

Coastal Jobs Creation Act of 2011 - HR 594



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Photo: 2006 Qweas

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Photo: 2006 NOAA

EXECUTIVE SUMMARY

In a period of national economic stagnation, it is imperative that we create sustainable domestic employment opportunities. With more than 50 percent of the population of the United States living along the 17 percent of land area that encompasses the coast, the creation of employment opportunities in coastal regions is critical (The Herald, 2010). The objective of the Coastal Jobs Creation Act of 2011 is socioeconomic revitalization through careful stewardship of the coastal marine environment. This report considers how the Act will foster innovation and develop solutions to the myriad environmental problems affecting coastal areas, including fishery stock assessment, ecosystem health, and marine debris.

Accurate fishery stock assessments are difficult for many reasons, including limited data on fishery populations, illegal or unregulated fishing, by-catch, and inadequate consideration of life-cycles. This Act supports cooperative research and activities that will provide a scientific basis for a more efficient and transparent management of fishery stocks. Activities include funding data collection efforts, such as the deployment of additional observers on ships, who would provide an objective information source for accurate catch numbers. Research on by-catch, population modeling, life-cycles, and specialty designed fishing devices also would be supported. Additionally, technological advances, such as satellite imaging, could be used to measure oceanic parameters of habitat that influence marine resources, and thus support assessment.

Water quality is a vitally important factor in the development of a healthy ecosystem. Key components in water quality determination are PCBs and DDT, which are toxic and have the ability to bio-accumulate or bio-magnify as they move through the food web. Additionally, increased CO₂ levels can cause ocean acidification, while excessive nutrient runoff can lead to eutrophic and hypoxic conditions that cannot support marine life. Potential water quality management solutions that could be funded through H.R. 594 include research on restoration technologies, the use of biotics to remediate waters, and the improvement of habitat through restoration or installation of artificial reefs.

Marine debris is solid material that accidentally or intentionally makes its way into the oceans. Two main types of marine debris are derelict fishing gear that “ghost fishes” by continuing to catch fish, and plastics that can be ingested by marine animals. Floating plastics, nets, and other detritus reduce habitat quality and can easily be transported from one location to the next by ocean currents. Marine debris removal research and community projects are eligible for funding under through the Grant Program.

This Act proposes solutions to some of the problems faced by coastal communities, specifically the environmental degradation issues listed above. Addressing those problems will reinvigorate the oceanic zones, protect current jobs and fulfill the goal of sustainable coastal development. However, due to competing interests, lack of consensus, and scientific uncertainty, the proposed solutions are not without some amount of controversy. The Act seeks to minimize these controversies through additional research and the engagement of local communities.

By complementing NOAA’s national initiatives with small-scale projects, the scope and impact of the Grant Program would be maximized. Because marine ecosystems can respond slowly and progress may not be demonstrable if viewed through a single vantage point, multiple metrics will be needed to track progress. The use of established coastal environmental and economic indicators could provide the metrics through which we could measure the success of the Coastal Jobs Creation Act of 2011 as an engine of environmental restoration and economic growth.

INTRODUCTION

Coastal regions, including beaches and estuaries, are complex environments characterized by rich biological diversity and important natural resources. They are also uniquely vulnerable to environmental degradation, habitat modification, and water pollution. Damage to United States coasts has an adverse economic impact on the coastal communities that engage in, and are supported by, a gamut of activities intrinsically connected to coastal zones (CCMCE, 2000). To address the correlation between environmental factors and economic output, the proposed Coastal Jobs Creation Act of 2011 (H.R. 594, hereinafter “the Act”) seeks to promote long-term sustainable coastal development. The Act will provide and protect employment opportunities for numerous marine-related industries and coastal communities. It proposes a solution to the environmental problems in the context of sustainable job creation, and in particular focuses on improving three key coastal health indicators: fishery stock, ecosystem health, and marine debris.



Photo: National Geographic

What is the Coastal Jobs Creation Act of 2011?

