluntary Management Mechanisms

In an effort to foster a sense of community and stewardship, many water quality programs implement voluntary guidelines, opting for community participation rather than enforceable and regulated measures. Appealing to an attitude of respect for the recreational value of the watershed, and the responsibility of passing on the similar amenities to future generations is a strong selling point of these programs. Encouraging citizen responsibility to improve water quality conditions in a local community can collectively make a difference in the watershed.

Best management practices are detailed and encouraged through public education forums, websites, and financial incentives. These guidelines can influence new development, and town management strategies. Positive financial incentives can accompany these practices to encourage their adoption and implementation with negative financial consequences as a backup alternative. The process relies on community participation, stakeholder involvement, transparency in the decision-making process, and community involvement in embracing the final solutions.

Smart Growth and *Coastal and Waterfront Smart Growth* (Smart Growth 2009) for coastal and waterfront communities have created guidelines for managing population growth and supporting economic sustainability in the

coastal zone. Currently, these new methods are not enforced, incentivized or regulated, but rely on voluntary participation, promoting sustainable concepts and highlighting local community achievements as mechanisms for implementation. The Environmental Protection Agency, the Department of Transportation and the Department of Housing and Urban Development collaborate on this program in hopes of establishing workable guidelines for sustainable communities (Smart Growth 2010, Smart Growth 2009).

In the coastal zone, there are programs that offer membership into the program as mechanisms improving community participation, raise awareness about water quality conditions and encourage a sense of stewardship. Examples of these awards are the Clean Marina Program, administered through the Office of Ocean and Coastal Resources. Each marina that is included is given a flag to fly and a plaque to display stating its commitment to cleaner water quality practices (OCRM 2011). The Blue Wave Beach designation from the Clean Beaches Coalition similarly offers a flag and a sign recognizing the efforts the local community has invested in cleaning the beach area (CBC 2009). Superstar and Five Star beach ratings from the National Resource Defense Council are designed to foster continued appreciation towards clean water at the beach, and to engage community support in maintaining water quality (NRDC 2011). These programs work because local businesses recognize the value associated with environmentalism.

Delaware hosts many volunteer opportunities through the state park system to plant dune grass, participate in a world wide beach litter clean up day, rebuild nature trails, monitor the beach plover population, maintain campgrounds (DSP 2011), rescue or dispose of stranded marine mammals (MERR 2011). There is a program that has been operating for twenty years,

where citizen volunteers monitor the water quality in the watershed, logging over 25,000 hours (CMP 2011). Events such as Coast Day, hosted by the University of Delaware, attract thousands to the coast each fall and further public education about the marine environment (CEOE 2011). These efforts build towards a respect for the coastal environment and develop community enthusiasm for participating in practices that are intended to improve water quality.

Given the range of voluntary and regulatory programs that are intended to appeal to the methods of development and recreational uses in the coastal zone and costal communities, there continues to be a discouraging degradation of water quality in the region. The next section details the process faced by one coastal community to improve water quality conditions by rerouting wastewater effluent that has been depositing into the bay. Rehoboth, Delaware is the focus of state water quality regulations.

Chapter 4

WATER QUALITY IN REHOBOTH DELAWARE

4. Water Quality

The purpose of this research is to investigate coastal policy coordination and gaps as they relate to the decision in the small coastal community of Rehoboth Beach Delaware, and its plan to build an ocean outfall (City of Rehoboth 2009). Voting to build the outfall is an outcome of federal and state mandates to remove point source pollution in the Inland Bays (EPA Lawsuit 2009). The outfall was chosen because unlike the Inland Bays, the larger marine environment is a resource capable of diluting wastewater effluent effectively. In some areas, this choice offsets the pollution that would have been deposited into the air, water, and from the land. In an area with limited options, an outfall can be the most financially and environmentally responsible solution (Grace 2009). This is the case in Rehoboth Beach, a small community bounded by the bays and the Lewes-Rehoboth Canal on one side, and the ocean on the other. The decision reflects the community's stake in improving water quality in the Inland Bays, managing it's growing full-time and summer population, and preserving recreational opportunities for future generations.

The Inland Bays are designated as "Estuaries of exceptional recreational and environmentally significance (ERES)." In order to preserve and protect the Bays, recommendations for improving water quality have been documented since 1969 (Peterson, Decisions for Delaware 1983, CCMP 1995, PCS 2008). Historically, voluntary guidelines and financial incentives have not shown

marked improvement in water quality (PCS 2008). The National Coastal Condition report rates the Inland Bays as "fair" with little improvement (NCCR 2008). The State of the Bays report shows only limited improvements in the Inland Bays (CIB 2011).

4.1 Impairment

In 1995 the waters of the Indian River, the Indian River Bay and the Rehoboth Bay were declared impaired, listed as such by the Delaware Department of Natural Resources and Environmental Control (DNREC), according to section 303(d) of the Clean Water Act (EPA 2009).

> Under section 303(d) of the Clean Water Act, states, territories, and authorized tribes are required to develop lists of impaired waters. These are waters that are too polluted or otherwise degraded to meet the water quality standards set by states, territories, or authorized tribes (EPA 2011).

States determine the cause of impairment and the source of impairment, according to standards approved by Environmental Protection Agency. Once a waterway is listed as impaired, the state is required to establish a Total Maximum Daily Load (TMDL) and enforce a plan designed to restore the waterways.

In addition to establishing a TMDL, each state issues an assessment report for each impaired waterway. Since 2001, the states have been encouraged to create a combined watershed assessment report, satisfying the Clean Water Act's requirement for listing impaired waterways under 303(d), with the 305(b) report on the status of all assessed waters (EPA 2011). In Delaware, the state has classified "2,509 miles of rivers and streams, and 2,954 acres of lakes and ponds" applying the categories in the chart in Table. 1. Swimming is compromised in eighty-six percent of rivers and the fish and wildlife are limited in ninety-eight

percent of the rivers in Delaware. Swimming is also compromised in forty-four percent of the ponds and lakes and the fish and wildlife are limited in eighty-nine percent. While most of the federal attention focuses on cleaning up point source pollutants in order to stabilize deteriorating water quality, it is now widely recognized that the majority of degradation results from nutrients from non-point sources (Watershed Assessment Report 2010).

Table 1: Five Integrated Report Categories for State Assessed Waters

Category	Description
1	All designated uses (DU) met
2	Some, but not all, Designated Uses met
3	Cannot determine if any Designated Uses met
4	*Impaired/threatened* - TMDL not needed
4a	TMDL completed
4b	TMDL alternative
4c	Non-pollutant causes
5	*Impaired/threatened* by pollutant - TMDL needed * Also known as the 303(d) list

Source: EPA National Water Quality Assessment Report 2011

4.1.1 Nutrient Loading

Nutrients, mainly nitrogen and phosphorus, enter the watershed in excess amounts in the form of air and water pollution. The largest point source contributors to the nutrient load have been wastewater treatment facilities; the largest non-point source has been agriculture. Eutrophication occurs when there is an excess of nutrients present in a water body leading to high rates of net photosynthesis during the day and resulting in high rates of respiration at night.

> As recently as 1975, Delaware routinely experienced serious water pollution and public health problems as a result of the discharge of

> untreated sewage and wastes. Since then, as a result of voluntary efforts, regulatory actions, and significant private and public investments in wastewater treatment facilities, localized improvements in water quality have been achieved (Watershed Assessment Report 2010).

In the Inland Bays, excessive nutrient loads have degraded the estuary, as evidenced by disproportionate growth of microalgae, phytoplankton blooms, and dissolved oxygen levels that fluctuate on a daily basis. Dissolved oxygen that drops below sustainable levels can lead to massive fish kills. Shellfish beds, submerged aquatic vegetation, nursery habitats and spawning grounds for fisheries suffer from degradation and habitat loss in conditions that include excessive amounts of nutrients and sediment (DNREC 1998).

4.1.2 Non-Point/Point Source Discharges

The Clean Water Act states once a waterway is impaired, the state is required to establish and enforce a Total Maximum Daily Load (TMDL) and systematically eliminate all point source pollutants. There were thirteen point sources identified as sources of pollution in the Inland Bays in 1995 when the waters were classified as "impaired." All but three have been eliminated, and there are plans in progress to address the removal of the remaining source pollutants (PCS 2008).

Non-point source pollution is more difficult to quantify, identify and mitigate. It is defined by DNREC as "pollution originating from diffuse areas having no well-defined source." Sources of non-point pollution include animal waste, farm fertilizers, sediment and stormwater runoff, and septic tank leaching into groundwater. Non-point mitigation measures include creating vegetative buffers, upgrading stormwater management practices, forest conservation and improving agricultural practices to reduce nutrient load (PCS 2008).

Tracking sources of pollution, and assessing their damage to the environment is greatly enhanced by advances in technology. Coordinating satellite imagery, remote detection techniques, and computer modeling enables a greater awareness of the problems within a specific area. Informational coordination is essential in order to identify and mitigate the harmful effects of specific pollutants (Cooper 1994).

4.2 Restoration Strategy

The restoration process for an impaired waterway focuses on identifying and reducing nutrient contributions to the watershed until the Total Maximum Daily Load numerical target is met (DNREC 1998). As part of the restoration strategy, point source discharge of nutrients is targeted for removal through the National Pollution Discharge Elimination System (NPDES) permitting system. The NPDES program regulates point sources as a mechanism for controlling pollution.

> Point sources are discrete conveyances such as pipes or man-made ditches. Individual homes that are connected to a municipal system, use a septic system, or do not have a surface discharge do not need an NPDES permit; however, industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. In most cases, the NPDES permit program is administered by authorized states. Since its introduction in 1972, the NPDES permit program is responsible for significant improvements to our Nation's water quality (NPDES 2011).

The NPDES system gives enforcement of pollution control some regulatory leverage on a site-by-site basis. Further management opportunities are presented through development of a Pollution Control Strategy and Comprehensive Conservation Management Plan. While these plans are often well

constructed, and scientifically sound, they lack enforcement measures, and have relied on voluntary and incentive based compliance mechanisms (PCS 2008).

4.2.1 EPA is Forced to Create TMDL Through Legal Action

The law requires that each state establish priority rankings for waters on the impaired lists and develop TMDLs for these waters. In 1995, once the Indian River, Indian River Bay and the Rehoboth Bay were listed as impaired, the state of Delaware did not create a TMDL. To expedite implementation of regulatory action, the American Littoral Society brought a suit against the Environmental Protection Agency (EPA) in June of 1995, claiming the EPA was remiss in failing to enforce the implementation of the Clean Water Act. The courts determined that the EPA was in fact remiss in allowing Delaware to take no action, once it listed the Inland Bays as "impaired." This was the first suit of its kind, and similar suits have since been won in twenty-six different states (EPA 2009).

> If a State fails to adopt water quality criteria and standards in accordance with paragraph (1)(A) that are as protective of human health as the criteria for pathogens and pathogen indicators for coastal recreation waters published by the Administrator, the Administrator shall promptly propose regulations for the State setting forth revised or new water quality standards for pathogens and pathogen indicators described in paragraph (1)(A) for coastal recreation waters of the State (CWA 2007).

