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## **DEVELOPING BETTER ECONOMIC INFORMATION ABOUT COASTAL RESOURCES AS A TOOL FOR INTEGRATED OCEAN AND COASTAL MANAGEMENT**

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“...we don’t have enough information about the oceans’ impact on our economy. A complete and accurate assessment of the ocean bounty has never been done, and I think this has been a serious handicap in our decision making over the past number of years. We need such information to make decisions on how to responsibly use our ocean resources. And we need it to protect the marine environment. We need it if we’re going to give the public a better understanding of how the oceans directly affect our lives.” The honorable William M. Daley, Secretary of Commerce, Monterey, June, 1998.

### **I: Practical Uses of Economic Data**

Ocean and coastal managers, legislators, members of congress, industry representatives, and academics are all concerned with a variety of questions regarding ocean and coastal resource protection, economics, research, monitoring and governance. Although economics is an important factor in any management analysis, studies of the value of ocean and coastal resources and their uses are generally lacking. In developing its Ocean Resources Management Program, the State of California conducted a first-ever analysis of the economic contribution of seven ocean-dependent industries to the State's economy in 1992. The resulting information, developed by the California Research Bureau, has been critical in the policy arena for demonstrating the role that the ocean plays in shaping the state's economy. Policy makers and other interested parties have clearly established the link between the economic value of ocean dependent industry and the need to manage and protect the resources that support it. This economic analysis was included in the 1997 strategy, *California's Ocean Resources: An Agenda for the Future* (California Ocean Agenda) and has been cited extensively by representatives of government, academia, the private sector, public non-profit organizations, and the media ever since.

The California Ocean Agenda and its economic conclusions had a substantial impact on ocean and coastal management in California. In the year that followed, California's Governor issued an executive order directing a series of new actions recommended in the document and fifteen new laws were enacted to improve the management and protection of the state's ocean and coastal resources. Administratively, the Department of Fish and Game was re-organized to establish a new marine region with additional marine enforcement capability dedicated to ocean and coastal issues. In the 3-4 years that followed, a series of additional legislative efforts and budget initiatives directed to the coast and ocean have been enacted. Governor Davis has made the ocean and coastal protection one of the top priorities of his administration, which has been reflected in new legislation and substantial budget increases for these programs. Proponents of ocean and coastal protection in California have continued to cite the findings from this single economic study, because little else exists. Other states and the federal government could benefit from the development of such economic data.

California's experience demonstrates the potential impact of economic data in driving public policy decisions. However, it was clear from the start that the analysis conducted was limited. For example, the economic studies focused strictly on market transactions of the industries studied. In the case of tourism, much of the recreation value was left out entirely. Estimates were based on travel spending data and reflected actual spending, not imputed data that might have represented something like the value of a day at the beach. Studies have been done and are currently underway to capture those values. It is the data from such studies that can provide a substantially

enhanced understanding of the impact of the ocean and coast on state and national economies. This enhanced level of analysis is what should be conducted at the state, regional, and national levels to help support informed decision making regarding the management of ocean and coastal resources.

## II: Utility and Justification for Baseline Economic Data for the Coast and Coastal Ocean

California is not alone in recognizing the importance of the oceans to their economy. Since the International Year of the Ocean (1998) raised America's consciousness about the coast and the ocean, there has been that same recognition at the national level, where there has been a proliferation of government and business reports about this bountiful and popular area of the United States. Many of those reports have tried to attribute values to coastal resources, real estate, recreation and tourism, fisheries of all kinds, or to estimate the cost of coastal erosion and other damage to the shore and waters. These estimates generally have large margins of error, depending on how these activities are defined, what was measured, and when it was measured. The need for reliable economic information for decision making is made even more urgent as the pace of technological change increases, investment patterns change, and mergers reinvent industry infrastructures. Tracking the economic implications of these trends over periods of time would indicate fluctuations in revenues, expenditures, and employment that could help direct decisions in the future. Indeed, at all levels of government, decision-makers have carved out a formal role for economics in federal, state, and local law and regulations. The most common economic tool to inform environmental decision-making--cost benefit analysis—depends critically upon sound economic information, including quantitative estimates of the value of coastal environmental assets, not normally traded in markets such as beach recreation. Currently, the ocean sector has little data with which to do this.

The coast and ocean are critical areas that demand better understanding of their economics, particularly because we don't know how large an economic engine is driven by the ocean and coastal zone. Yet we do know that many economic activities depend on and impact coastal and ocean resources; that pressures on these resources are testing their sustainability. Over the past three decades, the interaction between environment and economy has received increased attention. As our ability to measure both environmental and economic changes has improved, serious attempts have been made to integrate environmental and economic information for decision-making purposes. Some of this effort has been directed at the creation of integrated economic and environmental accounts within the national income accounting framework. Such integrated accounts provide a consistent conceptual framework and a more level "playing field" for decisions about conservation and development.