The Secretary of Commerce will oversee the appropriation of the annual \$80 million Coastal Jobs Creation Grant Program (hereinafter, “the Grant Program”). While this Grant Program would be available for a range of activities, projects must meet certain funding criteria. Funds could be appropriated to support cooperative research to collect and compile data on the health of ecosystems and the economic conditions for fisheries. It could fund the utilization of new monitoring technologies for coastal and ocean systems, the establishment and implementation of state fishing registry programs, and the training and deployment of observers. Activities related to the restoration, preservation, and redevelopment of coastal environments are also eligible for funding. These projects could focus on recreational, ecological, historic, or aesthetic considerations. The Grant Program could also facilitate the reduction and prevention of marine debris. To be eligible for the Grant Program, the project must provide the greatest employment opportunity for coastal communities, utilize previously successful projects, employ existing infrastructure, and/or support research to improve management systems. The Act mandates collaboration between federal and state governments, research institutions, regional fisheries management councils, and coastal communities to maximize benefit from the activities funded by the H.R. 594 Grant Program.



Photo: NOAA



Photo: Marine Science Today

What is the Environmental Problem?

Fishery Stock Assessment

Aquatic and Fishery Science Professor Ray Hilborn aptly expressed the frustration and difficulty borne in assessing fishery stocks when he mused, “Counting fish is just as easy as counting trees, except they are invisible and they move” (Hilborn et al., 2003). A fishery is an industry where the removal and/or processing of marine catch occurs, so by using the term “fishery” all organisms and habitats in the ocean are included in the evaluation (nmfs.noaa.gov). The main problems affecting fishery stocks assessment relate to the current stock and ascertaining which elements are affecting a fishery.

The Problem

The National Marine Fisheries Service is responsible for managing fishery resources and drafting regulations. Establishing accurate fishery stock data is made significantly more difficult due to the lack of background information missing in data collection. In 2006, for instance, only 30% of the 230 major commercial stocks in the United States had adequate information to determine the true biomass. Extrapolating from limited data makes fishery stock assessment particularly challenging. The assessments are subject to a high level of uncertainty due to the transient nature of marine animals and anthropogenic effects on behavior and life-cycle. Therefore,

sufficient data are not available for promulgating regulations that promote the successful management of commercial fisheries.

Data analysis provides the scientific basis for the management of fish stocks. Commercial fishing catch databases, surveys of recreational fishermen, and permitting systems all gather large quantities of information. However, these sources are easily misreported and the indirect nature of these observations leads to uncertainty when applied to stock assessments. On-board observers gather data on only a quarter of the fisheries, because so few observers are able to be deployed relative to the number of fishing vessels. This makes it difficult to determine accurate daily catch practices, or, except by generalized extrapolation, overall fishery stock numbers.

Illegal, unregulated, and “upgrading” fishing create even more difficulty in the assessment of fishery stocks. Upgrading is when a fisherman meets the regulated catch limit, but continues to fish and trades smaller fish on-board for larger fish caught later. These actions greatly affect the population of species because the fish that are thrown back often do not survive. Assessments must also account for unregulated by-catch and non-targeted species inadvertently caught by fishing gear

Cod Case Study

The North Atlantic Cod Fishery had been booming for centuries until the 1950's when the Canadian government opened the Great Banks to foreign fishermen. The high levels of cod fishing, and capelin that is consumed by cod, greatly increased pressure on the cod. After the peak catch of 81,000 tons in 1968, the cod population crashed and the fishery was closed to foreign fishermen in 1970. Canadian fleets continued to exploit the population for twenty-two more years. When the fishery was finally closed, 30,000 Canadian fishermen lost their jobs. This fishery might have been preserved if predatory cycles, food source cycles, and fishery stock behavioral patterns were taken into consideration earlier.

