
Valuing our National Marine Sanctuaries

August 2003

Peter C. Wiley

National Oceanic and Atmospheric Administration - National Ocean Service
Office of Management and Budget - Special Projects
1305 East West Highway, N/MB72
Silver Spring, Maryland 20910 - USA
Web site: marineeconomics.noaa.gov



Ocean resources have long been an important component of the identity and culture of our country and few would dispute that they have great value. Where there is debate, however, lies in how these resources should be utilized and who should receive the benefits. The designation of a National Marine Sanctuary carries with it a connotation that the area being designated and the resources therein are particularly unique. Valuation of these resources must take into consideration a range of sanctuary-specific issues. Currently, the United States has 13 National Marine sanctuaries; 11 of these are for the conservation of natural resources and two are dedicated to the protection of cultural resources.

The stewardship of these sanctuaries is of national importance, yet involves a broad range of local concerns that affect the valuation process. Additionally, sanctuary management is inherently a complicated process, often involving multiple agencies with overlapping jurisdictions. Management of sanctuary resources is necessarily collaborative in nature, involving all governmental entities with responsibility for sanctuary resources as well as representatives of all groups who have a stake in the process. These may include those who make their living from the resources found in sanctuaries or those in citizen groups whose goal is to protect those resources.

The ways in which these various stakeholders value the resources are as disparate as their reasons for participating in their management. However, the most difficult stakeholder group's value to take into consideration is the U.S. population as a whole. As a national resource, every citizen holds a claim to ownership of sanctuary resources. However, most of the attention is often paid to local stakeholders who use the resource directly.

The organization of this paper is as follows. A brief description of sanctuary resources is provided followed by a discussion of the role of socioeconomic analysis in the management of these resources. The next section is a short primer in valuation, in which the various types of values are explained, followed by a discussion of the link between values and the health of environmental resources. A brief introduction to valuation methodology follows in which some of the more popular valuation techniques are described and the concept of opportunity cost is discussed. Case studies are provided in the next section, in which various applications of resource valuation in the National Marine Sanctuary program are illustrated. The final section describes how sanctuary values must be used to incorporate the preferences of both users and the population as a whole, and the need for a comprehensive set of values to achieve the goal of holistic sanctuary management.

What are Sanctuary Resources?

It once was thought that the vast expanse of oceans were an inexhaustible source of resources that could be harvested without limit, as well as a dumping ground capable of absorbing the waste and refuse produced by the ever growing human population. We have since discovered, at great cost, that this is not the case. The past century has seen devastating oil spills which have caused long-term damage to ecosystems and wildlife as well as the fishing of species to, or near, extinction. Additionally, there has been a pattern of migration toward coastal areas and the Great Lakes region with over half of our population now living within 50 miles of the coast. This trend is expected to continue into this century. A cohesive system of resource management is necessary if human use is to continue in a sustainable manner. While a wide and varied system of regulatory agencies has been put in place for this purpose, the sanctuary program is one of the few that takes a holistic approach to

resource conservation. With a mission that includes biodiversity, ecological integrity and cultural legacy, the sanctuary system inherently faces a more complicated management process that involves a wider variety of stakeholders and other interested parties.

The thirteen National Marine Sanctuaries protect over 18 thousand square miles of ocean and coasts and may be found in U.S. waters in the Atlantic, Pacific and American Samoa. Missions vary across the individual sanctuaries and may include such activities as the protection of humpback whales, coral reef ecosystems, kelp forests, or the preservation of cultural resources, such as the *U.S.S. Monitor*, a Civil War ironclad sunk off the coast of Cape Hatteras, North Carolina. Moreover, the sanctuary system is not merely a regulatory agency that depends upon enforcement as their primary means of protection. The education and outreach component of the sanctuary system has long been a high priority.

The Role of Socioeconomic Analysis

Sanctuary resources are scarce commodities that are coming under increasing pressure from a variety of sources. Users have commercial, recreational and cultural motivations for making use of marine resources. From the perspective of those who manage these resources, none of these users is any more or less important than any other and they require information with which they can balance uses with resource protection. This information may include descriptive information such as who the users are (commercial fishermen, consumptive divers, whale watchers, etc.), the extent of their use (person-days of recreational activity, fishing catch, etc.) and how much of their income, if any, is dependent upon sanctuary resources.

Depending on the particular need, socioeconomic analysis based on a particular issue may also be important. In the course of planning the extent and location of a system of marine protected areas, for example, a lot of attention is paid to the science of what kind of habitats to include, how large the areas must be for viability, and where the areas should be sited. Just as important in this process are the socioeconomic issues. The establishment of marine protected areas will inherently alter the behavior of those who utilize sanctuary resources. Users generally behave in such a way as to maximize their utility, whether that takes the form of profit (for commercial enterprises), recreational benefits, or cultural utility. The role of socioeconomic analysis, in this case, would be to identify who the users are, determine how their



Kayaking in the Channel Islands National Marine Sanctuary (photo: Chris Gotschalk)

behavior will be altered, and estimate the socioeconomic impact of that change. Additionally, the estimation of the benefits derived from the institution of marine protected areas must be accomplished for comparison with the negative impacts, whether that takes the form of a formal cost-benefit analysis, or a less formal, but more extensive, socioeconomic analysis.

