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Recreational, Cultural and Aesthetic Services from Estuarine and Coastal Ecosystems

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Summary

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Keywords: Aesthetic Values, Coastal Recreation, Coral Reefs, Cultural Values, Ecosystem Services Valuation, Ecosystem Services, Estuarine Ecosystems, Marine Protected Areas, Non-market Valuation, Non-use Values, Passive Values, Recreational Fishing, Small Island Developing States, Spiritual and Religious Values

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KEYWORDS: aesthetic values, coastal recreation, coral reefs, cultural values, ecosystem services valuation, ecosystem services, estuarine ecosystems, marine protected areas, non-market valuation, non-use values, passive values, recreational fishing, small island developing states, spiritual and religious values.

ABSTRACT: The role of economic analysis in guiding the sustainable development of estuarine and coastal ecosystems is investigated based on a comprehensive review of the literature on the valuation of the recreation, cultural and aesthetic services. The implications of the findings for the sustainable management of coral reefs, Marine Protected Areas, and Small Island Developing States are discussed. Finally, the potential of meta-analytical benefit transfer and scaling up of values at various aggregation levels is demonstrated in the context of coastal tourism and recreation in Europe. The results of the study support the conclusion that the non-material values provided by coastal and estuarine ecosystems in terms of recreational, cultural and aesthetic services represent a substantial component of human well-being.

1 Introduction

Coastal and estuarine ecosystems deliver a wide range of goods and services, many of which provide material benefits such as food supply, regulation of water quality processes, storm protection, and carbon storage. An important component of the flow of services from coastal ecosystems to human beneficiaries, however, takes place as benefits that are of a non-material nature and that affect people in their spiritual, social, and cultural dimension. By supporting recreational activities, delivering spiritual and religious values, and providing aesthetic beauty, coastal and estuarine ecosystems are believed to substantially contribute to the well-being of both coastal and inland inhabitants.

Though challenged by the diversity of experiences that are related to the enjoyment of non-material benefits and by the public nature of many of such services, the valuation of their impacts on human well-being is crucial to establish equitable trade-offs among services and to determine sustainable development strategies for coastal and estuarine ecosystems. It is in fact increasingly acknowledged that the failure to account for the full range of ecosystem values may lead to excessive deterioration or overexploitation of many environmental resources (MA 2005).

Over the years, a range of techniques has been developed with the aim of capturing the value of environmental resources from a utilitarian perspective, i.e., as the result of an interaction between humans and the environmental resource that is the object of the valuation. Valuation methodologies aimed at the assessment of goods and services that are not subject to market transactions because they are not rival or excludable – such as non-material services – have undergone a steady evolution and refinement in the past four decades and it is generally acknowledged that a range of sound methodologies for the valuation of the various aspects of non-market benefits

in monetary terms is nowadays available to the investigator. A constantly enlarging bulk of valuation studies and guidelines of best-practice exists upon which the reliability of new value estimates can be assessed.

In this paper we discuss the role of economic analysis in guiding the sustainable development of estuarine and coastal ecosystems and review the vast literature on the valuation of the recreation, cultural and aesthetic services that such ecosystems provide. The first objective is to present a comprehensive summary of the valuation literature by describing and discussing what we believe to be the largest collection of recreational, cultural and aesthetic valuation studies of coastal and estuarine ecosystems thus far. Second, we examine the implications of the findings of primary valuation studies for the sustainable management of coastal and estuarine ecosystems from the perspective of recreation, cultural and aesthetic services. Third, we discuss how benefit transfer and scaling up techniques can be implemented to estimate the aggregated values of coastal and estuarine ecosystems at large geographical scales.