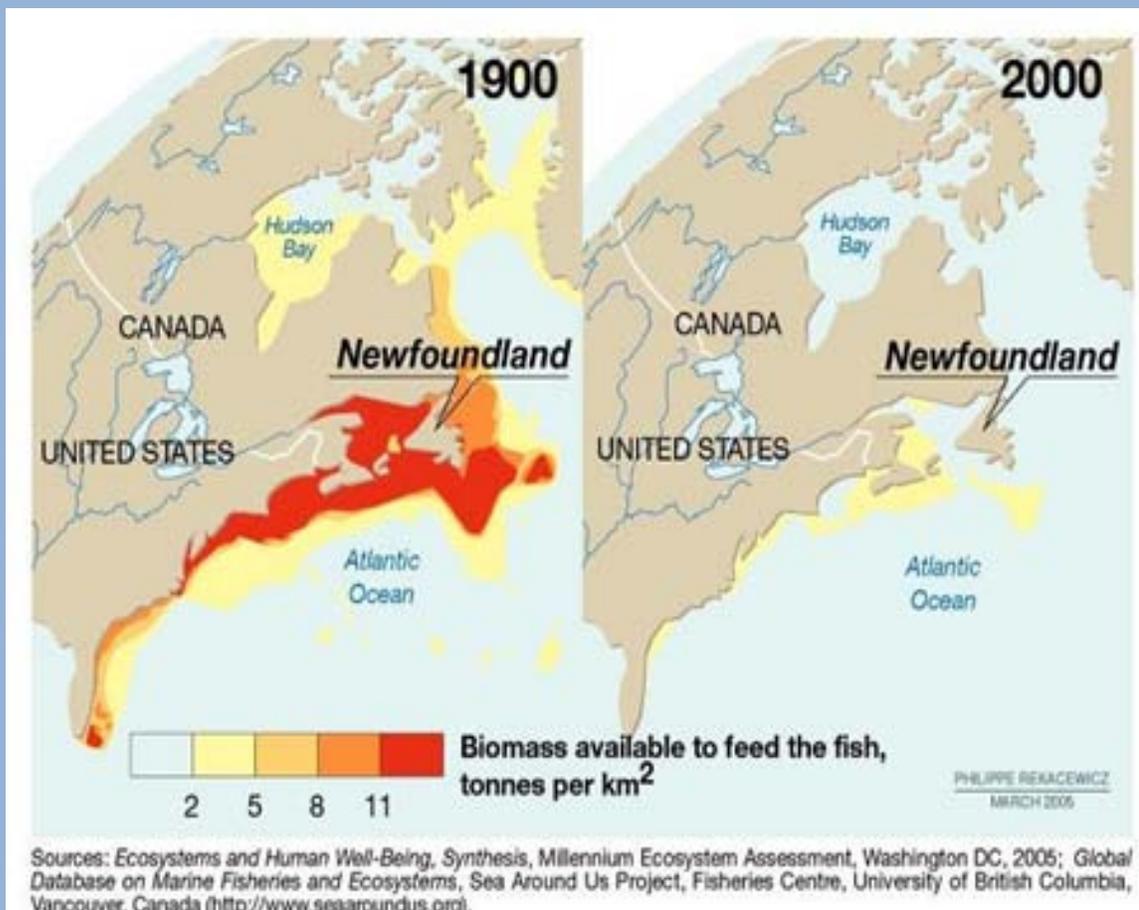


Photo: SeaAroundUs.org, 2006

(Castro & Williams, 2009). As an example, shrimp fishing has been known to catch up to six times more by-catch, by weight, than actual shrimp (Vianna & Almeida, 2005). The by-catch is often discarded and not reported, thus creating holes in data detailing the true quantity of a species being fished. “Fisheries can sustain intense fishing effort, but if by-catch is proportional to that effort, by-catch mortality levels will increase as fishing effort intensifies” (Lewis et al., 2004).

To spatially model a fishery accurately, more than births and deaths must be evaluated. Calculations need to consider the diverse biological processes, especially individual species’ lifecycles and the effects of other organisms. Additionally, changes in water cycles and temperature should be taken into account. Stock assessments are a key factor in the creation of sustainable fishing quotas. If the assessments are not based on a complete picture of the stock, then the regulation will not achieve maximum success.

The Solution

The National Oceanic and Atmospheric Administration (NOAA), under the guidance of the Magnuson-Stevens Fishery Conservation and Management Act, launched a nation-wide program called the Marine Recreational Information Program (MRIP) in January 2010, to monitor commercial by-catch.

The Act could expand on MRIP by seeking the full participation of coastal states through the proposed Grant program that could fund the training and deployment of

observers. An observer is “a person required or authorized to be carried on a vessel for conservation and management purposes by permits” (MSA, 1996). The role of the observer is to collect and record fishing data and interactions with the protected species, including by-catch information. This data is then used to calculate the official estimates of marine catch (NOAA PIR, 2011). Such information can then serve as a basis for further research, proper fishery stock assessment, development of specially designed fishing devices, as well as new fishing and conservation engineering technology (US Department of Commerce, 2011).