While marine reserves are a significant management action, any action taken by sanctuary

management has the potential for a socioeconomic impact, be it positive or negative. It is vital that these socioeconomic issues be explored not only for regulatory and/or legal reasons, but because human interaction with the resources are an integral part of the greater system, which the sanctuary program must manage. To do that, they must be as fully informed as possible concerning socioeconomic issues.

The approach of using socioeconomic information to give all stakeholders fair representation in the process of designing management strategies and regulations contribute to the goal of fostering cooperative management processes. Cooperative management processes can help lower transaction costs (e.g., administrative hearings and court proceedings) and enforcement compliance costs.

Finally, sanctuary management has been designed to be a partnership between sanctuary stakeholders (users and others who are interested in the well being of sanctuary resources) and sanctuary staff. How important these sanctuary resources are to each of these stakeholders, e.g. their value, is a critical component to the common frame of reference held by those who must work together to manage sanctuary resources.

Valuation – A Short Primer

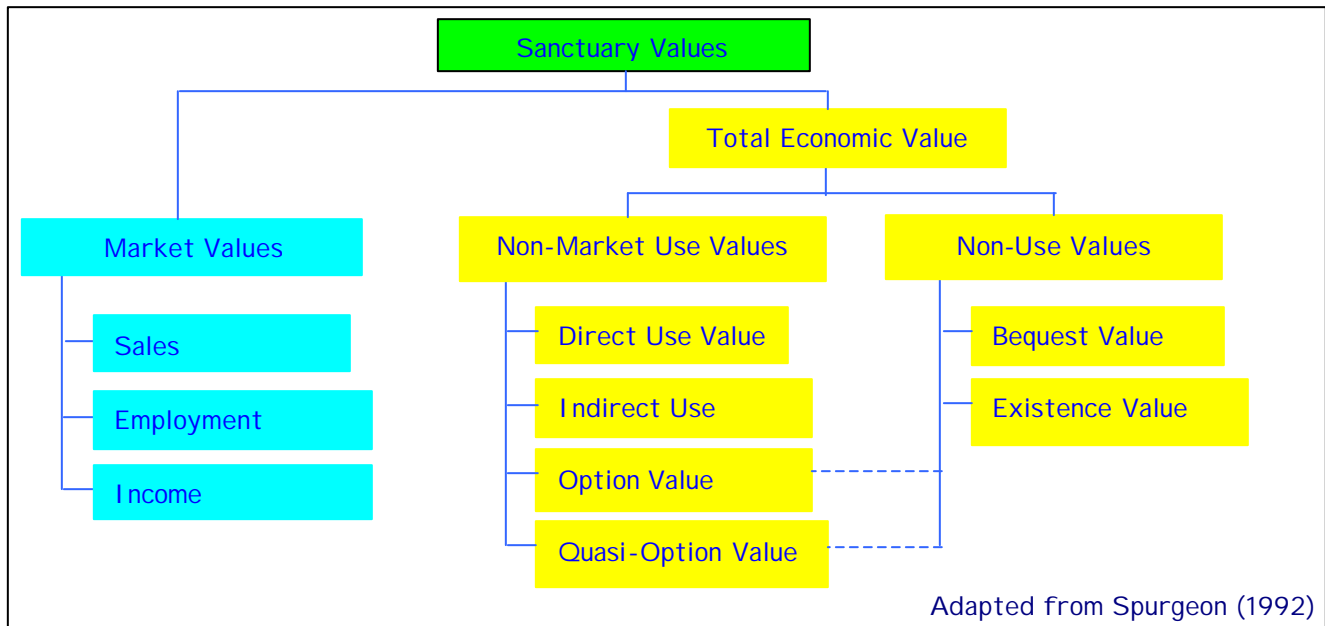
There is a lot of art to the science of natural resource valuation. While there are many guides to economic valuation, the truth of the matter is that every situation is different. One of the most important choices to be made at the outset of any valuation effort is whose values are to be measured. This involves not only geographic extent, but also whether this group of people are users of the resource. This is a critical first step based on which other choices will be made concerning the method of valuation to be employed. It is also important to consider whether market values, non-market values, or both are needed. See below for a description of value categories.

Unless the valuation effort is strategic in nature, one needs to examine the issue at hand in order to make these decisions. If the process involves a management action, the identification of those who are affected will indicate the appropriate type of valuation and the methodology required to measure the value. One could make the argument that any action taken by management will ultimately result in a change in value to the entire population of people who hold a value for the resource. Practically, however, budgetary and time requirements often necessitate the need to pare down the valuation effort.

It is often the case that valuation is limited to what is required by a typical cost benefit analysis, that is, the non-market use values of users of the resource (see left column of the yellow section in Figure 1 below). However, sanctuary resources are national in nature, so it is appropriate to consider the population as a whole when considering sanctuary values. This inexorably leads to the inclusion of those who are not users of the resource but still value the resource through appreciation of its existence, or a desire for it to be available for future generations. These value categories may be seen in the right column of the yellow section in Figure 1 below.