The EPA was ordered to intervene, establishing and enforcing a TMDL standard if the state did not impose its own TMDL in a timely fashion. As part of the settlement, Delaware was mandated by the federal court to establish TMDLs for Indian River Bay and Rehoboth Bay by 1998, and to implement the plan within a ten-year time frame (EPA 2009). A TMDL was established in 1998 and the Center for the Inland Bays began working on a pollution control strategy, a document that was finalized and published in 2008. A TMDL for Assawoman Bay was established in 2005 (PCS 2008).

The TMDL for the Inland Bays calls for systematic elimination of all point source pollution, and for non-point source reduction in the nitrogen and phosphorus levels in the upper portion of the Indian River at 85% and 65% respectively. In the Indian River Bay and the Rehoboth Bay, the levels of reduction were set at 40% for both nutrients.

4.2.2 State is Required to Enforce TMDL

In the Inland Bays, it was mandated that "permitted discharges of nutrients into the Indian River, Indian River Bay, Rehoboth Bay, Little Assawoman Bay or their tributaries under the NPDES program shall be systematically eliminated through their NPDES renewal process." Trading with non-point source nutrient loads is allowable for the Inland Bays and evaluated on a case-by-case basis, one unit of point source pollution traded for removal of two units of non-point pollution (DNREC 1998). Thus, each of the thirteen point source polluters were scheduled to be eliminated from contributing to the degradation of the Inland Bays as their permits were submitted for renewal.

As of 2009, only three point source polluters remain, the Millsboro, Lewes and Rehoboth wastewater facilities (see Fig. 1). The first facility, the Millsboro wastewater facility, releases its effluent into the Indian River, its NPDES permit has expired, and its mitigation plan is under consideration and not yet finalized (PCS 2008).

The second facility, the Lewes wastewater facility, releases its effluent into the Lewes and Rehoboth Canal. Because the Lewes facility is located near the Roosevelt Inlet and tidal currents partially disperse the effluent into Delaware

Bay, it was determined that only 2.5% of the nutrients load impacts Rehoboth Bay (???). Lewes is negotiating a settlement that will allow the facility to trade this nutrient load at a two to one ratio, a method described and authorized in section 3.2.1 of the Pollution Control Strategy for the Inland Bays. Upgrading the wastewater's filtration and biological nutrient removal system and reducing non-point source loads will accomplish this trade (PCS 2008).

The third wastewater facility is currently depositing effluent into the Rehoboth Bay services the City of Rehoboth and surrounding communities in Dewey Beach, Henlopen Acres and North Shores. The plant was upgraded to minimize the nutrient load on the Inland Bays (Stenger 2008). This facility is the topic of the next section.

4.2.3 City of Rehoboth Beach Mandated to Cease Nutrient Disposal

The City of Rehoboth Beach Delaware is a small coastal community in the Mid-Atlantic region, covering about one square mile. The U S Census Bureau listed the population for the city as 1,556 in 2007 (Census 2007). The median age for the city is fifty-seven, thirty-eight percent of the population is over the age of sixty-five. The city website estimates the seasonal summer population increases to 25,000 within city limits. The greater area beyond city limits is similarly populated with a dramatic seasonal fluctuation (City of Rehoboth 2009).

The seasonal population pattern is reflected in the daily usage data from the Rehoboth Beach wastewater treatment facility. Summer flow has been measured on average as 1.91 million gallons a day (mgd). In the winter, average flow is 0.72 mgd. Projected numbers for 2030 are similarly seasonal, with usage in the summer estimated to be 2.30 mgd and a winter average of 0.93 mgd. The

permitted level of treatment for the facility is 3.4 mgd, a number that is predicted to be sufficient through 2030 and compatible with a future ultimate design for the needs of the entire county beyond that time (Sussex 2009).

The Rehoboth wastewater treatment facility is authorized to dispose of its effluent into the Lewes and Rehoboth Canal through a National Pollutant Discharge Elimination System (NPDES) Permit No. DE 0020028 (EPA 2005). This permit will expire December 31, 2014, at which point the City of Rehoboth has been ordered to cap the effluent pipe and reroute the discharge. The allowable nutrient load for the discharge after 2014 is set at zero. The trading option to offset the nutrient load similar to the solution developed for the City of Lewes is not a viable option for the City of Rehoboth because the wastewater facility is larger, the nutrient load is greater, and 100% of the nutrient load from the effluent impacts Rehoboth Bay (PCS 2008).

The Rehoboth wastewater treatment facility was installed in its present location in 1935, operating as a primary treatment facility until 1987. Primary treatment involves a simple separation of solids, and a chlorine bath to eliminate bacteria (USGS 2011). The current plant was rebuilt on the same site in 1987, designed to include secondary treatment. Secondary treatment involves additional removal of solids using a biological treatment (USGS 2011). Nutrient removal, an enhanced secondary treatment process was added in 1997, chemically targeting removal of nitrogen and phosphorous. (S&W 2009).

The City of Rehoboth filed for appeal of the final TMDL order, suggesting upgrading the facility rather than complete elimination of its discharge. This only served to buy time for the treatment facility. The NPDES permit was renewed in 2005, on the condition that the facility ceases discharging its effluent

Map 2: City of Rehoboth, Delaware

into the Rehoboth Bay by December 31, 2014. The court set the nutrient level at zero; eliminating effluent discharge by the end of 2014 is the only option available to the City of Rehoboth (Stenger 2008).

4.2.3.1 Alternative Disposal Methods Search

The Clean Water Act calls for systematically eliminating point source pollutants (CWA 2002). The American Littoral Society, in conjunction with the Sierra Club, sued the EPA for not enforcing the State's TMDL orders in a timely fashion. This legal leverage had not been previously applied to deteriorating water quality conditions. The EPA was ordered to oversee the development of TMDLs for the state of Delaware within a ten-year time span, and, if necessary, enforce their application, and monitors their progress if the state was remiss in its responsibilities towards restoring impaired waterways (EPA Lawsuits 2009).

In keeping with this directive, the discharge rate for the Rehoboth Wastewater Facility was set at zero by the Department of Natural Resources and Environmental Control following the court decision described above. The city attempted to appeal this decision, based on the impracticality and questionable science supporting a zero standard, and the speed with which the TMDL was assessed and assigned to the Inland Bays (Stenger 2008).

The zero discharge order was upheld, and the City of Rehoboth Beach was granted an extension, through the NPDES permitting system, to continue operating under current disposal conditions until December 31, 2014. At that time, the NPDES Permit expires, and the wastewater facility must comply with the zero discharge order.

4.2.3.2 Minimal Federal or Regional Guidance

There has been little federal input for the challenge facing Rehoboth Beach in eliminating its wastewater effluent deposited into the Inland Bays. The Clean Water Act provides generalized guidance in order to cover every type of water body and pollutant. This capacity to include every different type of environment found is a priority for a national act but leaves a local area with out specific management oversight.

> The issue here is whether legislative direction and requirements for pollution prevention as it relates to water pollution should be provided. If so, should specific goals be set for amounts of reduction, should specific toxics be targeted, or should broad policy goals be established and states given encouragement or requirements to establish pollution prevention programs with assistance and approval by EPA (Tyler 2010).

The National Estuary Program requires each member to create and update a Comprehensive Conservation Management Plan, but allows each estuary to create a plan that is tailored to fit their water body and watershed.

The concept of regional guidance is gradually developing, but has not yet had an impact on coastal water quality management. Regionally, the Mid-Atlantic was considered the southern portion of the Mid-Atlantic Bight, which stretched anywhere from North Carolina to New York, depending on specific management parameters. Attempts at developing regional efforts were coordinated as a top down mechanism in 2009; MARCO was formed as a regional initiative through the governors' offices, including New York, New Jersey, Delaware, Maryland, and Virginia. The process includes developing a Mid-Atlantic identity, and beginning to consider the issues specific to the regional, with hopes of developing a regional plan. This effort is slowed by political turnover, as happened with the recent

governors' elections in New Jersey, New York and Virginia (MARCO 2011). Integrating the priorities of three new governors when the group only consists of five states causes further delay for implementing management strategies.

There are other Mid-Atlantic Estuaries that are managed similar to the Inland Bays in the Region: the Delaware Bay, the Chesapeake Bay, the Barnegat Bay, and Albemarle-Pamlico Sound. The Chesapeake Bay Program, the Barnegat Bay Partnership, the Center for the Inland Bays, the Delaware River Basin Commission and the Albemarle-Pamlico National Estuary Program document similar issues of deteriorating water quality. Originally, excess nitrogen and phosphorus were thought to be the cause of degradation but targeting their removal from point sources has not resulted in a hopeful measure of recovery. Extensive research indicates the solution may involve mitigating non-point source pollution, rethinking development patterns, land use, and managing the ecosystem on a watershed basis. As each estuary struggles to develop management plans that progressively improve conditions, they have not established a model, or a consistent body of measurable indicators, that can be applied though out the region (CBP 2011, BBP 2011, NCDENR 2011, CIB 2011, DRBC 2011).

4.2.3.3 Lack of Scientific Evidence to Help Weigh the Options

The City of Rehoboth cited lack of scientific evidence when disputing the ruling for zero discharge (Stenger 2008). There continues to be a lack of hard scientific evidence comparing wastewater discharge alternatives. In Governor Peterson's report released in 1969, the ocean outfall was proposed as the ideal solution to managing the growing population. At the time, federal funding was available to cover the majority of the cost of the project. Unfortunately, the plan was not implemented for Rehoboth Beach, although Sussex County's South

Coastal Plant has operated an ocean outfall since 1978 (Grace 2009). Further scientific study was not conducted in support of the proposal.

The surveys done for Governor Peterson's report in 1969 began an attempt to describe the region with respect to geology, biology, land use trends, water quality standards and programs, shoreline acquisition, environmental controls and a summary of recommendations. This brief report is still remarkably applicable for today (Peterson 1969). The area was surveyed more extensively in 1983 (Decisions for Delaware 1983) and further characterized in a report published in (CIB 1993). While these reports form a historical baseline, some of the information has not been updated since that time. The Delaware Inland Bays Environmental Indicators Report (CIB 2004) was recently updated and has been published as the State of the Bay Report 2011.

Within these reports there are many gaps in scientific data and analysis. The full impact of increasing population pressures within the region coupled with a lack of management strategy to build infrastructure capable of reducing the nutrient contribution to the Inland Bays was not well understood at the time of their preparation, although the basic planning criteria have been known since the late 60's (McHarg 1969). With the increasing use of GIS technology and interagency collaboration, presentation of information can enhance the ability for determining options such as the considerations the alternative wastewater disposal report was examining. A thorough understanding of underlying soil types and geological formations has the potential to direct growth and land use towards a comprehensive land use plan that relies on sound science and ecosystem understandings. This broad view is based on more readily available technology and interagency collaboration and cooperation. The willingness to

explore this avenue of cooperative venture has not been demonstrated in most land use decision-making processes.

4.2.3.4 Engineers Report Forms the Basis for Decision

The process of developing and evaluating wastewater disposal alternatives fell to the engineering firm of Sterns and Wheler, hired by the City of Rehoboth. Their task was to consider the available options and "identify the alternative which was most technically feasible, cost effective and environmentally acceptable (S&W 2005)." The four alternatives evaluated were:

> Land Application: Treated effluent is sprayed on agricultural land to irrigate and fertilize crops. The effluent, after plant uptake, percolates through the soil to the groundwater.
>
> Rapid Infiltration Beds: Treated effluent is flooded on to sand beds allowing the water to percolate down into the groundwater.
>
> Subsurface Injection: Treated effluent is injected either through a shallow well in an area where the groundwater is contaminated or through a deep well into an aquifer that is confined below the drinking water aquifers.
>
> Ocean Outfall: Treated effluent is discharged through an outfall and diffuser into the ocean at a depth and distance from the shore that insures public health and environmental standards are met (S&W 2005).