Photo: AquariumPros, Inc. 2010

Technological advances, such as satellite imaging, have improved the accuracy of fishery stock assessment. Although remote observation cannot directly measure fishery populations, it could be used to measure oceanic resources.

Orange Roughy Case Study

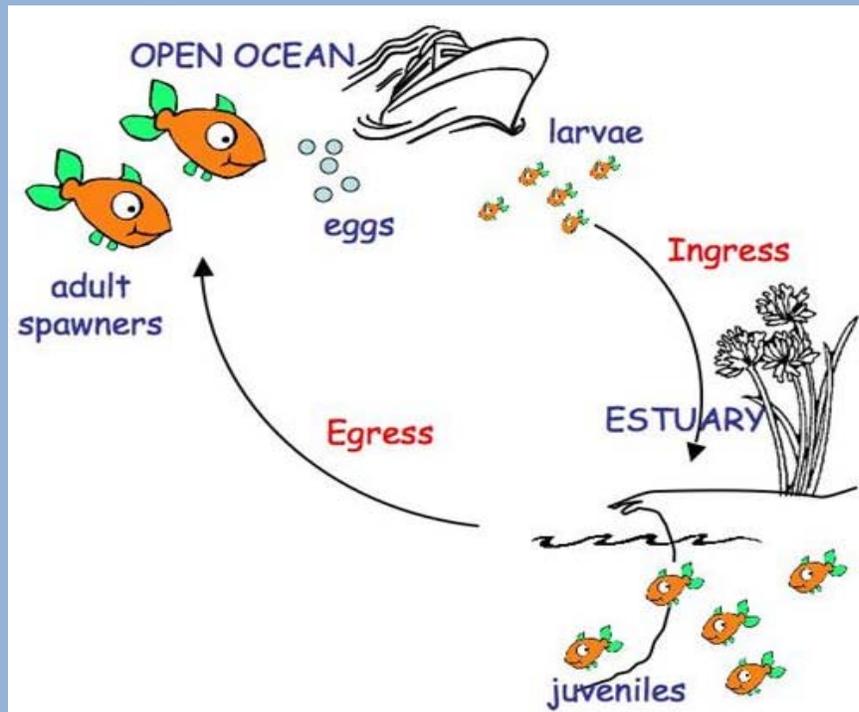


Photo: BrightHub, 2011

Orange Roughy offer a lesson on how regulations that do not consider lifecycle factors can have a negative effect on fishery sustainability. These fish can live for 140 years and do not reach sexual maturity until their twenties. In New Zealand, this late maturity was not taken into consideration when the sustainable harvest size and weight were set, and it caused a population crash due to overfishing and low reproduction rate. After the government realized what was happening, a moratorium was set on the harvest of these fish. However, it took more than twenty years for the population to begin to recover.



Photo: Sustainable Waters

River plumes, mesoscale circulation patterns, convergence zones, subsurface thermal structures, oil spills, and El Niño events could all be documented by satellite imagery (Wilson, 2006). This data could be used to ascertain quotas more accurately, and to forecast climate-related events like fishery migration patterns and stock growth.

The future of coastal health depends not only on fisheries stock assessment, but also on a successful and timely implementation of regulatory procedures related to assessment. The recovery and recruitment of exploited fisheries requires a systems-based management scheme to take advantage of ocean observers, remote surveillance technologies, marine reef planning, and exclusionary devices. A comprehensive approach to regulating human effects on the ocean system will work towards an efficient approach that integrates ecological, economical, and social factors that will aid in sustaining fisheries (Foley et al, 2010).

Ecosystem Health

Ocean water quality has a dramatic impact on fishery health and the life cycles of marine organisms. The chemical composition of the water has a direct effect on the biodiversity, fecundity, and health of organisms living there. Improving water quality will improve the health of the fishery, allowing individual fishery stocks to thrive, and increasing the total amount of catch that could be extracted sustainably.

By-Catch Reducing Technology

New technology for exclusionary devices is being developed to reduce by-catch. For example, it was discovered that unintended shark mortality can be limited by attaching metals and magnets to baited hooks. This technique has shown an 18% to 68% reduction in shark catch depending on location and species (Stroud, 2011). However, controversies surround exclusionary devices, due to their expense, the potential loss of desired catch, and questions regarding their effectiveness. In one study by Louisiana State University, the measured efficiency was approximately 97%, but a similar United Nations Environmental Program measured efficiency below 20%.