There are also two categories of values that fall somewhere in between use and non-use values. Option value is the value one may hold of having knowledge that the resource will be available for use sometime in the future and is characterized by uncertainty about both future demand and supply. The willingness-to-pay an amount

Figure 1. The Taxonomy of Sanctuary Values



to ensure future supply is commonly likened to taking out an insurance policy. Quasi-option value involves the possibility that the resource will be the source of information in the future that will result in a positive value. An example of this is a scientific discovery, based on the make-up of marine flora or fauna that results in a cure for a disease.

What are not included in the cost-benefit analysis framework are market values. Issues surrounding the National Marine Sanctuary Program generally involve the potential for impacts to those who make their living from the use of the resource or those who spend money that goes to businesses that rely on the presence and availability of the resource to these users. For these reasons, market impacts are generally an economic measure that receives a significant and, some might say, disproportionate share of the attention. The visage of the potential for the loss of income and jobs is one that is both politically significant and central to those who are at risk for incurring these losses. A more extensive discussion of this issue may be found below using recreational use as an example.

Market Values. Market values are derived from two fundamental concepts: demand, made up of the number of trips or person days users take, and economic impact, which is the amount of money that is spent in a local economy after the “ripple effects” have occurred. When an influx of spending occurs in an economy (direct effect), residents of that economy benefit by more than just the spending on the goods and services purchased. The reason for this is that the businesses serving these users must increase the amount of labor, goods, and services they buy in order to produce the additional goods and services (indirect effect). Thus, the businesses that have increased spending will have a “ripple effect” on the other businesses that supply them, and those businesses, in turn, affect others down the supply chain. Additionally, employees of these businesses will also spend money from the added income from the influx of spending (induced effect).

Non-Market Values. Non-market values can be difficult to explain to those who do not use this concept regularly. When goods and services are purchased in markets, the prices of those goods are stated explicitly and the price is set by the dynamics involved in the demand and supply of those goods and services. For many natural resources, there is no market in which the price, or value, of these goods is determined. For example, when users of a resource go on a scuba diving trip, there is no cashier taking their money as they enter the water. There can be costs associated with this use, however. Users of natural resources often have to travel to where the resources are located and rent or purchase equipment. Additionally, while they are on site, they have to lodge and dine. Economists use these costs as a proxy for price and through one of several analytical methods, derive the net value of the resource.

There are also several techniques by which these values are elicited through surveys during which respondents are asked directly what they would be willing to pay for certain marginal changes in attributes. Economists can use these responses to construct a demand curve, with which they can determine the value of the resource. This method is more popularly used for determining non-use values.

The Link Between Environmental Quality and Resource Values

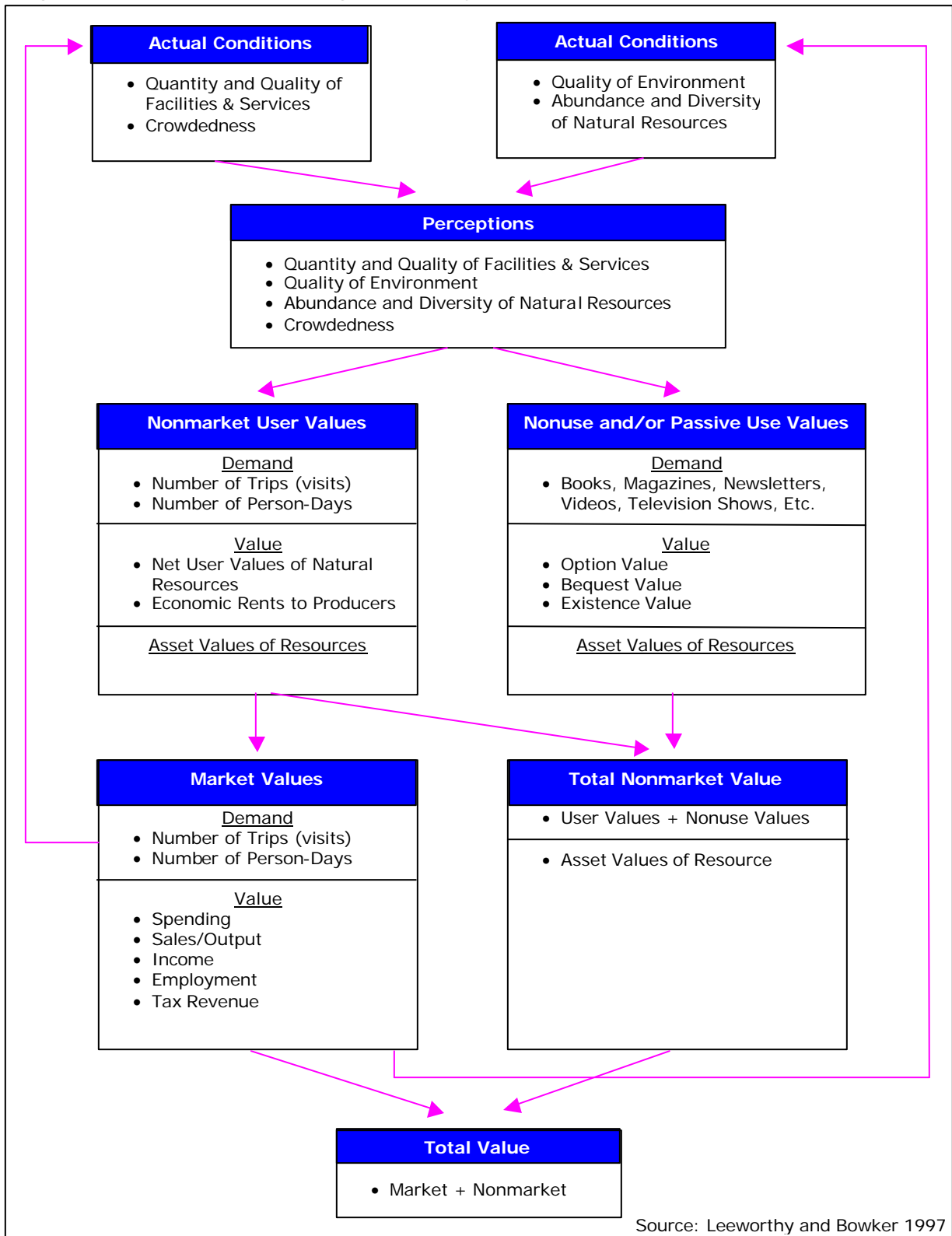
The manner in which people perceive sanctuary resources and how that perception is translated into values is a very complicated transformation that depends on many factors. Among the most important of these is the socioeconomic characteristics of the users whose values are being estimated. A user who is knowledgeable about coral reef ecosystems and has a broad experience in visiting areas where these ecosystems exist, will have very different perceptions from one who is visiting this type of environment for the first time (Leeworthy and Bowker 1997).