Most decisions are made with incomplete economic information that emphasizes the values associated with development, such as housing, and miss many of the values associated with conservation, such as habitat stability and recreation. This is because data have traditionally been gathered on the market-oriented activities, but not for non-market values. At the root of the problem is the limited scope of the national income accounting system of the United States – the accounting system from which measures such as gross domestic and gross national product, GDP and GNP, are derived. These national income and product accounts (NIPA), the most fundamental measure of the overall size of the US economy, include only limited information about recreational values and changes in environmental resources. And they give no special attention to coastal or ocean-related economies

Some of the most obvious uses for this information are

- Economic impact assessments for regulations, controversial decisions, predictions and projections.
- Management and investment decisions in coastal areas
- Conservation decisions regarding marine protected areas, no-take zones, and setting aside green space.
- Sustainable policies for natural resources management

The Nature Conservancy and the Natural Heritage Program recognize that wise conservation management cannot proceed without a thorough understanding of the stocks and condition of biodiversity around the world. Hence, Conservation Data Centers that document, measure, and track biodiversity are now an integral part of conservation

efforts throughout the Western Hemisphere. The conservation of coastal and ocean resources also requires similar documentation. But coastal conservation requires an understanding of how coastal resources are used, how these resources generate economic value, and how stocks of coastal environmental and economic resources have changed over time.<sup>1</sup> Informed coastal conservation in the 21<sup>st</sup> century will require an information system that can provide policymakers with important and accurate information about coastal resources and their values. Providing this data is the role of the National Ocean Economics Project, headquartered at the University of Southern California.

### III: Using Economic Data for Baseline Comparisons: A Sample of the Data

#### Federal Ocean Expenditures, 1970 – 2000

We have completed a preliminary assessment of federal ocean expenditures from 1970 to the present. The primary data source is the U.S. Office of Management and Budget's annual *Budget of the United States Government* publication. In some instances, data have also been obtained directly from federal agencies. The data include information on marine expenditures in the following federal functions and activities:

- Department of Defense (Navy, Marines)
- U.S. Coast Guard (USCG)
- U.S. Army Corps of Engineers (ACoE)
- National Oceanic and Atmospheric Administration (NOAA)
- Maritime Administration
- Panama Canal Zone government
- St. Lawrence Seaway Development Corporation
- Federal Maritime Commission
- Marine Mammal Commission
- Minerals Management Service
- Environmental Protection Agency

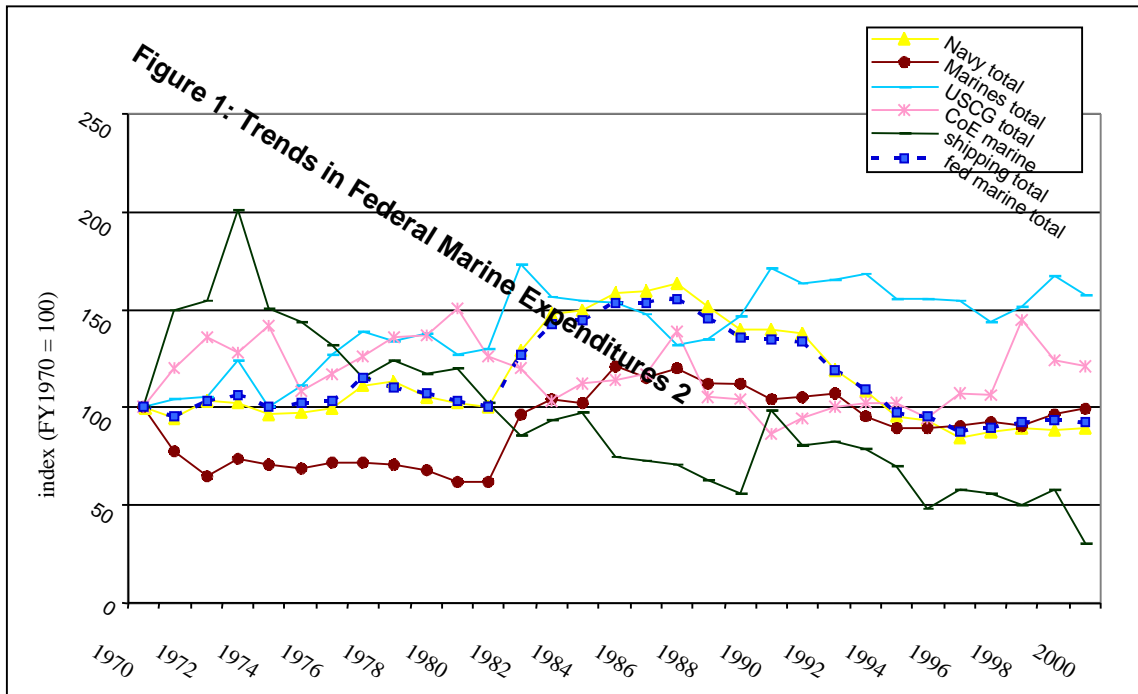
Some budget entries are considered to be entirely "marine" expenditures, while others are "mixed" (some part of the funds was spent on non-marine related activities). For "mixed" expenditure categories, we have made preliminary estimates of the marine fraction. These estimates will be refined in the course of the project.