The Problem

Overall water quality goes a long way in determining which marine organisms can live in that area. Key components in this determination are contaminant levels of

PCBs and DDT, as well as the proportion of carbon dioxide (CO₂) and dissolved oxygen (DO) in the water. As probable human carcinogens, PCBs were commonly used as coolants, hydraulic fluids, and in electrical transformers in heavy industry (EDG.org). Before being banned in the United States in 1977, manufacturers often discharged contaminated waste into the waterways; in many cases the PCBs have remained in the water. DDT was first mass-produced during World War II when it was used extensively as an agricultural insecticide, thereby entering natural bodies of water through runoff and discharge from manufacturers (Crump, 2000). While we know that these compounds are toxic to humans, additional monitoring and research can provide a more complete understanding of their effect on fishery lifecycles, especially in places where the toxins exist in high levels.

Over the last 250 years, as CO₂ levels rose, the world's oceans absorbed half of the emitted anthropogenic CO₂ (Widdicombe et al., 2008). Rise in the CO₂ level in the water leads to acidification due to the creation of carbonic acid, and therefore changes the water's pH. Marine organisms are extremely sensitive to pH, and a change in the pH level can cause decreased marine fecundity and/or death, resulting in a further reduction of biodiversity. Alongside acidification, eutrophication and hypoxia also present pernicious environmental threats to water resources. Eutrophication and hypoxia are caused by excessive nutrient runoff from non-point sources containing detergents and fertilizers, resulting in excessive algae growth. This depletes dissolved oxygen (DO) levels in

water (CCMCE, 2000). DO is a critical water quality parameter for characterizing the health of an aquatic system, as when levels are too low, marine life cannot survive.



Photo: NOAA, 2011

Poor water quality can severely impact the health of the entire ecosystem. For example, apex predator populations exert a profound influence on the structure and function of a marine ecosystem. The health of these predators can be damaged by environmental contamination, and their decline can cause their principal prey species to increase in abundance. Species in the middle of the food chain can put more pressure on the species they consume if their numbers increase due to a decrease in apex predator population. Therefore, a proper balance between trophic levels must be maintained to avoid a cascade effect that can occur through several layers of the food web if the predator population is reduced (Heithaus et al., 2008).

The Solution

Water quality management involves mitigating contamination risk through regulation, remediation, and the restoration or conservation of habitat. Research on water quality, therefore, requires extensive and multi-disciplinary investigation into the coastal and marine ecosystems of the affected region, involving expertise in a variety of fields. It includes research on accumulation of contaminants within systems and remediation measures, as well as restoration technologies (NOAA Restoration Center, 2011). The process requires cooperative research and monitoring of pollutants, activities that can create jobs and, at the same time, lead to improved water quality.

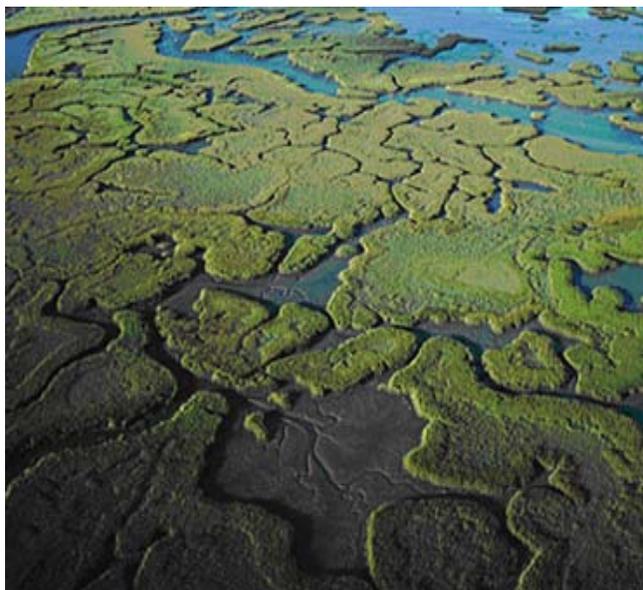


Photo: NOAA

Using biotic organisms to remediate contaminated waters in coastal zones reduces the contaminant load and improves coastal water quality. Through bioremediation, microbial organisms can breakdown contaminants using their