The link between natural resources and their values is shown in the conceptual model depicted in Figure 2 (source: Leeworthy and Bowker 1997). As can be seen, the actual conditions of amenities, attributes, and environmental quality, give rise to perceptions of these conditions. These perceptions result in a certain level of demand for the resource with which valuation estimates can be calculated. Demand for the resource will take the form of visits to the resource by users. For non-users, the demand will take the form of the manner in which they obtain knowledge and appreciation for the resource (e.g. books, magazines, television, etc.).

One way to translate changes in environmental quality into valuation effects is to use the concept of the value elasticity of environmental quality. Stated briefly, this is the percentage change in value resulting from a percentage change in environmental quality (Wiley and Leeworthy 1999, Leeworthy and Wiley 2003). This elasticity can be calculated with any study that includes in its results changes in environmental quality and changes in value. Examples are Bockstael, et. al. (1987) and Freeman (1995). To apply this parameter, one simply multiplies the percentage change in environmental quality by the elasticity parameter estimate.

Other important conclusions presented in Leeworthy and Bowker (1997) are that, in the long-term, values will decline if environmental quality declines. The fact that this is a long-term relationship is critical in that values are generally not a good leading indicator of environmental quality. The reason for this is that there is a lag between when environmental degradation takes place and when valuation catches up with change in environmental quality. In other words, there is a lag between when the

Figure 2. Conceptual Model Linking the Economy and Environment



change in the quality of the environment occurs and when users perceive this change. This can present an opportunity in that cash flow to businesses and government will remain high during this lag and may be used to invest in strategies to stem the trend toward environmental degradation. Another potential reason that values are a poor indicator of resource health is that there can be a short-term gain in economic values if natural capital is sacrificed.

Methods of Valuation

The following discussion should serve as a brief introduction to some of the more popular techniques available. It is not meant as an exhaustive list of available valuation techniques, nor is it a complete explanation of any one technique.

Travel Cost Method. The travel cost method (TCM) is a very popular technique with which researchers can examine a good or service that is not traded in any market (i.e. SCUBA diving) and estimate its value based on the behavior of the individual (how much the users spends on site, how long they have to travel to get to the site, etc). This method is limited in that it can only be used in the estimation of value associated with recreational use. In

general terms, this method employs a series of variables to estimate the demand, as measured in trips or visits, for the recreational experience being estimated. With this "demand curve" the per-person-per-day value is derived, then aggregated to the population of users. Although there are several approaches that may be employed in estimating use values through the travel cost method (e.g. the zonal approach and the individual travel cost method), the fact that travel and on-site costs are used as a proxy for price and the estimation of a demand model with which value is derived is common to all.



Data for the TCM is collected in a survey of users as they are leaving the site (exit surveys). Data collected as part of the survey include detailed information about how far the respondent traveled to get to the site, what mode of travel they employed, and how much they spent on lodging, dining, equipment, entrance fees, etc. Additional information required to estimate the demand curve includes demographic data such as gender, age, race/ethnicity, and income, as well as experience at the site. Along with the travel cost variables, these variables are used in a statistical procedure to estimate the demand for the resource.