The organization of the remainder of this paper is as follows. In Section 2 the conceptual framework that underlies our classification of the recreational, cultural and aesthetic benefits of coastal ecosystems is described. Section 3 introduces the methodological instruments that are used by economists to derive the monetary estimates of the values of ecosystem services. Section 4 gives an overview of the empirical evidence from an ecosystem service perspective, providing an in-depth analysis of the values of estuarine and coastal ecosystems for recreational fishing (Section 4.1), non-consumptive recreation (Section 4.2), and cultural and aesthetic services (Section 4.3). Section 5 discusses the empirical evidence and policy implications of economic valuation studies from a management perspective, within the context of coral reefs ecosystems (Section 5.1), Marine Protected Areas (Section

5.2), and Small Island Developing States (SIDS) (Section 5.3). Section 6 discusses the potential of the combination of datasets on primary valuation studies with a scaling-up value transfer methodology, and presents an application to coastal recreation in Europe by means of meta-analysis. Section 7 concludes.

2 A Framework for the Classification of Recreational, Cultural and Aesthetic Ecosystem Services

In this paper we largely rely on the Millennium Ecosystem Assessment (MA 2005) conceptual classification of ecosystem services. In this framework, ecosystems are regarded as important steering forces of human well-being insofar as they provide a wide range of goods and services to humans. The paradigm that underlies this welfare approach, and adopted in this paper, is that of the anthropocentric value perspective where ecosystems, and their provision of goods and services, are determined by the consumption opportunities that these provide to humans (see (Nunes and van den Bergh 2001)).

According to the MA conceptual framework, ecosystem goods and services can be classified into four main categories. They refer to: supporting, provisioning, regulating and cultural services. Supporting services are generally understood as the fundamental structural characteristics that underlie ecosystem's functionality in terms of their capacity to provide goods and services to humanity. Important illustrations of these services refer to nutrient cycling, soil formation and primary production. Provisioning services refer to the extraction, or consumption, of products such as food, water, fiber, and fuelwood from ecosystems. The benefits obtained from the self-regulation of ecosystem processes – for example climate regulation, disease regulation, storm and flood protection, and water purification – are identified as regulating services. The fourth group of ecosystem services described in the MA is

the category of cultural services. This refers to both consumptive and non-consumptive values, such as hunting/fishing and landscape/aesthetic values. Furthermore, cultural values may also embed benefits that do not necessarily need the consumption of, or personal experience with, the ecosystem under consideration. The economic literature refers to these as non-use, or passive, values. They represent the value that people ascribe to the knowledge that a certain ecosystem exists (“existence value”) and/or is kept protected so that future generations may also enjoy it (“bequest value”).

The present paper shall subscribe to the MA conceptual framework and proposes to study and discuss the recreational, cultural and aesthetic services provided by estuarine and coastal ecosystems accordingly – see Figure 1.