metabolic processes and catalyze the rate of contaminant degradation. In addition, phytoremediation mitigates pollutant concentrations through the use of plants that are able to contain, accumulate, degrade, or eliminate the contaminants from the media. Both bioremediation and phytoremediation are affordable resources that can be used to improve the health of the local aquatic system with minimal long-term disruption. Restoring natural conditions to degraded estuarine riparian zones could also improve the health of coastal ecosystems and resources. This can be done by transplanting flora, encouraging its growth by providing proper habitat, and clearing the water of toxins by using bio- and phytoremediation.

In addition to improving water quality, creating habitat also can increase ecosystem function. Artificial reefs can give rise to new marine organism communities. They can be used as an aggregating device, providing a safe haven for lower trophic organisms and a good source of food for higher trophic levels (Bohnsack, 1989). They provide substrata for benthic fauna, additional food and increased feeding efficiency, shelter from predation and tidal currents, a recruitment habitat, and reduced harvesting pressure on natural reefs (Pickering and Whitmarsh, 1996). The implementation of artificial reefs along many coastlines of the U.S. could aid fishery recovery, attract fishermen, and promote eco-tourism, all of which would benefit the economies of coastal communities. However, installing large reefs is costly and it can take years before they are fully functional. When artificial reefs are created

by sinking out-of-service ships, for example, there could be issues of toxin leaching. The money from this Grant Program could support small, local reef projects that provide transitory habitat to fisheries and create tourism and recreational sites.

Marine Debris

Marine debris is another major concern. The U.S. Coast Guard considers marine debris to be “any persistent, manufactured, or processed solid material that is directly or indirectly, and intentionally or unintentionally, disposed of or abandoned into the marine environment” (Federal Register, 2008). Debris finds its way to the oceans accidentally and intentionally, and its impacts to the coastal ecosystem can be significant (CEI, 2008).

The Problem

A central component of marine debris is derelict fishing gear. Lost or discarded fishing nets contribute to “catch” aquatic organisms, a process referred to as “ghost fishing”. Formerly, fishing gear was constructed with natural fibers, but now, fishing gear is predominantly made of polyethylene and polypropylene, which take substantially longer to decompose (NOAA.gov). This means that anything lost or jettisoned can stay in the water almost indefinitely. Abandoned nets continue “fishing” for months to years, catching anything that happens to swim into them. When this occurs the nets become ‘self-baited’ and more organisms are drawn to the area, get caught and die (Matsuoka et al., 2005). In addition, derelict fishing gear

causes damage to the sea-floor and harms the organisms living there. The organisms most affected are stationary invertebrates such as sponges that can take decades to recover or reefs that can take centuries to rebuild (Chiappone et al., 2002).



Photo: NOAA

Plastics that make their way into the ocean can have adverse consequences on marine life. Although most plastic is developed to be incredibly durable, it does eventually succumb to photodegradation and becomes micro-plastic that ends up in the stomachs of filter feeders and other marine life (Mato et al., 2001) (Andrady, 2009). As the concentration of micro-plastics increases, so does the likelihood of ingestion. Larger pieces of plastic are often consumed by whales and sea turtles that confuse them for squid. Birds and fish are attracted to brightly colored objects and will eat plastic pellets mistaking them for fish eggs (Bugoni et al., 2001). These plastics remain in the creature’s stomach, leading to blockages and the false sensation of being full, which can potentially cause starvation (EPA.gov).

Currents are the highways of the oceans and they do not respect political boundaries. Marine debris moves along these currents and can affect coastal protected areas regardless of their marine pollution regulations. In a study by Chiappone, seven different fishing zones, reference sites, and protected non-fishing areas in several coastal habitats were examined for marine debris. The study found no difference in debris density between protected non-fishing zones and those that were open to fishing (Chiappone et al., 2002). A large-scale commitment to marine debris removal is needed to reduce its effect on the marine ecosystem.