A significant subject of debate is how/whether to account for the opportunity cost of time. The debate revolves around the potential for the respondent to be working for additional wages during the time he or she is at the site or in transit to the site. Although it has been shown that the inclusion of these costs may be appropriate, it is not assured that respondents are necessarily giving up wages to go on the trip, or what, precisely, the tradeoff in utility would be between work and recreation (Freeman 1993). Some researchers have avoided the practice of including loss of

income as a cost of being on the trip and opt for using whether or not wages were foregone as an explanatory variable (a variable used to explain the level of demand) (Leeworthy and Bowker, 1997).

The Contingent Valuation Method. The Contingent Valuation Method (CVM) is a survey methodology, which entails describing to the respondent the set of environmental attributes relevant to the resource being valued. The survey then obtains bids either by asking the respondent whether or not he/she would be willing-to-pay (WTP) for specified beneficial changes in the attributes or what he/she would be willing-to-accept (WTA) for a specified degradation of the attributes (Mitchell and Carson, 1989). In other words a hypothetical market is established for the resource in which transactions can be made for a set of resource attributes, by the bidding process. Once this step is complete, the mean WTP or WTA (for open-ended surveys) is calculated, and the data is aggregated from sample to population. (Hanley, et. al. 1997).

Much of the controversy surrounding the CVM is related to the potential for *bias*. Bias is the systematic over- or under-estimation of values based on specific problems with



the description of the attributes or of the way the survey is conducted (Hanley, et. al., 1997). This bias may stem from the fact that the respondent knows that the questions are hypothetical, or that the attributes being valued were not described accurately enough. Respondents may also respond differently based on the vehicle of payment (e.g. writing a check or paying the amount in a tax or an entrance fee). There are a number of potential sources for bias, which may or may not be significant depending on the survey instrument or the resource being studied.

Economists have developed survey design and analytic methods to avoid these biases (Mitchell and Carson, 1989)

The Hedonic Price Method. This method relies on the assumption that the value of certain non-market goods or services will be imbedded in the price of something (usually real estate) that is traded in a market. For example, given two houses of identical size and attributes, one being adjacent to a National Marine Sanctuary and the other being one hundred miles away, the difference in price could be construed as being a willingness to pay for the sanctuary attributes. This method has several inherent difficulties. One is that environmental attributes may not have a significant effect on housing prices. Additionally, there are many attributes both environmental and otherwise, which have an effect on the price of a house. Controlling for the entire breadth of attributes while singling out one particular attribute (e.g. proximity to an amenity) can be problematic at best (Letson, 2002).

Benefits Transfer. In many instances, there will be insufficient time or funding to perform a study at a particular site. A potential solution to this challenge is the use of a benefits transfer. Benefits transfer is the practice of using valuation estimates



Commercial Fishers on a Trawler in the Gary E Studds Stellwagen Bank National Marine Sanctuary

from a previous study in which the attributes and the users of the subject site are similar. Benefits transfer applications can be placed into two main categories (Letson, 2002). The first includes those in which the results from a previous study are aggregated based on the usage of the current site, with adjustments for differences in the current site and the site for which the estimate was originally calculated. The second type of benefits transfer involves applying the model from the original study to the new site.

Although there has been much research performed and many papers written on the subject, the profession is still not in agreement on a standard set of protocols for the application of benefits transfer. Several researchers have presented sets of protocols and procedures, but they are not generally accepted. There are several issues, such as transferring values of functions and calibration (adjusting for various methods – direction and scale of adjustment coming from meta analyses) for which there is no consensus. Ultimately, professional judgment is what is relied on in making the decisions necessary to apply this technique.

Opportunity Cost

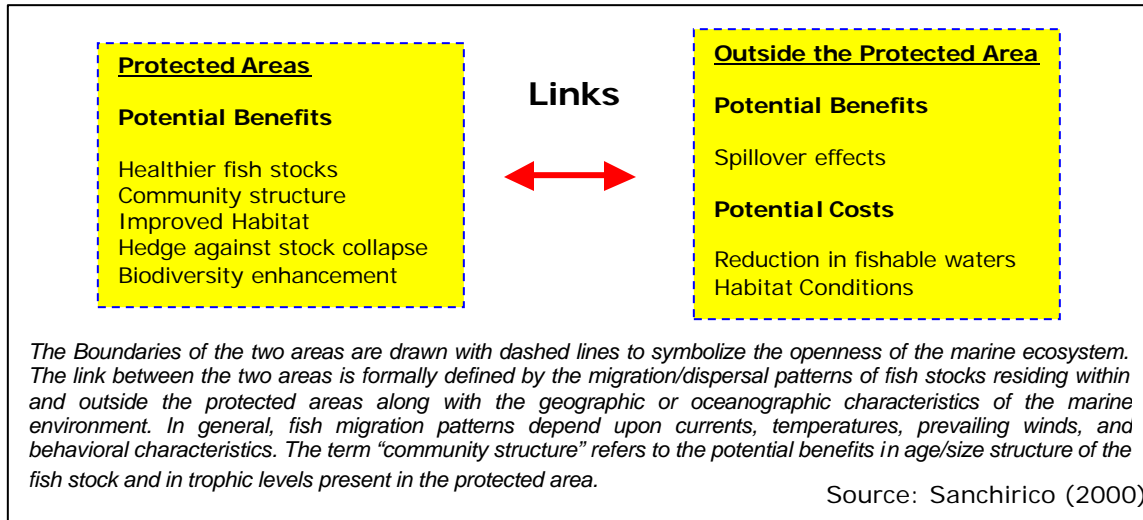
Another way to look at the value of sanctuary resources is through the concept of opportunity costs. The opportunity cost of using a resource in a certain way is the value of the next most preferred use. Opportunity costs exist only in situations where there is a scarcity of the resource (i.e. not enough of the resource to accommodate all of the existing demands). There are certain tradeoffs between alternative uses of the resource that may not be conducive to sustainable resource use. Certain uses of the resource may result in degradation of the resource, which has the potential to eliminate the possibility of other uses. For example, if consumptive uses either degrade the environmental quality of an area or result in a decrease in the amount or diversity of wildlife, there is a resultant opportunity cost accrued to those who would use the resource in non-consumptive or in sustainable consumptive ways.