The report concluded that the Land Application method was a popular choice, but the cost of land near Rehoboth Beach was an obstacle that was not surmountable given potential for development and population pressures. Land prices were at a premium at the time, and not much land was available. Preliminary explorations into purchasing land suited for spray irrigation in order to assess cost estimates deterred further pursuit of this option (S&W 2005).

Rapid Infiltration Beds (RIB) posed a greater environmental risk, given the type of soil in Sussex County, the proximity to sources for drinking water, and the anticipated load. The potential for contaminating ground water aquifers that are also the principal source of local drinking water was a concern. As RIBs provide little nutrient attenuation subsequent to application, some wastewater nutrients could still discharge to the Bays through groundwater pathways. Previous experience in other areas suggested the clean up costs to the environment and short lifespan of the RIBs was not the best solution for Rehoboth Beach (S&W 2005).

Similarly Subsurface Injection was rejected due to lack of conclusive evidence of successful disposal. The geology of the region not a good match for this type of disposal. This option was also the most expensive option, given the depths to which the wells would need to be drilled. Considering the lack of confidence that this solution would succeed, the risk and costs proved to be prohibitive.

The report recommended Ocean Outfall as the clear choice given the factors studied. The choice was the best fit given the geology of the area, the soil types studied, the state of the Inland Bays and the need to improve the impaired waters. As technological advances in wastewater treatment become available, they can be applied to reduce the levels nutrient levels in the effluent. An additional benefit was the proximity of the ocean to the town and the direction of the currents that would disperse the effluent into the marine waters. This choice was also the least costly of all the options (S&W 2005).

The City did not quickly adopt this plan, and in 2009 Sterns and Wheler created a new report, this time comparing the economic evaluation of Land Application Method and the Ocean Outfall. The engineering firms worked closely

with city and county engineers and council members in creating the reports. These reports came to the same conclusion; an ocean outfall represented the alternative for the City of Rehoboth that would be the least costly, the most effective in improving the water quality of the Inland Bays, and the most reliable solution. The nutrients would be dispersed through the larger marine environment. Once the ocean outfall was completed, it would be the least costly solution to maintain.

The county engineers were then consulted and contributed to a joint report, which overwhelmingly favored the ocean outfall (S & W 2009, Sussex 2009). These final recommendations were based on cost and technological feasibility. The ocean outfall was the least costly alternative, and the alternative that allowed the city to maintain ownership over its wastewater system, rather than partnering with the county or a private utility. These results were presented to interested stakeholders and residents through a public hearing, and made available for public comment in November of 2009. No other report was presented, so it was accepted that the engineers covered all applicable fields of study in coming to their decision.

4.2.3.5 Decision Made by Small City Council of Seven People

The decision about which discharge method to choose rested solely in the hands of the Board of City Commissioners for the City of Rehoboth, a group made up of six city commissioners and the mayor. Each commissioner is elected for a three-year term and may run for reelection. At least three commissioners must be full-time residents living in the City of Rehoboth; three of the commissioners may be part time residents as long as they own real estate in Rehoboth. The Mayor, Sam Cooper, has been in office since 1991, he had been a city commissioner prior to that. The newest commissioner, Bill Sergeant, was sworn

into office in July of 2009 (Rehoboth 2009). It is interesting to note that the city debated this issue for ten years, and in that time there were many changes in the Board of City Commissioners. Ultimately, the group that voted for an outfall was different than the members who heard the arguments over the time as they developed through the presentations and debates, and the issue reached its resolution.

The City of Rehoboth website provides links to presentations the council has heard during the past year with regards to alternative wastewater discharge methods. In addition to formal presentations, a running compilation of all comments and workshop proceedings addressing the issue is accessible. These are stored under ongoing business on the City of Rehoboth website (Rehoboth 2009).

According to city code, before voting on an alternative wastewater discharge method, the council must hold a public hearing. The hearing took place on November 7, 2009. Everyone who attended was invited to speak. Written comments were also accepted (Hearing 2009). Five hundred and thirty-seven written comments were received. Many comments were in favor of Rehoboth retaining ownership of its future, rather than relying on partnering with the county to transport its effluent away from the coast. Other comments voiced a preference for the least costly ocean outfall as being the solution that also provided the most secure option for improving the water quality of the Inland Bays. Consideration for the entire ecosystem was mentioned, with the ocean outfall succeeding in that respect. And lastly, some concern was voiced about the reliability of the outfall, and the reliability of the wastewater treatment facility, and the value of maintaining the quality of life in the coastal community.

An informal commissioners workshop, open to the public, was scheduled for December 3, 2009, to clarify questions raised at the public hearing and through the written comments. The issues that were brought out during the public hearing and the subsequent city council workshop summarized the findings the engineers presented. One commissioner brought four glasses of water. The glass of water from the Inland Bays was the least clear, the glass of ocean water was clearer and the two glasses of water containing drinking water and effluent were both the clearest.

City Commissioners formally voted on the alternative wastewater disposal method on December 14, 2009. The vote was seven votes for the ocean outfall and none for the land application method. The work was then begun to finalize the route the ocean outfall would travel through Rehoboth. The City will continue to maintain its upgraded wastewater facility, limiting the levels of nitrogen and phosphorous contained in effluent disposal. Environmental studies are being undertaken to secure proper permits for the outfall, and satisfy the requirements for the State Environmental Impact Statement.

4.3 County, State and Federal Support and Funding for Decision

Funding for the ocean outfall has yet to be determined. The cost of the entire project is expected to be nearly $87 million (Sussex County 2009), an enormous sum for a small coastal town with a full-time population of 1,556, and a summer population of more than 25,000. The city did not create a dedicated capital investment fund by collecting a small surcharge to cover the cost of the project prior to 2009, as this was not a requirement of the court order. However, given the large cost and current economic conditions, this was an oversight (City of Rehoboth 2011).

The city will seek state and federal government funding for assistance in covering the cost of the project. However, the cost of the project is equal to the entire budget allocated statewide for all wastewater infrastructure projects (see Table 2).

The state revolving fund is currently supporting forty-one projects, totaling one hundred million dollars. An additional sixteen million dollars this coming year, 2011, will support sixteen projects throughout the state (DNREC Public Affairs 2011). The state will not have sufficient funds to support the cost of the ocean outfall. It will only be able to cover a small portion of the full cost of the project.

Table 2: Available Water Pollution Control Revolving Loan Funds

Water Pollution Control Revolving Loan Fund FY 2009-FY 2014	**Millions**
Federal capitalization grants plus state match allocated for loans (1989-2009)	$152.42
Anticipated federal capitalization grants plus state match (2010-2014)	$ 18.86
Loan repayments (1989-2008)	$ 43.17
Loan repayments (2009-2014)	$ 68.94
Investment interest earned (1989-2008)	$ 7.98
Investment interest (2009-2014)	$ 9.91
Total WPCRF Funds (1989-2014)	$301.28
Loans made (1989-2009)	$195.88
Total WPCRF Funds Available (2009-2014)	$105.40

Source: Clean Water Advisory Council 2008.

Traditionally, large wastewater infrastructure projects could expect to find generous federal support in the form of grants. However, as these grants were plentiful when the Clean Water Act was first administered, they have become scarce in recent years. Federal Capitalization grants are available through the Clean Water Act dependent on a twenty percent match from state funds. These funds are designed to improve wastewater facilities, and enable funding for water pollution control. Repayment of the loans contributes to further available funding for similar projects.

Other sources for state funded projects with federal backing are becoming unreliable as budget shortfalls are dominating the economic outlook. The state is looking at resourceful mechanisms for continuing to fund these projects (CWAC 2008).

The Clean Water Advisory Council in Delaware is tasked with funding long-term wastewater projects. Using a combination of grants and loans they have creatively financed three hundred million dollars in statewide projects. Until recently, the majority of funds were in the form of grants. The object of the funding was to minimize the user fee impact on Delaware residents, widely dispersing the benefits as much as possible, throughout the state. With the current shift in economic priorities on the state and federal level, funds that were traditionally replenished have become exhausted. The CWAC is shifting its funding policy and focusing on long term loans, with "supplemental grant funding and/or creative financing, such as reduced interest rates, deferred payments, extended payment periods, etc. to make the projects affordable CWAC 2008)."

4.4 Political Will

Land use and planning in the Inland Bays watershed continues to be a source of contention between developers, farmers and environmentalists. Voluntary controls and incentive-based regulations are dependent on the cooperation of its citizens, and the capacity of the local region to develop policies designed to benefit the environment.

> A key factor in the eventual development of any comprehensive resource management strategy for the Inland Bays will depend on broad-based public support and knowledge of the issues (Decisions for Delaware 1983).

Deteriorating environmental conditions are not enough to motivate and encourage change, as evidenced by the thorough report: *Environmental Study of the Rehoboth, Indian River and Assawoman Bays*, submitted in 1969. In this report, "increasing and uncontrolled development" is seen to threaten marshland, finfish and shellfish populations, to increase pollution, to contaminate ground water and to destroy woodlands, which leads to increasing erosion. The recommendations include coordinating new legislation with the State Planning Office, county land development controls through zoning ordinances and coordinating with the State Planning Office, and regulations based on sound management practices (Peterson 1969). These management suggestions were reiterated again in Decisions for Delaware 1983.

The same conditions continue to persist in 2011. Change travels a slow course, without political will, and properly managed windows of opportunity (Kingdon 1995). Interagency collaboration and coordination will be necessary (CEQ 2009). Strategies for improving waterways have had limited success due to the narrow nature of application. Expanding pollution control strategies from a small limited area to the entire watershed to the whole ecosystem have been

challenging. Ideally, this allows for collaboration and cooperation as well as sharing of resources when applied in a coherent manner (Tyler 2010).

The emphasis on measurable results from the Chesapeake Bay Program may create some impetus in changing standards in the Inland Bays due to its proximity, and similar estuarine conditions. With Executive Order 13508, the Federal Leadership Committee for the Chesapeake Bay is developing restoration policies that include "regulatory and accountability enforcement (CBEO 2011)." These enforceable policies may create a window of opportunity within restoration politics.

Otherwise, the very words from 1983 ring just as true today: "Projects are often influenced by economic considerations and political pressures that are inconsistent with sound estuarine resource planning and management principles (Decisions for Delaware 1983)."

Colin O'Mara, Secretary of the Department of Natural Resources and Environmental Control, upon taking office, declared "Improving water quality of our bays and local waterways is among our highest priorities as a state" (Rain Gardens 2010). This political resolve is challenged by the recent court ruling to uphold county zoning authority that conflict with proposed Pollution Control Strategy regulations. The current administration will need to assert their dedication to this priority in coordinating policy and pushing for authority to implement the pollution control strategy or comparable mechanisms.