The Solution

Activities related to the reduction and prevention of marine debris are eligible for funding under the Grant Program. NOAA conducts extensive research in marine debris prevention and reduction based on the Marine Debris Research, Prevention and Reduction Act of 2006. In addition, NOAA funds national projects for detecting and

removing derelict fishing gear and other anthropogenic substances in the waters. The community-based marine debris prevention and removal projects that NOAA supports benefit coastal habitats. Under this program, NOAA has funded 50 projects, removing 1,500 metric tons of marine debris since 2006 (NOAA ORR, 2011). The Grant Program proposed by the Act can complement the community-based projects by supporting regions that are not covered by NOAA initiatives. The Act will also provide grants to groups that are too small to receive NOAA funds, but are able to address an ecological niche that NOAA does not address.

Through restoration and remediation of contaminated and degraded aquatic areas, coastal communities can improve the physical, chemical, and biological conditions for spawning and larvae development in strategic zones like estuarine systems and ocean floors. As these systems continue to recover and develop, communities that supported coastal restoration will benefit from increased fishing yields, recreational tourism, and a healthier ecosystem.



Photo: Thrush y Dayton, 2010

Analysis of the Solutions Proposed

The Act simultaneously addresses two major issues faced by coastal communities: the loss of jobs and the degradation of the marine environment. By supporting research and remediation activities, the Grant Program could lead to technological advances in restoration and pollution prevention, while an extensive amount of environmental data could also be accumulated for use in future policy-making.

The Grant Program has an appropriation limit of \$80 million per year for five years. Ideally, these would complement NOAA national-level initiatives by focusing on small-scale local projects and local coastal community restoration efforts. The Grant Program provides an immediate stimulus into local job creation, thereby protecting current jobs, while simultaneously developing the potential for future job growth.

Solution Cost

In the case of Los Angeles County, the Department of Public Works and the Flood Control District spend nearly \$18 million annually on marine debris prevention and removal (EPA, 2011).



Photo: Science Daily

By working alongside the NOAA initiatives, funding supplied by the Grant Program would invigorate smaller, local, job-creating programs. Although the actual economic value of coastal reconstruction and research initiatives is hard to quantify, examples of current losses due to environmental degradation illustrate the benefits of the Grant Program. Local efforts to clean-up coastal areas can reduce such losses in the long run, and therefore, benefit coastal communities both economically and environmentally.

The Cost of Inaction

According to a news report by the Santa Cruz Sentinel, up to \$250 million of marketable lobsters are lost annually due to ghost fishing, while nearly \$800 million is spent on repairing or replacing boat propellers damaged by derelict fishing gear (Haifley, 2011).

Measuring Success

The primary goal of the Act is “to promote sustainable coastal development and provide employment opportunities to coastal communities by supporting a range of activities” (H.R. 594, 2011). Within these activities, metrics need to be established to determine if the policy is achieving its goals and desired outcomes (Theodoulou et al., 2004). Cataloging the program’s expected outcomes and the degree to which the

products have been achieved are key to measuring success.

Fortunately, a Coastal Environment Indicators system is already in place, and is part of a coordinated effort among the EPA, NOAA, the U.S. Geological Survey, the U.S. Fish and Wildlife Service, coastal states, and the National Estuary Programs. The annual National Coastal Condition Report tracks the success of programs already in place. It uses a rating system known as the Overall Condition of Coastal Waters. The rating system includes a water quality index, a sediment quality index, a benthic index, a coastal habitat index, and a fish tissue contaminants index. Together, they provide a valuable measure of marine ecosystem health.

Monitoring the increase in coastal jobs, (and the resulting economic growth) is another determinant of the success of the program. NOAA has developed Coastal County Snapshots, a system that tracks the economic impact of jobs that are dependent on the coastal ecosystem, which could aid local officials in prioritizing job-creating investments (NOAA Coastal County Snapshots Website, 2011).

Conclusion

The improvement of coastal aquatic ecosystems can promote fishery-related jobs, and build the framework for long-term, sustainable coastal development. By augmenting existing national programs, the Coastal Jobs Creation Act of 2011 can be a valuable aid in the effort to restore the nation's coasts. By building on already-available programs and resources, this program encourages new ideas and technological approaches to prevent over-extraction of fisheries and promote healthy marine ecosystems. By working together, community members, scientists, policymakers, and government agencies can create a healthy coastal ecosystem that will foster a sustainable, economic recovery of the coastal regions.



Photo: NOAA



Photo: WorldPress, 2010

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