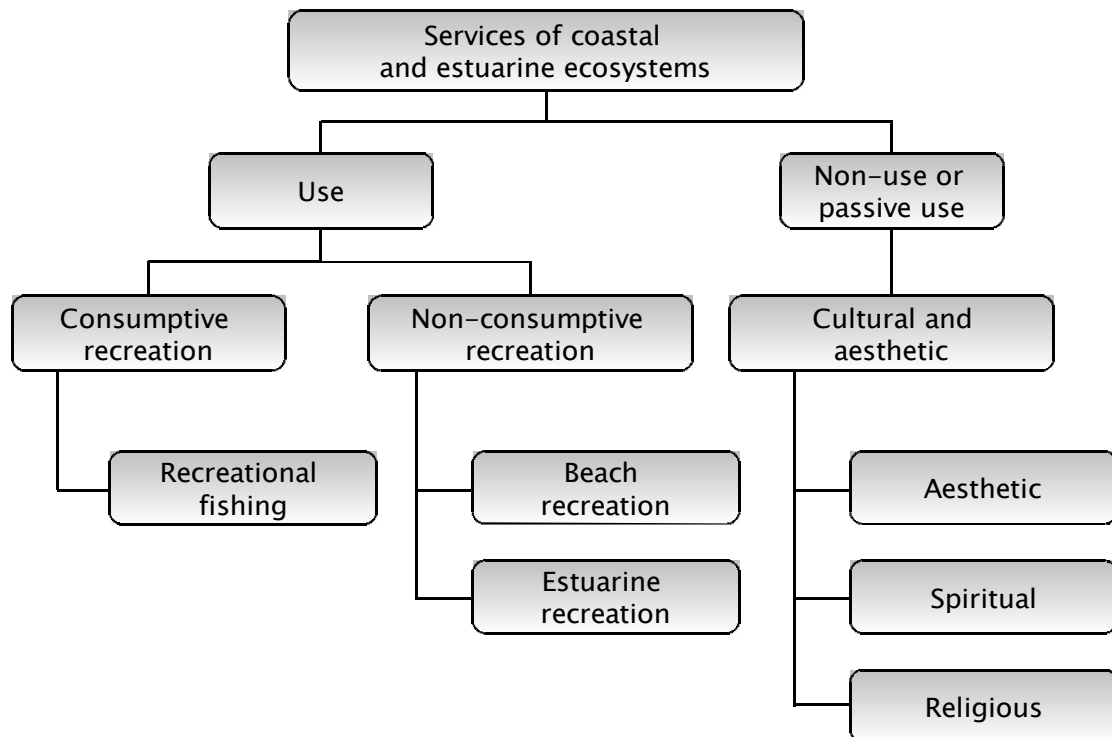


Figure 1. Recreation, cultural and aesthetic services

The two main value components identified in Figure 1 are recreational, on one hand, and cultural and aesthetic, on the other. Recreational values, in turn, can be further classified into consumptive and non-consumptive use. Like the name suggests, consumptive values refer to benefits derived from the consumption of the resource. Recreational fishing and hunting are the main examples of this category. Alternatively, non-consumptive use values refer to recreational benefits that do not involve a reduction of the stock of the ecosystem services and include benefits such as the ones derived from swimming, diving, boating, snorkeling, sunbathing and wildlife watching (Vaske et al. 1982). Finally, cultural/aesthetic values are here defined in terms of their non-use value component (and therefore not require a direct experience with the ecosystem or extraction of the ecosystem goods and services) and embed spiritual and religious values in addition to aesthetic ones. The classification of services presented in Figure 1 is also of pragmatic value and shall provide guidance to the reader through the remaining sections of this paper. Before, however, we shall present and discuss the wide range of economic valuation tools available to the economist in an assessment of the magnitude of the benefits derived from recreational, cultural and aesthetic services.

3 Methods for the Valuation of Ecosystem Services

The economic valuation of ecosystem services can proceed in different ways: using market price information or eliciting consumer's preferences through a wide range of non-market valuation methods. Market prices and costs can provide estimates of the increase in the value of commercial activities, the value of revenues from tourism activities related to visits to natural areas, and the value of contracts signed by firms and governmental agencies, also known as bioprospecting contracts. In many cases, however, ecosystem services do not affect markets and market data are

not available to value them. In such cases methods have been developed to derive consumers' preferences. They are divided broadly into two categories – revealed preference methods and stated preference methods.

Revealed preferences techniques seek to elicit preferences from actual, observed market-based information that is indirectly linked to the ecosystem service in question. Preferences for environmental goods are usually revealed indirectly when an individual purchases a market good to which the environmental good is related in some way. They are all indirect, because the service in question is not itself traded. The techniques included in this group are the travel cost method (TCM), the hedonic price (HP), wage techniques and averting behaviour. These techniques only capture use values, leaving passive values out of consideration.

In the travel cost method researchers estimate the economic value of recreational sites by looking at the generalized travel costs of visiting these sites (Bockstael et al. 1991). The valuation is then based on the derivation of a demand curve for the site in question through the use of various economic and statistical models. Where the individual makes a choice involving more than one site, the discrete choice models have used the random utility theory framework to value not only visits to different sites but also the attributes of sites, such as water quality.