Clearly the call for collaboration, cooperation and maximizing resources is being echoed in the repeated efforts to improve impaired waterways. Ecosystem-based management efforts are combining advances in technology with a sense of urgency for changes in implementation strategies. Without an

overarching national policy, there are limits to the capacity, effectiveness, inventiveness and consistency of state and regional programs.

Chapter 5

EVOLUTION OF A NATIONAL OCEAN POLICY

President Obama issued an executive order to establish a National Ocean Policy, overseen by the National Ocean Council, on July 22, 2010. *Executive Order 13547: Stewardship of the Oceans, Our Coasts and the Great Lakes* adopts the *Final Recommendations of the Interagency Ocean Policy Task Force*, setting a course towards using marine spatial planning, based on regional management, and consistent with the Law of the Sea:

> In carrying out the provisions of this order and implementing the Final Recommendations, all actions of the Council and the Executive Departments, agencies and offices that constitute it shall be consistent with applicable international law, including customary international law, such as that reflected in the Law of the Sea Convention (EO 13547).

Interest in creating a national ocean policy began with the Marine Resources and Engineering Development Act of 1966. The subsequent National Council on Marine Resources and Engineering Development formed a Commission of Marine Science, Engineering and Resources, chaired by Dr. Julius Stratton. The Stratton Commission Report is titled *Our Nation and the Sea: A plan for National Action* (Stratton Commission 1969), and clearly states the intent for a national ocean policy to balance economic development and environmental protection. The report considers the future of estuary and coastal preservation as well as strategies for managing resources in the marine environment and those that lie below the sea (Stratton Commission 1969).

The report accurately detailed the need for an overarching management policy to protect both the environmental qualities of a coastal region as well as the economic benefits of marine resources. The report called for a course of action that would include long-term strategies, and cited the lack of coordination already evident between the federal, state and local efforts in the coastal zone. There was an undercurrent of urgency about creating a system of planning that could supersede development pressures which showed remarkable insight into the nature of conflicts and difficulties evident the coastal region (Stratton Commission 1969).

The commission's recommendations are credited with creating many new programs such as the National Sea Grant College Program, National Advisory committee on Oceans and Atmosphere, as well as the National Oceanic and Atmospheric Administration. The report also provided guidance for legislation managing estuarine reserves, national marine sanctuaries, marine mammal protection, coastal zone management, fishery conservation and management, ocean pollution, and seabed mining. Its goal of "implementing a truly comprehensive and forward-looking national ocean policy" was begun, but would take decades to mature to fruition (Upton 2010).

The drive to create a national ocean policy began to gather momentum again with the Oceans Act of 2000, whose purpose was stated as:

> To establish a commission to make recommendations for a coordinated and comprehensive national ocean policy that will promote:
> (1) Protection of life and property
> (2) Stewardship of ocean and coastal resources
> (3) Protection of marine environment and prevention of marine pollution

(4) Enhancement of maritime commerce
(5) Expansion of human knowledge of the marine environment
(6) Investments in technologies to promote energy and food security
(7) Close cooperation among government agencies
(8) U.S. leadership in ocean and coastal activities (Oceans Act 2000).

Within four years, the Commission's report, *An Ocean Blueprint for the 21st Century* (USCOP 2004), provided a comprehensive assessment of the needs of the ocean and recommendations for ocean management. This report overlapped an independent report published in 2003 from the Pew Charitable Trust, *Living Oceans: Charting a Course for Sea Change* (PEW 2003). These two reports together brought a spotlight to deteriorating coastal conditions, and fundamental gaps in the management of ocean resources. The debate about creating a national ocean policy continued, with both commissions coming together to form the Joint Ocean Commission (JOCI). The groundwork for developing and implementing a National Ocean Policy was laid, as JOCI built upon previous work and provided the new administration with *Changing Oceans, Changing World: Ocean Priorities for the Obama Administration and Congress* (JOCI 2009). Upon taking office, Obama appointed a task force to create a National Ocean Policy, and adopted their final recommendations in July of 2010 with Executive Order 13547: Stewardship of the Ocean, Our Coasts and the Great Lakes (Upton 2010). The national policy establishes the National Ocean Council, and will implement its policy of stewardship, sustainability, and ecosystem-based management through coastal and ocean marine spatial planning (CEQ 2011).

5.1 Interagency Ocean Policy Task Force

The Interagency Ocean Policy Task Force was appointed by Presidential

Memorandum in June of 2009: To succeed in protecting the oceans, coasts, and Great Lakes, the United States needs to act within a unifying framework under a clear national policy, including a comprehensive, ecosystem-based framework for the long-term conservation and use of our resources (Memorandum 2009).

The Interagency Ocean Policy Task Force was appointed by Presidential Memorandum in June of 2009 to develop a sustainable framework for ocean management. The implementing ecosystem-based management principles backed by sound science. Led by the Chair for Council on Environmental Quality, the Task Force was given a short-term task; the first report was due within ninety days, the second and final report within one hundred and eighty days. Twenty-four senior level officials were assigned to the task force (CEQ 2010). Regional meetings and roundtables were scheduled, public comments were solicited on the CEQ website in order to assess stakeholder input. The interim report introduced the concept of Coastal and Marine Spatial Planning:

> CMSP is a comprehensive, adaptive, integrated, ecosystem-based, and transparent spatial planning process, based on sound science, for analyzing current and anticipated uses of ocean, coastal, and Great Lakes areas. CMSP identifies areas most suitable for various types or classes of activities in order to reduce conflicts among uses, reduce environmental impacts, facilitate compatible uses, and preserve critical ecosystem services to meet economic, environmental, security, and social objectives. In practical terms, CMSP provides a public policy process for society to better determine how the ocean, coasts, and Great Lakes are sustainably used and protected now and for future generations (CEQ 2009).

Coastal and Marine Spatial Planning is a practical application of ecosystem-based management, based on interagency coordination, and regional management. Its implementation reaffirms sound management principles based

on science and a negotiated balance between economic and environmental priorities.

5.1.1 Final Recommendations

The Final Recommendations of the Interagency Ocean Policy Task Force were submitted ten months after the Presidential Memorandum. This document establishes the structure for a National Ocean Policy, as overseen by the National Ocean Council, and a full schedule for implementation of the recommended governance of the oceans, our coasts and the Great Lakes. The National Ocean Policy is defined in these broad terms:

> It is the Policy of the United States to:
>
> Protect, maintain, and restore the health and biological diversity of ocean, coastal, and Great Lakes ecosystems and resources;
>
> Improve the resiliency of ocean, coastal, and Great Lakes ecosystems, communities, and economies;
>
> Bolster the conservation and sustainable uses of land in ways that will improve the health of ocean, coastal, and Great Lakes ecosystems;
>
> Use the best available science and knowledge to inform decisions affecting the ocean, our coasts, and the Great Lakes, and enhance humanity's capacity to understand, respond, and adapt to a changing global environment;
>
> Support sustainable, safe, secure, and productive access to, and uses of the ocean, our coasts, and the Great Lakes;
>
> Respect and preserve our Nation's maritime heritage, including our social, cultural, recreational, and historical values;
>
> Exercise rights and jurisdiction and perform duties in accordance with applicable international law, including respect for and

> preservation of navigational rights and freedoms, which are essential for the global economy and international peace and security;
>
> Increase scientific understanding of ocean, coastal, and Great Lakes ecosystems as part of the global interconnected systems of air, land, ice, and water, including their relationships to humans and their activities;
>
> Improve our understanding and awareness of changing environmental conditions, trends, and their causes, and of human activities taking place in ocean, coastal, and Great Lakes waters; and
>
> Foster a public understanding of the value of the ocean, our coasts, and the Great Lakes to build a foundation for improved stewardship (CEQ 2010).

The recommendations call for the formation of a National Ocean Council to oversee the process, insuring interagency collaboration with high-level leadership. The mechanism for implementing the National Policy is through Coastal and Marine Spatial Planning.

5.1.2 Adoption of Recommendations

The Final Recommendations of the Interagency Ocean Policy Task Force were adopted in full with one signature from the President, signing Executive Order 13547 on July 19, 2010, more than forty years after the first committee was formed to create a National Ocean Policy. The order establishes the National Ocean Council, co-chaired between the Chair of the Council on Environmental Quality and the Director of the Office of Science and Technology Policy. The Council also includes the Secretary of State, Secretary of Defense, Secretary of the Interior, Secretary of Agriculture, Secretary of Health and Human Services, Secretary of Commerce, Secretary of Labor, Secretary of Transportation, Secretary of Energy, Secretary of Homeland Security, the Administrator of the

Environmental Protection Agency, Director of the Office of Management and Budget, Under Secretary of Commerce for Oceans and Atmosphere, Administrator of the National Aeronautics and Space Administration, Director of the National Science Foundation and Chairman of the Joint Chiefs of Staff (EO 13547).

In addition to these cabinet members, the council will also include the National Security Advisor, Assistants to the President representing Homeland Security and Counterterrorism, Domestic Policy, Energy and Climate Change and Economic Policy. The Vice President will contribute one federal employee to the council, and the Chairman of the Federal Energy Regulatory Commission may be invited as often as is deemed essential by the council. This full representation reflects the growing awareness of the complexity in managing the coastal regions. The recommendations are forging a foundation of collaboration and cooperation among the multiple agencies involved in all aspects of the oceans and our coasts (EO 13547).

5.2 Emphasis on Stewardship

The memorandum that established the Interagency Ocean Policy Task force called for stewardship as one of its objectives:

> The recommendations should prioritize upholding our stewardship responsibilities and ensuring accountability for all of our actions affecting ocean, coastal, and Great Lakes resources, and be consistent with international law, including customary international law as reflected in the 1982 United Nations Convention on the Law of the Sea (Memorandum 2009).

The final recommendations use stewardship as the focal point of emphasis:

> The National Policy recognizes that America's stewardship of the ocean, our coasts, and the Great Lakes is intrinsically and

> intimately linked to environmental sustainability, human health and well-being, national prosperity, adaptation to climate and other environmental change, social justice, foreign policy, and national and homeland security (CEQ 2010).

And its vision statement encompasses stewardship:

> Vision: An America whose stewardship ensures that the ocean, our coasts, and the Great Lakes are healthy and resilient, safe and productive, and understood and treasured so as to promote the well-being, prosperity, and security of present and future generations (CEQ 2010).

The Executive Order firmly establishes the stewardship concept with the title of the policy: Stewardship of the Oceans, Our Coasts and the Great Lakes (EO 13547). Prioritizing stewardship as a centerpiece concept honors the previous attempts at creating a national ocean policy and bodes well for engaging stakeholders, creating a common platform of interest from which to begin negotiations about coastal and marine issues. Stewardship implies a shared responsibility by all parties, towards a greater common goal, with an interest in passing on something of value to future generations. Treasuring the ocean and coasts becomes an intrinsic value in negotiating the multiple uses of the waterfront in coastal communities.

5.3 Emphasis on Guidance From Agency Collaboration and Cooperation

Collaboration and coordination of interagency actions form another cornerstone for the National Ocean Policy. Engaging the highest ranking officials in each agency and coordinating their efforts towards stewardship in an atmosphere of cooperation will set the tone for collaborative efforts to arise from the implementation of the National Ocean Policy. Federal agents and their agencies will direct the coordination of policies towards sustainable ecosystem-based implementation strategies (CEQ 2010).