The Uses of Valuation in National Marine Sanctuaries

As mentioned above, any sanctuary management action has socioeconomic implications. There are several applications that require specific valuation estimates to address socioeconomic issues. However, because the management of National Marine Sanctuaries inherently involves searching for a balance between conservation of resources and human uses, socioeconomic information is a necessary tool needed by management, independent of any specific management action.

The following section provides a description of three applications that require valuation estimates to address socioeconomic issues: marine protected areas, damage assessment, and socioeconomic monitoring. Additionally, a case study is provided for each application.

Figure 3. Potential Ecological/Biological Benefits and Costs of Marine Protected Areas

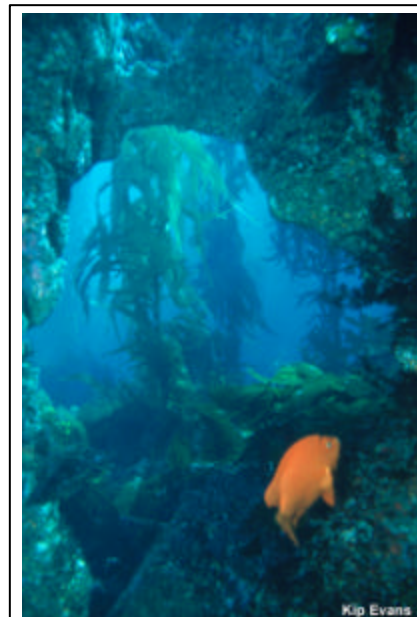


Marine Protected Areas (MPAs)

The term "marine protected areas" is in wide use and means different things to different people. Here the term is used to mean specially protected areas within National Marine Sanctuary boundaries. Marine reserves (e.g. in the Channel Islands National Marine Sanctuary) and ecological reserves (e.g. in the Florida Keys National Marine Sanctuary) are both examples of MPAs. With regard to values, the benefits and costs of MPAs are based on biophysical changes and behavioral responses to those changes (Sanchirico and Wilen 2001). Additionally, the distinction between benefits and costs inside and outside the protected areas and their respective linkages is a critical factor to consider (see Figure 3, above). The success or failure of the MPAs will depend both on the ecosystem and on the human behavioral response to their creation.

The planning and institution of MPAs is inherently complicated and controversial. There are myriad individuals and groups who have a vested interest in the issue, either by the mission of their organization, through personal beliefs concerning the environment or an activity, or by a financial stake in a business that relies on sanctuary resources. While there is a great deal of opportunity to find common ground, there will often be positions that are diametrically opposed on fundamental issues. In these instances it is a challenge to reach agreements, and the better informed the stakeholders are with regards to the issues at hand, the more able they will be to negotiate from a position of common ground.

The Channel Islands National Marine Sanctuary (CINMS). Beginning in July 1999 a joint project was initiated between the CINMS and the California



A garibaldi in the Kelp Forests of the subtidal zone in the Channel Islands National Marine Sanctuary

Department of Fish and Game to consider MPAs in the Channel Islands National Marine Sanctuary. This process stemmed from a shared concern for protecting and sustaining Channel Islands marine resources and overlapping and complimentary jurisdictions. The Channel Islands National Marine Sanctuary Advisory Council (SAC) created the Marine Reserve Working Group (MRWG) to engage additional experts and community members. Two advisory bodies were formed for the MRWG, a science panel and a socioeconomic panel.

The goal of the socioeconomic panel was to advise the MRWG on any issues requiring socioeconomic information or analysis. This included developing a socioeconomic overview of the surrounding study area (neighboring counties with the potential for socioeconomic impact from the MPAs) as it relates to marine related industries and activities, and the collection of data to determine the types and levels of activity that are reliant on sanctuary resources. Other goals included the estimation of socioeconomic impacts of proposed MPA boundaries, working with the stakeholders by performing analyses of interim MPA boundary proposals, and presenting the results of interim and final MPA boundary alternatives (see Leeworthy and Wiley 2003).