When the aggregate expenditures from 1970 to the present are normalized to 2000 dollars, we find that federal marine expenditures have been fairly constant around \$100 billion per year. Of this, about 80% are Navy expenditures and another 12% are the Marines. The Coast Guard accounts for 4%, and other civilian expenditures make up the remaining 4%. Figure 1 illustrates the trend in some expenditure categories over the 30-year period.

The \$100 billion annual federal marine expenditures represent from 10 to 50% of typical "coastal GDP" or "ocean GDP" estimates. The \$4 billion in purely civilian federal marine expenditures represent from 0.5 to 2% of coastal/ocean GDP estimates. The percentage of the federal budget devoted to civilian marine expenditures decreased by two thirds from 1970 to the late 1990s. Total federal marine expenditures accounted for about 12% of the overall budget in 1970 and dropped to just over 5% by 2000.

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<sup>1</sup> Linwood Pendleton, December, 1999, internal document.



#### IV: Using Economic Data in the Decision Making Process: A More Complete Cost-Benefit Calculation

Federal laws, court rulings, and Executive Orders, as well as a plethora of state and local laws and regulations, increasingly call for assessing the costs and benefits of proposed environmental management and policy interventions and initiatives. Fortunately, over the last few decades, economists have developed tools and methods to value many of these so-called non-market environmental assets, to quantify these values, and to add them up and include them in the cost benefit equations. This gives a much richer picture of the nature of the tradeoffs involved in environmental decision making. These tools include travel cost models, hedonic price models, and contingent and conjoint valuation techniques. Further, better understanding and wider acceptance of metrics to deal with risk, uncertainty, and discounting, particularly as applied to environmental issues, has made the cost benefit framework more transparent and less controversial as a decision tool.

The convergence of requirements to consider cost benefit analysis and our ability to paint a much broader picture of the choices involved in environmental decision making has led to intense interest on the part of coastal and marine planners and managers to understand and apply modern cost benefit techniques. The National Oceanic and Atmospheric Administration has conducted a series of regional environmental workshops for state and local planners and managers, NGOs, and the private sector on methods and techniques of applying environmental valuation to environmental management. NOAA is now actively partnered with Sea Grant institutions, leading environmental and natural resource economists, and NGO's to develop regionally specific Environmental Valuation Guidebooks. These include economic concepts such as tradeoffs and willingness-to-pay, economic tools such as cost benefit analysis and economic impact analysis; valuation tools like travel cost models; and regionally specific case studies such as sediment remediation in the Great Lakes. Regional Handbooks in preparation cover the Great Lakes, South Florida, and New England.

## V: Measurement Strategies and Past Studies: How to formulate the database.

Now that we have discussed the impetus for creating the database for the coastal and ocean economy, it is important to understand the theoretical and intellectual underpinnings for this work. There is, in fact, a great deal of economic information about the ocean and its resources available in myriad public and private databases and in a large amount of literature both peer reviewed and "gray". But this large array suffers from a series of major flaws. Data is inconsistently estimated, utilizes a variety of measures from output to employment to income, and is sometimes constructed using techniques that are controversial among economists and poorly understood by non-economists. A major task of the NOEP will be to develop and apply consistent rules for measuring and describing the economic values associated with the ocean, and then providing the data in a way that users understand both the strengths and limitations of the various approaches.

The core strategy to sorting the data is to use the framework for measuring the economy that underlies the measurement of most economic activity in the U.S.: the National Income and Product Accounts. These accounts measure the total output of goods and services in the economy (gross domestic product), the income earned from producing those goods and services (gross domestic income), and the sales of the individual industries (gross product originating). The NIPA framework provides the consistent set of rules, which help avoid the dangers of counting the same activity twice. NIPA measures both the annual flows of economic activity and changes in the value of assets used by the economy (stocks), and permits measurement of economic activity related to the ocean at both the regional and national level. The result is a "satellite" account of the NIPA that measures the "ocean GDP" of a type increasingly being developed by the U.S. and other countries to focus attention on particular areas of the economy..