The National Ocean Council is the focal point for leadership and direction for implementing the National Ocean Policy. The council is co-chaired by the Chair of the council on Environmental Quality and the Director of the Office of Science and Technology Policy. The Council consists of several cabinet secretaries, agency directors and policy advisors to the President. The council will operate with authority, leadership and respect for to creating a framework of policy implementation. This top-down approach will instill stewardship, cooperation and collaboration throughout interagency interactions. This senior level participation and coordination will set the tone for effective policy development (CEQ 2010).

5.4 National Ocean Policy Plan Supports Coastal and Marine Spatial Planning

The National Ocean Policy and the National Ocean Council are basing their commitment to the stewardship of the Oceans, Our Coasts and the Great Lakes on the development of Coastal and Marine Spatial Plans as an essential tool for implementation. The plans are designed to coordinate interagency collaboration with regional planning bodies that can represent stakeholder concerns on the local level. The framework of Coastal and Marine Spatial Planning is designed to be a resource mechanism for conflict resolution. Implementation of Coastal and Marine Spatial Plans through coordinating regional interests with interagency support is designed to streamline the process of ocean governance. Application of this tool will coordinate the efforts of federal agencies, state agencies and local governing bodies. Coastal and Marine Spatial Planning will be guided by these clearly stated goals:

Table 3: Goals of Coastal and Marine Spatial Planning

GOALS OF COASTAL AND MARINE SPATIAL PLANNING
Support sustainable, safe, secure, efficient, and productive uses of the ocean, our coasts, and the Great Lakes, including those that contribute to the economy, commerce, recreation, conservation, homeland and national security, human health, safety, and welfare;
Protect, maintain, and restore the Nation's ocean, coastal, and Great Lakes resources and ensure resilient ecosystems and their ability to provide sustained delivery of ecosystem services;
Provide for and maintain public access to the ocean, coasts, and Great Lakes;
Promote compatibility among uses and reduce user conflicts and environmental impacts;
Improve the rigor, coherence, and consistency of decision-making and regulatory processes;
Increase certainty and predictability in planning for and implementing new investments for ocean, coastal, and Great Lakes uses; and
Enhance interagency, intergovernmental, and international communication and collaboration

Source: Council on Environmental Quality 2009.

The means by which Coastal and Marine Spatial Planning will be developed is an open and ongoing process. Ultimately, streamlining traditional overlapping jurisdictional conflicts will enhance efficiency. However, the initial establishment

of CMSP may be met with considerable resistance. In this light, interested parties are asked to participate with these three attitudes:

> (1) a cooperative, open, and transparent CMSP process leading to the development and implementation of CMS Plans, acknowledging that each partner may have different authorities and non-discretionary mission objectives that must be fully addressed;
>
> (2) ensure that consideration of the National Policy, national CMSP goals, objectives, and principles, and regional CMSP objectives are incorporated into the decision-making process of all the partners consistent with existing statutory, regulatory, and other authorities, and the critical needs of emergency response, and homeland and national security activities; and
>
> (3) dispute resolution processes that enable concerns and issues not resolved through the cooperative planning process to be resolved quickly, rationally, and fairly (CEQ 2010).

Given these attitudes with which to implement the National Ocean Policy through Coastal and Marine Spatial Planning, these guiding principles are designed to introduce and facilitate the process. It is an all-encompassing process that recognizes each ecosystem has its different demands, regional processes differ, and negotiations within each region will produce different results.

Table 4. The Guiding Principles of Coastal and Marine Spatial Planning

GUIDING PRINCIPLES OF COASTAL AND MARINE SPATIAL PLANNING
CMSP would use an ecosystem-based management approach that addresses cumulative effects to ensure the protection, integrity, maintenance, resilience, and restoration of ocean, coastal, and Great Lakes ecosystems, while promoting multiple sustainable uses.

Multiple existing uses (e.g., commercial fishing, recreational fishing and boating, subsistence uses, marine transportation, sand and gravel mining, and oil and gas operations) and emerging uses (e.g., off-shore renewable energy and aquaculture) would be managed in a manner that reduces conflict, enhances compatibility among uses and with sustained ecosystem functions and services, provides for public access, and increases certainty and predictability for economic investments.
CMSP development and implementation would ensure frequent and transparent broad-based, inclusive engagement of partners, the public, and stakeholders, including with those most impacted (or potentially impacted) by the planning process and with underserved communities.
CMSP would take into account and build upon the existing marine spatial planning efforts at the regional, State, tribal, and local level.
CMS Plans and the standards and methods used to evaluate alternatives, tradeoffs, cumulative effects, and sustainable uses in the planning process would be based on clearly stated objectives.
Development, implementation, and evaluation of CMS Plans would be informed by sound science and the best available information, including the natural and social sciences, and relevant local and traditional knowledge.
CMSP would be guided by the precautionary approach as reflected in Principle 15 of the Rio Declaration, "Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."
CMSP would be adaptive and flexible to accommodate changing environmental conditions and impacts, including those associated with global climate change, sea-level rise, and ocean acidification; and new and emerging uses, advances in science and technology, and policy changes.

The development of CMS Plans would be coordinated and compatible with homeland and national security interests, energy needs, foreign policy interests, emergency response and preparedness plans and frameworks, and other national strategies, including the flexibility to meet current and future needs.
CMS Plans would be implemented in accordance with customary international law, including as reflected in the Law of the Sea Convention, and with treaties and other international agreements to which the U.S. is a party.
CMS Plans would be implemented in accordance with applicable Federal and State laws, regulations, and Executive Orders.

Source: Council on Environmental Quality 2010.

5.4.1 Based on the Ecosystem

The principles of ecosystem-based management have been suggested in previous attempts to create a National Ocean Policy (PEW 2003, Ocean Commission 2004, JOCI 2008). Within the application of Coastal and Marine Spatial Planning, they will be an integral part of the process. "This must include a comprehensive, integrated, transparent, science-based, and ecosystem-based planning process to achieve the sustainable use of the ocean, our coasts, and the Great Lakes (CEQ 2010)."

Coastal and Marine Spatial Planning will embody ecosystem-based principles in its implementation, as well as in the process of acquiring implementation plans. Establishing this framework respects the agencies that are already managing aspects of coordinating activities in the coastal and marine environment, and enhances their ability to continue to manage the ecosystem.

> To ensure healthier, more resilient, and productive ocean, coastal, and Great Lakes environments, comprehensive management systems are needed that fully integrate ecological, social, economic, and security goals into decisions. Embedding ecosystem-based management, grounded in science, as an overarching principle would be a fundamental shift in the traditional way the Federal Government approaches management of the ocean, our coasts, and the Great Lakes. It would provide the opportunity to ensure proactive and holistic approaches to better manage the use and conservation of these valuable resources. This broad-based application of ecosystem-based management would provide a framework for the management of our resources, and allow for such benefits as helping to restore fish populations, control invasive species, support healthy coastal and Great Lakes communities and ecosystems, restore sensitive species and habitats, protect human health, and rationally allow for emerging uses of the ocean, including new energy production (CEQ 2010).

5.4.2 Based on Science

Using the best available science is reiterated in the Final Recommendations of the Interagency Ocean Policy Task Force as one of its stated policy objectives. Sound science is one of the twelve guiding principles for Coastal and Marine Spatial Planning (CEQ 2010). Consistent with this objective, the formation of a research board, the Ocean Research and Resources Advisory Panel (ORRAP), will provide independent advice to the National Ocean Council. This scientific network will enhance the credibility of the framework designed to be a transparent planning process, and its subsequent implementation process for carrying out its decisions.

5.4.3 Based on Flexible Guidance

Creating a management plan, enforcement standards and implementation time lines is challenging in a coastal and marine environment. Conditions are in a state of constant change, impacted in ways that are unpredictable and could

become unprecedented. As information becomes available, the planning process needs to be responsive. Coordinating federal, state, local and tribal regulations will dramatically change the former mechanisms of management and oversight. In addition, regional variations will necessitate the system of planning and implementing decisions is designed with flexible mechanisms to account for these differences. The coastal and marine spatial plans are expected to vary region to region, as determined by collaborating stakeholders (CEQ 2010).

5.4.4 Based on Multi-Stakeholder Involvement

The Final Recommendations of the Ocean Policy Task Force refine the definition of Coastal and Marine Spatial Planning through engaging stakeholders in the process of creating this Policy. Thirty-eight roundtables, six regional public meetings and sorting through over five thousand public comments received on the website contributed to the final recommendations document (CEQ 2010).

The work of implementing the National Ocean Policy and bringing about a sense of change in the management of the marine environment is based on building "strong partnerships" between all agencies and stakeholders involved in coastal activities. Jurisdictional challenges can be addressed by applying the guiding principles to the planning aspects of implementation, and coordinating the transition towards a cooperative collaboration involving all parties.

Creating flexible ecosystem-based plans requires local knowledge and input. The plans will have federal oversight based on the guiding principles and high-level coordination. Local input will be invaluable to tailor the plans to accommodate the wide range of conditions and changing environments. The National Ocean Council is expected to offer national oversight developed by engaging with local participation.

Another advantage to including stakeholders in the process of creating coastal and marine spatial plans is to utilize recommendations and increase community buy-in. The plan can reflect the involvement of invested stakeholders in order to facilitate this collaboration. The process envisions involving stakeholders during the initial phases of the process, throughout the planning stages, actively seeking participants during the implementation stages and constantly reviewing conflicts as they arise.

Being proactive and looking towards the future, the ultimate success for coastal and marine spatial plans rests with the local enforcement, and community participation. Outreach efforts can be effective in correcting misinformation, as well as prioritizing attributes of the coast and ocean essential to the people most affected by decisions being negotiated. Stewardship is enhanced when embraced by the entire community, effectively furthering the planning and management plans through sustainable implementation of sound practices.

5.5 National Plan Relies on Regional Involvement

Creating, negotiating and implementing the Coastal and Marine Spatial Planning is dependent on active regional governance. Strong regional representation can facilitate and coordinate implementation of the plan, as well as tailor the plan to the specific needs of the region. The national ocean policy has developed guiding principles, which will be taken up by regional planning bodies.

There will be nine regions used to organize the coastal regions of the United States. They are Northeast, Mid-Atlantic, South Atlantic, Caribbean, Gulf of Mexico, West Coast, Alaska, the Pacific Islands and the Great Lakes. From these areas, an eighteen member Governance Coordinating Committee will be formed. The Committee will facilitate greater coordination with the plans from the

National Ocean Council. The regions will be responsive within their respective regions to the committee, and will have general representation in long-term goal setting, and adapting the national plan to coordinate with regional concerns. Each of the nine regions will create Regional Planning Bodies are designed to represent their region and develop a coastal and marine spatial plan in line with national objectives and guidance. Each regional planning body will be assigned a lead federal agency, to be determined by the council (CEQ 2010).

It is hoped that this regional emphasis and a collaborative approach will mitigate conflicts between competing interests. It is also expected to reduce the inefficiencies caused by multiple agency gaps and overlaps, streamlining the planning process to reduce duplicity. The strength of ecosystem-based management principles can be expected to coordinate activities while engaging active stakeholders (CEQ 2010).