The ability of the socioeconomic team to ensure comprehensive access to socioeconomic impact information is critical to building a constructive relationship between stakeholders. Each party must feel that they have the ability to make known the consequences of any proposed MPA boundary for the purposes of a fully informed debate, to report back to their constituents, and to reach an agreement on a final boundary alternative.

Damage Assessment and Restoration

Another area in which valuation estimates are a critical component is the process of damage assessments. When damage to sanctuary resources occurs, an estimate of the monetary value of that damage is needed. Because of the unforeseen nature of damages to sanctuary resources and the inability to conduct a study every time a damage takes place, the availability of strategic valuation estimates is a critical component to the assessment of damages. There has been some discussion on whether a comprehensive system of sanctuary values would be a prudent component of a sanctuary-wide monitoring system. Using benefits transfer (see description, above), however, is often (but not always) an adequate substitute.

The R/V Columbus Iselin Grounding. An example of a damage assessment case in which benefits transfer was used successfully is the grounding of the *Columbus Iselin* in Looe Key Reef in the Looe Key National Marine Sanctuary (now part of the Florida Keys National Marine Sanctuary). This grounding resulted in loss of recreational use of the damaged portion of the reef by SCUBA divers and snorkelers, the value of which was presented in Meade (1996). In this assessment, the author did not measure educational, scientific, or historic value, nor was the value of reduced nursery habitat for recreational fish/shellfish measured. More significantly, passive



use values, which the authors describe as very likely high, were also not measured. "The Florida Keys contain the only tropical coral reef ecosystem in the continental US and third largest barrier reef system in the world." (Meade 1996). As a result of this, Meade characterizes this analysis as an understatement of the actual economic damages.

The loss of use value to divers and snorkelers was calculated as follows. The value per dive trip (taken from Leeworthy (1991)) was multiplied by the annual number of dive trips for each year of loss (based on a recovery period of 30 years). This product was multiplied by the percentage of the reef still damaged for that particular year¹ and by a discount factor². This product for each year was then summed over the entire recovery period to arrive at a total estimated value of lost use damages. In calculating annual losses throughout the recovery period, the extent of partial recovery occurring during each year was explicitly incorporated into the calculations. The estimate of lost use-damages to recreational diving resulting from injuries caused by the *Columbus Iselin* grounding is \$746,397 (Meade 1996 and Penn 2003).

This case makes clear how having existing studies of sanctuary resource values in place is critical for ongoing sanctuary management. If the Leeworthy study had not been in place, conducting the study for the purpose of assessing the loss value of this single incident would have been unwarranted on the basis of the relative magnitude of the damages compared with the cost of doing an original study. Additionally, because there was no passive use value study in place for this type of resource, the collection of damages for this category of values was not attempted.

Monetary damages recovered from responsible parties is used to restore or replace damaged resources. When damages are underestimated there will be a corresponding under-investment in restoration. The resulting loss in natural capital will lead to not only losses to individuals, but also the local economies, which depend on the flow of services from the natural resources.

Socioeconomic Monitoring

As management actions are put in place, it is important to gauge their effectiveness in terms of their goals and objectives. A necessary element of this is to measure the socioeconomic impact of the actions, both positive and negative. In order to do this, one needs to collect data on usage and how it changes over time; but of equal importance, one needs to have up-to-date parameters with which the usage estimates can be translated into impacts. Although valuation studies can be carried out as part of a socioeconomic monitoring program, this is one more example of the advantage of strategic socioeconomic research, the results of which may be used for a variety of applications.

The Florida Keys National Marine Sanctuary(FKNMS) Socioeconomic Monitoring Program. This program, begun in 1998, was designed to complement the sanctuary's ecological monitoring program. The primary goal of socioeconomic monitoring is to

¹ This was calculated with the following formula. $A(1-K_t)$, where A is the proportion of the total coral reef area of FKNMS injured by the grounding in 1994, and K_t is the cumulative percentage of the original injury recovered by year t.

² The discount factor puts damages incurred in future years into present value (baseline 1996) terms. The standard discounting factor for adjusting losses incurred in each future year, t, to obtain the 1996 equivalent is: $y_t = 1/(1+r)^{t-1996}$ where r is the discount rate of 3.00% (Meade 1996).

detect and document resultant changes in sanctuary resource utilization patterns and their impact on market and nonmarket economic values of sanctuary resources. While the monitoring effort is designed to encompass all aspects of sanctuary management, the socioeconomic component pays particular attention to the 23 no-take areas (Sanctuary Preservation Areas (SPAs) and Ecological Reserves (ERs)) in the sanctuary. The program currently includes commercial fishing and recreational activities (see <http://marineeconomics.noaa.gov>).

Sanctuary Management and Values

In balancing the many demands on sanctuary resources, sanctuary management must be fully informed as to the nature of the various interests in sanctuary resources. But possessing information is not enough. In the process of fashioning and assessing the direction of sanctuary management, it is often the most visible stakeholders who receive the majority of the attention.