Another technique is the hedonic price method, which estimates the economic value of an environmental commodity such as an attractive view by studying the relation between that attribute and house prices (Palmquist 1991). Hedonic price estimation has been applied to elicit environmental/ecosystem values associated with recreation, landscape values and genetic and species diversity.

Stated preference techniques are based on the simulation of the market through a questionnaire administered to a sample of the affected population. In simulated

market conditions, the supply side is represented by the interviewer, who typically offers to provide a certain amount of units of the good at a given price. The respondent, who either accepts or rejects the offer, represents the demand side. One of the most crucial issues in this kind of method is to be precise in the description of the market, and yet simple and clear enough for people to understand it. This is particularly important because biological and landscape diversity are among those goods for which it is difficult to simulate a clear, credible, precise and understandable market in a poll process.

The best-known stated preference method is contingent valuation (CVM) (Mitchell and Carson 1989), where individuals state their willingness to pay (WTP) for a good or their willingness to accept payment for something that is taken away. CVM or similar methods (see below) are currently among the most used techniques for the valuation of environmental goods. One important reason for this is because only stated preference methods like CVM can elicit the monetary valuation of the passive values, which typically leave no 'behavioral market trace'. Furthermore, CVM allows environmental changes to be valued even if they have not yet occurred (i.e., ex ante valuation). It allows the specification of hypothetical policy scenarios or states of nature that lie outside the current or past institutional arrangements or levels of provision. Finally CVM allows one to enrich the information base by submitting the process of value formation to public discussion. Against this is the criticism that the values are hypothetical (payments are not actually made or cash paid out) and that the method is also subject to many biases. Over the last decade and a half, however, there has been greater agreement on what constitutes a credible CVM study, what protocols have to be carried out to meet the good practice standard and what tests for biases

need to be conducted. It is fair to say that many of the studies that value different ecosystem services, carried out in that period, would meet these protocols.

Other tools similar to CVM have now been developed and form part of the toolkit of stated preference techniques. These include conjoint choice or choice experiments (CE), where information on values is obtained by asking individuals to choose between alternatives, conjoint ranking, where individuals rank alternatives in order of preference and conjoint rating, which indicates their strength of preference on a cardinal scale. Conjoint choice is the most used of the three in environmental valuation, and the relative merits of this against contingent valuation are much discussed in the literature. The primary difference between CE and CVM is that the former involves trade-off among choices, while in the latter respondents express their WTP based on a proposed environmental change. At present a number of economists are tending to favor CE as a method of elicitation on the grounds that marginal values of goods and services are easier to measure, it is more informative as it offers individuals multiple choices, it reduces response problems and some biases associated with CVM and it is relatively less expensive to conduct (Hanley et al. 2002; Louviere et al. 2000).

Finally, combined stated preference and revealed preference methods are increasingly used in environmental economics for their potential to unite the desirable features of both, i.e., to base the valuation on actual behaviour as in revealed preference models and to extend the investigation beyond the current observed state (Hanley et al. 2003). Among these methods, contingent behaviour (CB) models combine the observation of the current behaviour (e.g., current number of trips to a recreational site) with the behaviour that would occur in a contingent market (e.g.,

number of intended trips to a recreational site if characterized by a different level of environmental quality).

4 The Empirical Evidence from an Ecosystem Service Perspective: Recreational, Aesthetic and Cultural values

A very comprehensive dataset of studies on the valuation of the non-material benefits that people derive from estuarine and coastal ecosystems was assembled and investigated. In total, 320 primary valuation studies were retrieved and analyzed from online databases, libraries and through direct contact with authors. The Environmental Valuation Reference Inventory (www.evri.ca) was a particularly useful source. The investigation was not limited to the analysis of publications in the official scientific literature, but also explored “grey literature” (such as reports for both public and private institutions, consultancy studies, and unpublished working papers). Only primary valuations were considered and care was taken not to include more than once in the dataset estimates that were published in multiple papers. Overall, 758 observations of either the total or individual value of recreation, aesthetic and cultural services could be retrieved. Figure 2 presents the geographical distribution of the value observations collected.