5.6 Regional Level Management

The National Ocean Council will begin implementing its plan by establishing regional planning bodies, and the guidelines for their operation. The goal will be to build the capacity for developing Coastal and Marine Spatial Planning that is responsive on a local level while adhering to national objectives and priorities. Outreach tools will include blogs and webinars as well as local stakeholder workshops. The Coastal and Marine Spatial Planning process begins with each region identifying its objectives:

ESSENTIAL ELEMENTS OF THE CMSP PROCESS

Identify Regional Objectives
Identify Existing Efforts that Should Help Shape the Plan throughout the Process
Engage Stakeholders and the Public at Key Points throughout Process

Consult Scientists and Technical and Other Experts
Analyze Data, Uses, Services, and Impacts
Develop and Evaluate Alternative Future Use Scenarios and Tradeoffs
Prepare and Release a Draft CMS Plan with Supporting Environmental Impact Analysis Documentation for Public Comment
Create a Final CMS Plan and Submit for NOC Review
Implement, Monitor, Evaluate, and Modify (as needed) the NOC-certified CMS Plan (CEQ 2009).

A time line has been developed, phase one covers the first year, phase two overlaps phase one and ends the second year, and phase three begins after a year and a half and continues for the duration of five years. Within Phase 1, the regional planning bodies will begin to take shape. They will adhere to the guiding principles and essential elements of the coastal and marine spatial planning process. The regional planning bodies will consist of a wide array of interested parties, to insure all aspects of the ecosystem are well represented. The planning body is essentially responsible to understand the challenges specific to its region, and to tailor the plan to fit the needs of its stakeholders. The planning process will be transparent, with ample opportunity for public comment. The mechanisms to achieve these goals will be developed by each regional planning body in ways that will serve their region (CEQ 2010).

5.6.1 Coordinate National Agency Actions

Initially, the National Ocean Council will organize the regional framework that will build towards Coastal and Marine Spatial Planning. The Strategic Action Plan will be developed, prioritizing methods for dispute resolution, investigation into legislative changes, and information management. The goal for the National Ocean Council is to build the capacity within each region to implement a national Coastal and Marine Spatial Planning system by 2015. This will be accomplished by appointing appropriate regional planning body members, and reviewing strategic action plans in a cooperative and collaborative manner (CEQ 2010).

The collective effort is expected to produce a system of actions, implemented over time in measurable increments. Each action will have targets established, and reporting mechanisms. Lead agencies will adopt the various actions with a sense of accountability back to the regional planning body. Modifications and clarifications can be addressed as the plan progresses towards implementing the stewardship, ecosystem-based management and collaborative concepts the national ocean policy has been dedicated upon.

5.6.2 Implementation Strategy

The implementation strategy is expected to unfold as work on the National Ocean Council progresses. The complex demands of regional governance, local coordination of planning and conflicts that may arise will challenge the determination to coordinate the efforts of multiple agencies and legislative efforts towards stewardship of the Ocean, Our coasts and the Great Lakes.

Interagency collaboration within the federal system guided by the principles of the new policy is expected to replace the layers of mismanagement and gaps in the current system of ocean governance. Relying heavily on the leadership aspect of coordinating agencies by appointing senior officials to actively oversee activities that are breaking new ground is going to form the basis for successful planning.

The recommendations rely heavily on the successful implementation of Coastal and Marine Spatial Planning. The framework will impose a new system of cooperative management, coordinating federal, regional and local interests. The success of the policy will depend on the success of building this framework to be

responsive and reliable to a wide range of stakeholders. Multiple use conflicts are common in the marine environment, and will be addressed by a strong system of transparently creating a coastal and marine spatial plan that has the backing and support from the broadest range of participants CEQ 2010).

The National Ocean Policy is carefully worded to reflect and build on much of the work that has preceded it with respect to ocean governance. The principles of ecosystem-based management and objectives of coastal and marine spatial planning are consistent with the goals echoed through previous works. The policy fully embraces these ideals, with a system of coordinating actions regionally and locally that can embody the essential dilemma of ocean governance. Transparently mitigating user conflicts and streamlining regulatory processes through stakeholder participation coupled with strong interagency collaboration will build a foundation for continued stewardship and cooperative management.

Chapter 6

ANALYSIS

6. National Policy Strengths and Shortcomings

The National Ocean Policy is a comprehensive, well considered document that prioritizes stewardship through protecting diversity, improving resiliency, seeking sustainable practices, using the best scientific understanding available, respecting recreational and historical aspects of the coasts and ocean, creating a compatibility with international law, increasing scientific understanding, awareness of the constantly changing coastal marine environment, and valuing public input and understanding. The guidelines create a foundation for a clear ocean policy that supports future considerations for the ocean, coasts and Great Lakes in a way that provides guidance for legislation and multi-agency interaction (CEQ 2010). The development of marine spatial planning led by regional planning bodies is designed to engage local communities throughout the process, while raising awareness of the marine environment and the needs of the ecosystem, and minimizing opposition to policy decisions. The challenges ahead are the implementation of this policy on a local level, development of conflict resolution strategies, and the strength of measures that will be able to challenge business as usual practices.

This section will analyze the benefits available to a local community through application of the National Ocean Policy, and the policy's ability to build the capacity for coastal management on a local level. Coastal communities such as Rehoboth Beach, Delaware are instrumental in the application of the National

Ocean Policy as advocates of environmental stewardship that is compatible with economic interests. Framing the decision made to build an ocean outfall as a commitment to the preservation of the Inland Bays and continuing to seek water quality improvement mechanisms is in keeping with regional goals and national ocean policy objectives. The National Ocean Policy can build upon similar examples in local communities that demonstrate successful navigation through legislative and regulatory channels, and are able to improve water quality conditions in their coastal environments.

The National Ocean Policy is designed to settle the issue of fragmented ocean management and overlapping jurisdictions that are not coordinated, and lead to regulatory inefficiency and continued ecosystem degradation. Using an ecosystem-based approach, with the assistance of the newly appointed, high-level National Ocean Council, Regional Governance Committee, and regional planning bodies, the policy calls for collaboration and coordination of interagency, legislative and regulatory efforts at the federal, regional, and local levels. Coastal and Marine Spatial Planning is proposed as the framework for the application of the policies and guidelines established by the adoption of the Final Recommendations of the Ocean Policy Task Force (Memorandum 2010).

> To level the playing field and accommodate society's diverse interests, comprehensive ecosystem-based marine spatial planning can minimize regulatory uncertainty, unnecessary costs, and biodiversity loss that siloed sectoral management has produced (Norse 2010).

6.0.1 System Stepping on Its Own Toes

The ocean, our coasts and Great Lakes has been managed by a system of more than twenty federal agencies and over one hundred and forty laws (TNC 2010). A new Ocean Policy has been adopted and is being implemented, based on

Coastal and Marine Spatial Planning, to improve the management of the coastal and marine environment. During the coming year, the National Ocean Council is coordinating efforts to determine methods of applying the new policy, according to its national priority objectives known as "How we do business," areas of special emphasis and guiding principles. Implementation will rely on the ambitious development of regional governance plans, local stakeholder participation and federal agency oversight, based on interagency collaboration and cooperation (CEQ 2010).

Adherence to the selfless interagency collaboration and national priority principles prioritizing stewardship and concerns for future generations above economic development will necessitate jurisdictional upheaval. Interagency collaboration will alter some long-standing relationships within and between agencies. The same system that provides a forum for public participation, public debate and solicits public comment may not be able to resolve conflicts and distribute uses of the oceans, our coasts, and Great Lakes equitably. Local areas that feel imposed upon will organize opposition to proposed actions and complicate the collaboration and cooperation process. The process however, relies upon their contribution. The implementation of stewardship principles will necessitate developing this capacity within local coastal communities. The final authority must be a flexible, responsive, transparent, regionally adapted Coastal and Marine Spatial Plan developed with local and regional partnerships, and interagency coordinated efforts.

Opposition to the new ocean policy will undoubtedly come from all corners. Successful management systems will be resistant to change, reigning agencies will be reluctant to relinquish total control, and relationships between individuals in the private sector and government officials will shift. Change will be the dominant force rather than the status quo (Norse 2010). But collaborative

interagency efforts will eventually become the norm, and then the process of developing a coastal and marine spatial planning system for navigating ocean governance into the future will be commonplace and mechanisms for negotiating conflicts will reflect the national ocean policy objectives.

6.0.2 National, Regional or Local Concerns Dominate Policy?

The National Ocean Policy is a top-down initiative that seeks to engage bottom-up participation in order to create a sustainable ecosystem-based strategy caring for the ocean, our coasts and the Great Lakes. National priorities are clearly stated as goals and guidelines for implementation of the Coastal and Marine Spatial Planning that will have a positive overall impact and streamline current practices. The National Ocean Policy hopes to prioritize national interests through this planning process while remaining flexible to local and regional initiatives without adding additional regulatory layers of management.

Regional planning bodies with national oversight will carry out the specific details of creating the Coastal and Marine Spatial Planning. This will allow for deviations to incorporate regional differences and modifications. The regional entity will emphasize the national priorities, goals and directives while remaining open to local concerns and stakeholder input. Local interests, in turn, will be encouraged to establish an active role in the regional planning process.

Regional governance is capable of bridging national and local concerns, while adequately representing its unique regional ecosystem. Regional governance will provide an integral role in both tailoring the plan to suit the region and as a forum to bring local issues into the national spotlight. Examples of regional and local collaborative efforts will provide the impetus for continued application of the regional management mechanisms. There will be nine different regions, each with their own regional representation and coordination

of spatial planning. Each region will prioritize its objectives differently, developing a plan within the national objectives and guidelines (CEQ 2010).

The strength of the region will be dependent on local outreach mechanisms and participation. Case studies will be highlighted, and encouraged to facilitate coastal and marine spatial planning implementation. Management solutions and planning opportunities will seek to reflect the priorities within a local community, and within the region. Local areas will benefit from the capacity for regional coordination of data and information, as well as regional guidance and conflict resolution.

The goal of the National Ocean Policy to have a positive overall impact will be visible on the local level. The system of coastal and marine spatial planning has the capacity to balance the needs of the present and the future, to balance conservation with economic concerns, to balance the national interests with the local interests. It is this balance that will engage local, regional and national supporters and implement the national policy in a meaningful way (Norse 2010).

6.1 Regional Policy Strengths and Shortcomings

Regional Coastal and Marine Spatial Plans are to be developed by each of the nine coastal regions. Together they will form the basis of the coordinated national plan. This work will be delegated to regional planning bodies, which are as yet unformed. The idea of regional governance is not new; the application of a national policy through regional governing bodies creating coastal and marine spatial plans is unique to this National Ocean Policy.

The regional planning bodies will submit their plans to the National Ocean Council for review and certification. The strength of the plan and the ability to adhere to the guiding principles and goals will determine the strength of the

policy. The region will then be responsible for its implementations, monitoring, evaluations and modifications. The regional planning body is a pivotal component of the National Ocean Policy, designed to reflect the overarching goals while being responsive the needs of the local communities.

The regional plan is based on essential elements similar to those of coastal and marine spatial planning. There is an initial overview and scope of the planning area, and then a review of the regulatory context already in place. A regional assessment then can be undertaken given the current regional concerns and challenges. The regional process then begins to incorporate objectives, strategies, methods and mechanisms for coastal and marine spatial planning. Compliance mechanisms, monitoring and evaluation mechanisms will follow the CMSP process, and lastly the dispute resolution process will be considered (CEQ 2010).