Consider the three case studies in the "Use of Valuation in National Marine Sanctuaries" section of this paper. In each of these examples it was the direct users of the resource on whom data was collected and assessments were performed. This did not happen by accident. In the political climate that is the prevalent framework in which sanctuary management takes place, those who have the potential for negative impacts are often the loudest voices among the din. The fact is that sanctuary values are a *national* resource. Those who use the resource have no more right to expect the continued use of the resource than one who is not a direct user of the resource and wants that resource to be conserved. The users of the resource, on an individual basis, will tend to have a higher value for the resource than non-users, but it is in the aggregation of the values of non-users that this category of values realizes its magnitude. This force is diminished when the medium for expressing opinions is a meeting at which a stakeholder must attend to be heard.

While it is important that sanctuary management keep in mind who they are working for, it is also necessary that researchers remain objective. This is not always as easy as it sounds. Because researchers must often gain the trust of, and work closely with, various stakeholders, they often develop a close working relationship. This relationship can often lead to attributes of advocacy that are not appropriate within the framework of objective research. It is only by operating in a completely objective fashion that a researcher can escape from the perception that they are acting as advocates for any stakeholder group.

To achieve the goals of a holistic view of sanctuary management and researcher objectivity, a comprehensive set of values is called for. Complete information – or as close to that as is feasible – considerably reduces the potential for bias.

An illustration of this might be a comparison between strategic research and research geared toward the establishment of MPAs. In the latter case, sanctuary management does not experience pressure from stakeholders. They are thus open to the idea of obtaining valuation estimates that reflect the complete set of sanctuary values. Researchers are not working under the specter of a management action that may harm the subjects of their research. The result is likely to be a more open exchange of information and a reduced chance for the perception of advocacy. The end result is a more fully informed sanctuary program that is better able to manage sanctuary resources.

References

- Bockstael, N.E., K.E. McConnell and I.E. Strand, 1987. *Benefits from Improvements in Chesapeake Bay Water Quality* (Volume II of *Benefit Analysis using Indirect or Imputed Market Methods*). EPA Contract No. CR-811043-01-0. University of Maryland, College Park. 160 pp.
- English, D.B.K., W. Kriesel, V.R. Leeworthy, and P.C. Wiley, 1996. *Economic Contribution of Recreating Visitors to the Florida Keys/Key West*. National Oceanic and Atmospheric Administration: Silver Spring, MD, Southern Forest Research Station U.S. Department of Agriculture – Forest Service: Athens, GA, and University of Georgia: Athens, GA. 22 pp.
- Freeman III, A. Myrick, 1993. *The Measurement of Environmental and Resource Values: Theory and Methods*. Washington, DC: Resources for the Future.
- Freeman III, A. Myrick, 1995. "The Benefits of Water Quality Improvements for Marine Recreation: A Review of the Empirical Evidence." *Marine Economics*. Volume 10. pp. 385-406
- Hanley, N., J.F. Shogren, B. White, 1997. *Environmental Economics in Theory and Practice*. Oxford University Press: New York. 464 pp.
- Leeworthy, V.R., 1991. *Recreational Use Value for John Pennekamp Coral Reef State Park and Key Largo National Marine Sanctuary*. Office of Oceanography and Marine Assessment, National Oceanic and Atmospheric Administration.
- Leeworthy, V.R., and J.M. Bowker, 1997. *Nonmarket Economic User Values of the Florida Keys/Key West*. National Oceanic and Atmospheric Administration: Silver Spring, MD and Southern Forest Research Station U.S. Department of Agriculture – Forest Service: Athens, GA. 41 pp.
- Leeworthy, V.R. and P.C. Wiley, 2003. *Socioeconomic Impact Analysis of Marine Reserve Alternatives for the Channel Islands National Marine Sanctuary*. National Oceanic and Atmospheric Administration, National Ocean Service, Special Projects. 118 pp. plus Appendices.
- Letson, D., 2002. "Methods of Economic Analysis" *Florida Coastal Environmental Resources: A Guide to Economic Valuation and Impact Analysis*. D. Letson and J.W. Milon, Editors. NOAA Grant #NA16RG-2195. National Sea Grant College Program. 229 pp.
- Meade, N., 1996. *R/V Columbus Iselin Grounding – Lost Use Damages, Looe Key Reef, Looe Key National Marine Sanctuary*. National Oceanic and Atmospheric Administration, Damage Assessment Center: Silver Spring, MD. 12 pp.
- Mitchell, R.C. and R.T. Carson, 1989. *Using Surveys to Value Public Goods: The Contingent Valuation Method*. Washington, DC: Resources for the Future. 463 pp.
- Penn, T., 2003. Personal Communication.

Sanchirico, J., 2000. "Marine Protected Areas: Can They Revitalize our Nation's Fisheries?" *Resources*, Issue 140, Summer 2000. pp. 6-9, Resources for the Future: Washington, DC.

Sanchirico, J. and J.E. Wilen, 2001. "A Bioeconomic Model of Marine Reserve Creation" *Journal of Environmental Economics and Management*. 42(3). pp. 257-276.

Wiley, P.C. and V.R. Leeworthy, 1999. *A Cost-Benefit Analysis for a Proposed Wastewater Treatment Plant in the Florida Keys*. National Oceanic and Atmospheric Administration: Silver Spring, MD. 23 pp.