The concept of an "ocean GDP" is not new. In 1974, the Bureau of Economic Analysis, the agency responsible for maintaining the National Income and Product Accounts undertook to identify the contribution of the ocean to the Gross National Product (Nathan Associates, 1974). In that study, BEA developed estimates for Gross Product Originating from the ocean using the economic census data for 1972. Two follow-up studies used a similar approach to estimate this value for 1977 and 1987 (Pontecorvo et.al, 1980; Pontecorvo, 1988).

Creating an "ocean GDP" requires that the national data be disaggregated in two ways: by industry and geography. Certain industries, like fisheries or marine construction, are clearly ocean related. Other industries, like tourism, are related to the ocean only by virtue of geographic proximity. The task, therefore, is to identify the interaction of industry and geography that defines the sectors associated with the ocean, then measuring these sectors output and income. Though not formally part of the NIPA data, employment is also of interest and will be included as well. Estimates at both the national and regional (state and county) levels can be derived from existing federal data sets.

The NIPA framework is the foundation for the Project's data collection. It will provide a wealth of critical information about how the national and regional economies are affected by the ocean, about how these effects change over time, and, when linked with other data sets that measure the ocean, how changes in the marine environment affect the economy. But it is not a complete picture, so the NOEP will extend the core NIPA account in several ways. These "extended accounts" will provide additional details on major industry sectors associated with the ocean, about the ocean economy of a number of key states, and the assembly of economic information concerning the ocean that is not accounted for by government or industry (non-market values).

A number of key industries must be studied in significant detail in order to provide the best estimates of activity within the NIPA framework, and these industry studies can then be used as stand-alone products. The industries to be examined include fishing and aquaculture (including commercial fish processing); minerals (oil and gas); tourism/recreation, including beach use and boating; construction (including expenditures on restoration, maintenance, repair and rehabilitation of coastal lands); marine transportation; real estate; ship and boat building; and government.

Interest about the ocean and its economic activities is not confined to the national level. State and local decision makers need to know about ocean related economic values as well, and a number of studies at the this level have been conducted. A recent example is the economic data cited from "California's Ocean Resources: An Agenda for the Future," sponsored by the State of California. Other studies for the state, multi-state, or sub-state level Luger (1993); Colgan and Plumstead, (1993) and Colgan (1990). The NOEP data will update these studies at the state and county levels. Where funding is available, more detailed analysis of individual states will be undertaken, focusing particularly on activities that are best examined at the sub-county level like tourism and recreation and the ocean's effects on real estate values.

Measuring economic activity associated with the ocean through examination of the goods and services produced by specified industries and in coastal locations will provide answers to many of the most commonly asked questions about the ocean economy. But even this data will still be incomplete. Beyond are a variety of "non-market" values, which are needed to complete the picture. When someone goes to the beach in Florida or boats on Chesapeake Bay, there may be little that is directly purchased on that day. But the popularity of such activities is testament to their underlying value. Economists have developed a variety of techniques to measure such values, and a large number of studies have been done throughout the country using these techniques. The Project intends to compile the results of these studies into the ocean economy database to provide researchers with access to the information that has been generated.

The resulting integrated, web-accessible database will provide as comprehensive a picture as possible of the economic values associated with the ocean. It will provide historical data, and because it is estimated as much as possible on a consistent basis, it can be used to compare these values across time and space. But there will still be important limitations. Requirements to maintain confidentiality of data will require that many smaller geographic areas cannot be described in the same level of detail as larger regions. The surveys of industries conducted by the Census Bureau that underlie the national data and which will be used to disaggregate to the industrial and geographic level will have sampling limitations that will require some indirect estimating techniques. The non-market values are estimated using complex techniques that can result in widely varying figures for the same resources.

Therefore a key part of NOEP will be to develop approaches to quality assurance and quality control (QA/QC) for the data. Thorough documentation of sources and estimating techniques available on line as part of the data distribution system will be one key element. The other element will be primers on the techniques and professional review of estimates made by others (particularly the non-market data) that will allow users to better understand what the data is and how it might be used.

In summary, many decisions about the use and conservation of ocean and coastal resources hinge on economic assumptions. Frequently, the arguments revolve around conflicting statements about the real or perceived "value" of the oceans and coastal zone. Despite the magnitude of these arguments and the importance of the decisions, the fact is there is no systematic accounting of the market and non-market values of the marine environment. This work intends to fill that void.

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