The national plan will rely heavily on the successful implementation of its policy at the regional level, however the plan does include a disclaimer, which may inhibit its effectiveness, in which states are given the choice to opt out. The coastal and marine spatial plan is based on regional cohesiveness, however a state or tribe may exercise the right to not participate. The planning process will continue, however, it will not have the capacity to fully integrate all aspects of the region. While seeming to limit the effectiveness of the regional plan, this option may actually be a strengthening factor, as the collaborative planning process and dispute resolution mechanisms developed through interagency cooperation demonstrate the effectiveness of the coastal and marine spatial planning concepts.

6.1.1 Does the Region Have the Capacity to Incorporate Regional and National Guidance?

There is a five-year window for implementing the National Ocean Policy through Coastal and Marine Spatial Planning. During this time, performance measures will be developed which will reflect the ability of the region to coordinate its coastal and marine management. Ecosystem-based regional coordination of programs will lessen the individual states' responsibilities while creating a platform for collaborative performance measures. With national oversight, and responsive to the needs of the local communities, these performance measures will reflect the National Ocean Policy. Performance measures are expected to be "grounded in theory, responsive and specific." They are also expected to reflect both the ecology of the region as well as socio-economic factors (CEQ 2010).

Ecosystem-based management strategies for marine environments have relied on scientific studies of the ocean. The environment is no longer a pristine wilderness, with human intervention through deep-sea exploration, marine transportation routes and heavily populated coastal settlement. This human element is studied through the social sciences, and adds as important an element as the physical sciences. Social and physical science representatives included in the planning bodies will add credence and effectiveness to the understanding and implementation of the planning strategies (Orbach 2010).

Traditional management of ocean resources has been relegated to each state, with overlapping jurisdictions and interstate coordination on a sectoral basis. The public trust doctrine, which is grounded in the rights of states to manage resources in the best interest of its citizens, does not extend these same rights to national jurisdiction in federal waters. The doctrine is compatible with

the National Ocean Policy stewardship objectives, and could facilitate the implementation of ecosystem-based management. The public trust doctrine could be applied through executive order, judicial interpretation or congressional mandate, strengthening the regional capacity to oversee coastal and ocean management (Turnipseed 2009).

Local resources have not relied on national ocean policy objectives, and will take time to develop a working relationship between national, regional and local interests. The states will similarly find themselves in opposition to some regional objectives, and strong promoters of other objectives. These conflicts will again seek to find resolution within local communities that can be promoted as examples of compatible applications of regional policies.

6.1.2 How to Build Implementation Skills

Creating the regional Coastal and Marine Spatial framework is designed to develop the skills to facilitate the implementation of ecosystem-based principles and stewardship policies. Sustainable management and flexible responsiveness will develop by applying the framework of spatial planning, supported by national objectives and defined by local initiatives and coordinated marine management. Implementing Coastal and Marine Spatial Planning will require interagency and collaborative skills. These cooperative attributes are expected to develop within the parameters of these essential elements.

It is expected that the process of developing the regional objectives, and coastal and marine spatial plans will provide regions, stakeholders, and federal agencies with the necessary skills to implement the plans. Consulting local communities with respect to their priorities will begin to forge the working relationships necessary to implement those same priorities. The framework of marine spatial planning is designed to guide agency interactions rather than

forcing rigid decisions and imposing the regional plan upon a local area. Establishing regional goals and objectives within the stated national goals of Coastal and Marine Spatial Planning will facilitate the cooperative nature of interagency collaboration that will improve the design and implementation of the coastal and marine spatial plans (CEQ 2010).

Coastal and Marine Spatial Planning encompasses and embodies ecosystem-based management. The implementation of this broad interdisciplinary understanding of the marine environment requires communication across agencies that may struggle to find a mechanism for equitably comparing options and assessing tradeoffs. Ecosystem services is proposed as a tool devised to assist coastal and marine spatial planning. Numerical values are assigned to each activity based on supply, service and value. The supply metrics are measured by the capacity of the environment to produce that service, whether it is the numbers of fish, the miles of shoreline, or number of swimmable beach days. The service metrics are determined by assessing the actual resource amount used by the numbers of people who enjoy the particular service. The value metrics are determined by the priority people place on that particular service.

The framework for applying these principles is to apply this method for comparison of the various options. Numerical values are more easily compared and the system is suggested as a way to be able to assess options, and facilitate interagency collaboration. Ecosystem services is developing into its own science, hoping to bring the goals from different agencies into alignment with one another. The numerical system is expected to reveal the hidden costs of decisions, and to bring transparency to the compromises in terms of services lost and services gained. Application of this scientific understanding to the process of

creating coastal and marine spatial plans may develop the efficiency and cross-cutting agency collaboration the National Ocean Policy is supporting (McLeod 2011). Whether this method is applied or another method arises, the application of ecosystem-based management through interagency collaboration is going to forge new ground for comprehending the marine environment and its management strategies.

6.1.3 How to Create a Flexible System

The National Ocean Policy and the National Policy Objectives are broad enough to be compatible internationally, federally, regionally, within each state, and locally. In this way, each region can reflect the priorities of its stakeholders and become flexible to their concerns without losing sight of the larger context within which they are working. The details will be left up to each region and locality, to allow for the variations in the environment and differing priorities of regional populations (CEQ 2010).

The coastal and marine spatial planning process is designed to be flexible to new information and responsive to new data. This is possible as technology increasingly offers decision-makers real time information. Coordination of information is considered a "national strategic asset" of the spatial planning process. Coastal and marine spatial plans can be designed to respond to the consequences of climate change, sea-level rise, and the risk of increasing disasters. Building a network of local community stakeholders through the process of creating a spatial planning framework will facilitate a more timely response in critical situations. Response to impending storms and environmental disasters can facilitate cooperative alliances between regional and local agencies (CEQ 2010).

6.1.4 Develop Community Participation

Regional resources can better serve local communities within the coastal and marine spatial planning framework. The regional coastal and marine spatial plans rely on local community and stakeholder input to establish regional objectives. The regional plan will reflect the priorities of the local communities. How these priorities are developed and integrated will differ in each region. The objective of the policy is to develop the capacity within local regions to participate in regional collaboration (CEQ 2009).

Within the framework of marine spatial planning, local priorities are coordinated with regional resources in order for the plan to become sustainable and reflect the ecosystem and its needs. The National Ocean Policy plan is designed to coordinate the activities in the coastal and marine environments, resolving conflicts through regional mechanisms. This comprehensive system will need to account for all legitimate interests, and to create the capacity to give an opportunity for those interests to be heard (Norse 2009).

Rehoboth Beach, Delaware has experience prioritizing water quality in the Inland Bays, a regional concern, over immediate economic interests. This experience can provide some insight and guidance towards the development of regional objectives. The challenges facing a shallow estuary are common in the Mid-Atlantic region, and the solutions, while expensive, are less costly than the continued failure of fisheries, widespread eutrophication and degradation of waterways. Framed within a regional objective, the improvement of water quality on a local level and the commitment of communities to work towards this objective could well define this coastal region.

6.2 Implementing National Policy on a Local Level

Coastal and Marine Spatial Planning is a system of managing activities along the coast and in the ocean in a favorable way. The strength of the system is the overarching national guidance that provides resolution to multiple users, to insure their activity is protected, and made possible into future generations. Local activities are promoted through representation in the regional plan. The regional plan will resolve differences in their local areas, according to the national spatial planning framework. The National Ocean Council will build the framework through interagency collaboration, to guide development of an ecosystem-based, scientifically sound management plan and accommodate the multiple concerns encountered in regional planning efforts.

The National Ocean Council will review all regional finalized coastal and marine spatial plans. Once accepted, and certified, these plans will become active and will be formally implemented. The implementation relies on cooperative enforcement at the regional and local level. There will be some ocean activities that are incompatible, and a strong local public voice along with a strong regional decision-making framework will be used to resolve these conflicts (Norse 2010).

The case study examined in this thesis took place before the adoption of the National Ocean Policy. However, the ocean outfall could impact future development in the region as population pressures continue to challenge the current infrastructure, and the town's capacity to preserve recreational opportunities. Construction of the outfall will redefine the possibilities for competing uses along the coast. Incorporating the outfall into the regional marine spatial plans provides a tangible example of local community involvement, and could exemplify an application consistent with regional objectives.

It was evident from the first national review of activities in the coastal and marine environment that a lack of organized management was encountering cumulative impacts beyond the capacity of local regulations. As coastal areas were populated without any regional or long-term oversight, unintended consequences began to develop, compounded by an increasing population competing for limited resources. Coordinated management mechanisms did not exist, nor did the collection and interpretation of data pertinent to sustainable coastal habitation.

> Rapidly intensifying use of coastal areas already has outrun the capabilities of local governments to plan their orderly development and to resolve conflicts. The division of responsibilities among the several levels of government is unclear, and the knowledge and procedures for formulating sound decisions are lacking (Stratton Commission 1969).

The patchwork regulatory framework has continued, pressured by local land-use regulatory authorities, coastal management efforts, state regulatory agencies, and federal agency compliance mechanisms. Coastal regions are gaining momentum for stewardship and sustainable development interests to become more important than upholding the rights of industry and private landowners.

The National Ocean Policy proposes to institute performance measures once the regional objectives are established, consistent with national objectives. These measures are designed to fulfill the goal of "integration across sectors." The goals of the regional plans are expected to extend beyond the jurisdiction of any one agency, and thus they being asked to coordinate enforcement and regulation as well as management and planning. Building effective working partnerships is essential to this process. The partnerships will be based upon

sharing of information, implementing best management practices, and supporting regional enforcement strategies and priorities (CEQ 2010). Local ordinances that are consistent with regional objectives can be identified as interagency efforts seek potential areas of coordination.

Legislative changes are proposed through the efforts of the National Ocean Council. Once the coastal and marine spatial planning framework is active, gaps and overlapping federal jurisdictional conflicts can be resolved through high-level collaboration and consolidation of efforts. The current system of tasking various federal and state agencies with oversight and regulatory responsibilities leaves some coastal activities unregulated and some activities over managed. Legislative changes can be proposed and amended as are deemed essential to the implementation of the spatial planning process, and the specific spatial plans. The development of regional priorities will challenge the states within the regions to support implementation of marine spatial plans and the National Ocean Policy. These actions will follow the establishment of regional objectives, regional plans and conflicts that arise as implementation practices become active.

6.3 Outreach Efforts

The Task Force was very active in recruiting stakeholder participation as these final recommendations were developed. Through a series of regional meetings, round tables and active website comment postings, a foundation of active stakeholder participation was established. The current work of creating a Coastal and Marine Spatial Planning framework, regional objectives, and regional coastal and marine spatial plans continues to build upon this participatory process. As the plans are further developed, the inclusion of stakeholders throughout the process is one of the key elements to the success of Coastal and Marine Spatial Planning.

> The task force is mindful that these recommendations may create a level of uncertainty and anxiety among those who rely on these resources and may generate questions about how they align with existing processes, authorities and budget challenges (CEQ 2010).

The National Ocean Policy is open to public comment. Each stage of implementation is also open to public comment. These comments are posted on the National Ocean Council website to compliment the transparent process of Coastal and Marine Spatial Planning. Regional objectives, regional coastal and marine spatial plans and implementation strategies will continue to be open to public comment throughout their development, implementation and conflict resolution. Some of the comments represent individual's concerns, some have been posted on behalf of entire nongovernmental organizations. It is the stated goal of the implementation process to be responsive to public comment (CEQ-NOP 2011). In addition, there is an open blog on the National Ocean Council website (NOC 2011).

Due to the nature of the formation of the regional planning bodies and marine spatial plans, the local communities will be strengthened and their capacity to participate will be enhanced. Interagency collaboration and coordination will seek local input, and in responding to this invitation, the local community will develop its capacity to participate the coastal management planning. In turn, the National Ocean Policy will find in its implementation, successful stakeholder involvement. The design of the policy draws local interest, which in turn, benefits regional priorities.

Collaborative efforts that result in successful cooperative ventures and efficient management of conflicts through the spatial planning framework will continue to draw stakeholder participation into the process. Just as land use zoning has engaged the participation of local communities, so the coastal zoning process will engage the various vested interest groups in the decisions affecting their coastline.

It is the Policy of the United States to: "Foster a public understanding of the value of the ocean, our coasts, and the Great Lakes to build a foundation for improved stewardship." One of the National Ocean Policy Objectives is dedicated to informing and increasing understanding of the ocean, coastal, and Great Lake environments. This is proposed through creating both formal and informal programs. The objective is dedicated towards raising awareness of management and policy decisions, and improving the nation's capacity to respond to changing conditions.

It is the further hope that the National Ocean Policy and its dedication to ecosystem-based management will generate interest in multi-disciplinary policy studies, and scientists who pursue ecosystem-based studies. In this manner, the spatial planning process will become self-perpetuating and sustainable.

Public participation is essential to the implementation and effectiveness of a successful National Ocean Policy. Mechanisms for public participation are still being developed as communities develop awareness of the possibilities. Vocal communities will have a platform for participation. Implementation of the coastal and marine spatial planning decisions will depend on their acceptance and adoption through local community actions. Outreach through the design of the regional plans can enhance the stewardship of local recreational and environmental priorities.

Rehoboth Beach has an opportunity to generate interest in the community for taking an active role in the development of marine spatial planning in the region. The small community is a focal point for recreational opportunities, attracting tourism from several nearby cities. This cosmopolitan population presents the potential to promote stewardship qualities within the coastal community and carry the experience into their local communities. Leadership from within the city and awareness of the impact of the National Ocean Policy and its guiding principles could harness this opportunity for Rehoboth.

Engaging stakeholders in the process of creating Coastal and Marine Spatial Planning would be greatly enhanced by a public if they were taught throughout their school curriculum how to voice their public opinion and participate in public policy process. Technological advances in today's society and the availability of mass media such as twitter, YouTube, Facebook and web blogs, may likely reshape interest in public planning participation. Stewardship of the ocean, our coasts and the Great Lakes can facilitate the development of public participation skills as coastal marine spatial planning impacts local communities and generates responses to the implementation of certified plans.

6.4 Strengthen Stewardship of the Ocean Through Local Actions

With the adoption of the National Ocean Policy, stewardship practices in the oceans, our coasts and the Great Lakes are nationally supported. Local communities can contribute to the process by proactively coordinating their efforts and framing their contribution within the stated National Policy Objectives. The National Ocean Policy hopes to identify and engage proactive communities.

The Chesapeake Bay Trust builds its program in a similar manner, developing stewardship through community efforts. Raising awareness is the key to creating ownership of the bay, which is the foundation of efforts towards restoration.

> Community-led stewardship efforts increase public understanding of water pollution challenges, build ownership of the local watersheds, engage more individuals and organizations into stewardship practices and projects, and expand the base of citizen support and community involvement necessary to advance broader Bay restoration and protection goals. Through its community outreach and engagement programs, the Trust seeks to build the base of community awareness and engagement necessary to restore local watersheds and the Chesapeake Bay (CBT 2011).

Coordinated efforts at improving stewardship through ecosystem-based management of the coastal and marine environments will be begin to replace fragmented implementation of multiple agency regulations and environmental degradation that have responded to the emphasis on short-term gains. Local communities can create proactive decisions that prompt regional approval and support at the federal level.

The coastal community is still at the heart of coastal management decisions. Residents and visitors experience the benefits of proper coastal management and the consequences of continued destructive practices. The stewardship of a local area remains in the hands of the local residents, within new parameters supported by a National Ocean Policy, regional initiatives to create a coastal and marine spatial plan and overseen by the National Ocean Council.

6.5 Rehoboth Beach, Delaware and the National Ocean Policy

This thesis researched the relationship between ecosystem-based management and regional ocean governance, and water quality management decisions made at the local level, using the case study of wastewater disposal planning in coastal Sussex County bays in Delaware. The environmental challenge was created by the degradation of water quality in Delaware's Inland Bays, which required the City of Rehoboth Beach, Delaware, to reroute its wastewater effluent from Rehoboth Bay to some other site. The process was hampered by the lack of coordination of regulations and planning on the local level. Without an overarching national policy that requires better local and regional coordination and includes technical support of the decision making process, there are limits to the capacity, creativity, and effectiveness of state and regional water quality management programs. Local environmental decision making is by its nature self-centered and myopic and therefore is bound to conflict with broader regional goals. Regional planning must account for the potential of local conflicts.

Regional Total Maximum Daily Load (TMDL) programs have traditionally relied on the elimination of point sources wastewater, underestimating the contribution from less visible but often larger regional non-point sources. Local communities, therefore, often feel that they carry the entire financial burden of environmental remediation, while the agencies promoting (or requiring) environmental remediation contribute nothing to the solution. This problem could be solved, at least in part, if the agencies provided technical assistance and perhaps some financial assistance to local communities, who often do not have the expertise and financial resources to acquire the necessary expertise to make economically and politically sound decisions. This will require a coordinated planning effort that includes federal, regional, state, and local agencies rather than the adversarial process that currently exists.

The recent adoption of a National Ocean Policy by the Obama Administration in 2010 prompted this thesis to consider these two questions: How can the local coastal community benefit from the implementation of the National Ocean Policy; and how can the National Ocean Policy improve the capacity of the local community to manage its coastal environment?

The National Ocean Policy is designed to streamline the regulatory process through interagency collaboration. In the case of Rehoboth, Delaware,

the decision to build an ocean outfall was the result of twenty-four years of regulatory and judicial negotiations with state and federal agencies. While the decision to build the ocean outfall was identified as the best option throughout the twenty-four year process, streamlining this decision would have saved the city millions of research dollars spent on evaluating disposal alternatives, as well as total construction costs, which in today's dollar are considerably higher than they would have been twenty-four years ago. The National Ocean Policy can bring a sense of urgency to this process, coordinating regulatory and interagency solutions in a timely fashion.

Understanding the complex trade-offs of each disposal alternative presented was a difficult task for the small community of Rehoboth Beach to grasp, given the expense of the project, the potential financial impacts on the residents of this small coastal community, and the lack of scientific and technical expertise in the community. Interagency support through the National Ocean Policy could have provided a set of clear and transparent alternatives based on sound scientific perspectives that would achieve the regional goals, for consideration by the City of Rehoboth Beach. These alternatives would be based on the best available information from areas of expertise not readily available to the people of Rehoboth and its City Council members, in order to expedite the process. Regional and federal resources applied towards technical support of the

project could have helped in evaluating the alternative land and ocean disposal options, a process that took a number of years as a result of limited local expertise, and could have suggested the optimal placement of the outfall pipe along the City's coastline, once the ocean disposal decision was made.

Rehoboth is a community with a valued stake in the environment, a vacation destination for the Nation's Capital, and many other cities in the Mid-Atlantic region. Stewardship values are evident as priorities of its local residents. Building the ocean outfall represents a resolution between water quality restoration efforts for the Inland Bays, the need to comply with federal regulations, and a desire to maintain the amenities of life in a coastal community that thrives on a tourist economy. Framing the decision to build the ocean outfall as a decision to protect the Inland Bays allowed Rehoboth to take a prominent role in promoting environmental stewardship. But the cost of the planning, the evaluation of alternatives, and of construction almost derailed the decision making process.

The National Ocean Policy is looking for local communities that exemplify their national objectives of protecting, maintaining, and restoring the health, biological diversity and resiliency of the ocean and coastal ecosystems (CEQ 2010). Implementation of the policy will highlight communities such as

Rehoboth, where coordinated efforts towards a sustainable coastal community are compatible with regional goals. As the implementation of the National Ocean Policy unfolds, and the regional priorities and processes are developed, towns such as Rehoboth Beach will have the opportunity to play a part in the development of the plan. Their local voice could be instrumental in shaping regional priorities. In these ways, providing technical assistance based on understanding the ecosystem, and including local communities in negotiating regional goals, the National Ocean Policy will benefit local communities.

How can the National Ocean Policy improve the capacity of the local community to manage its coastal environment? The national and regional plans have been designed to include positive participation from local communities, engaging local leaders and stakeholder involvement. Developing regional priorities, creating coastal and marine spatial plans, and a robust conflict resolution process will include local stakeholders throughout the formation of regional plans and implementation of the national ocean policy. This engagement is designed to build and strengthen the capacity of local communities to enhance their ability to participate in the National Ocean Policy process. Its success will rely on involving vocal community leaders, supporting legitimate interests, and respecting local priorities in each community. Communities proactively involved in planning the management of coastal

activities can coordinate their efforts within regional objectives and can become active participants on the regional level through pilot projects initiated on the local level.

Local politics between the City of Rehoboth and Sussex County and costs dominated negotiations about the ocean outfall, as the city presented the decision as the least costly option for its residents, and the only option that did necessitate partnering with the county. Discussions about the outfall option decision centered around limiting the increase in monthly bills of local residents, and maintaining control over the operation within city boundaries, rather than transporting the effluent to a county facility. However, the decision also benefits the Inland Bays ecosystem, reducing the nutrient load. While this was not the deciding factor in the case of Rehoboth Beach, Delaware, it was certainly a motivating factor. There are elements of promoting stewardship and creating a legacy for future generations that rely on a small community and its community leaders to take actions that reflect a commitment to see itself as part of a bigger picture.

The National Ocean Policy can provide the support and guidance for a community to coordinate coastal management decisions with ecosystem-based management. Issues such as sea-level rise and climate change related issues

necessitate a greater understanding of the marine environment in order to manage community response on a local level. Difficult decisions related to beach restoration directly impact local residents. Conflicts arise due to limited funding options. These issues challenge the capacity of the local level to manage its coastal community, and create urgency for the implementation of a national ocean policy.

The National Ocean Policy and its coastal and marine spatial planning framework will benefit future projects in coastal communities, providing interagency guidance for solutions compatible with the needs of the ecosystem. The implementation process can offer technical expertise in collaboration with local planning, and mechanisms for conflict resolution. Local politics may be the limiting factor in raising awareness of the coastal ecosystem, however, highlighting projects involving interagency collaboration, within national and regional guidelines will encourage other communities to coordinate their activities within the national ocean policy's stated objectives. Negotiations and resolutions such as this case study described will continue to form and shape the regional plans for coastal and marine spatial planning as the national ocean policy seeks avenues of implementation, offering examples of collaboration and coordination of the many policies involved in ocean governance.

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