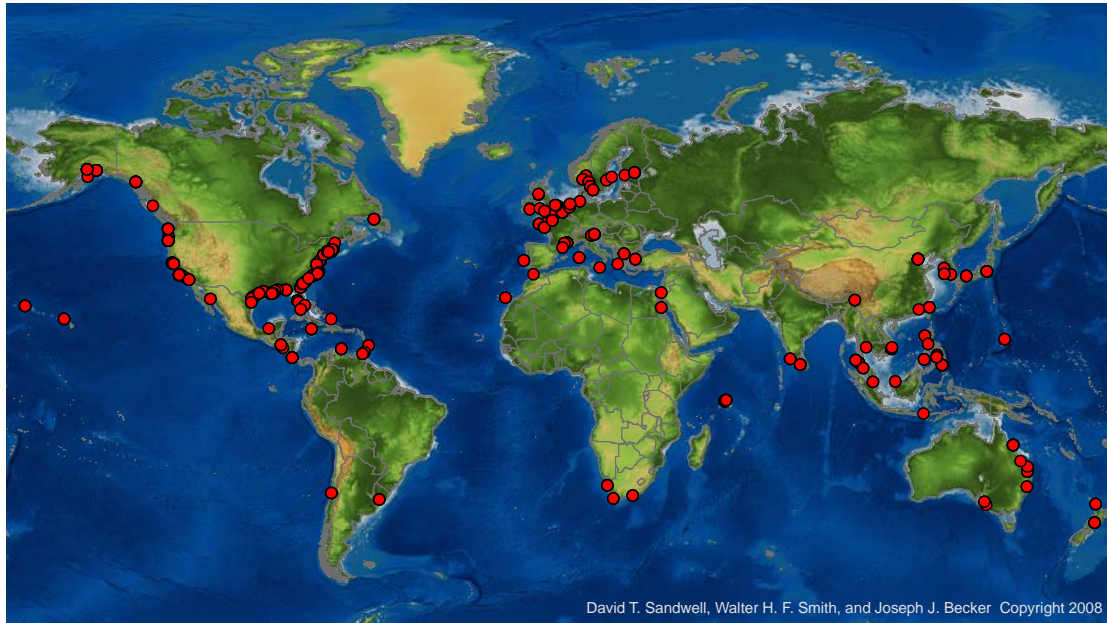


Figure 2. Overview of the geographical location of the collected value observations

The valued estuarine and coastal ecosystems are located in six continents and 45 countries. By far the largest number of studies focus on ecosystems located in the United States (67 studies), but a substantial number is from European countries (United Kingdom, 12 studies; France, 7 studies) and Australasia (Australia, 8 studies). We could retrieve 23 and 17 studies from Asia and Latin America, respectively, but only 4 studies from African countries. Asian studies are concentrated in south-east Asian countries such as the Philippines (4 studies, 18 observations), Thailand (3 studies, 13 observations), and Malaysia (3 studies, 7 observations). Only 55 of 758 observations are from countries south of the Equator.

The collected studies implemented a range of stated and revealed non-market valuation techniques. A large number of value observations were obtained with CVM (419 observations) and TCM (234 observations). Choice experiment and contingent behaviour were used for 66 and 39 observations, respectively. Due to the different methodologies adopted and scenarios considered, the value estimates in the dataset

vary in term of welfare measure type, metric and measurement units. In some of the studies the total willingness to pay or consumer surplus for a specific service or range of services is ascertained (292 observations). In other studies, the value estimate represents the marginal value attributed to an improvement (289 observations) or a decrease in the quantity or quality of the provision of ecosystem services (174 observations) at the valued sites. Values may be reported at the individual level, at a household level, or aggregated over the entire population that holds values for a certain ecosystem service. To allow for a comparison between values calculated in different years and expressed in different currencies and metrics, value observations were standardized to a common metric and currency. Following the procedure described in Brander et al. (2006) and Ghermandi et al. (2008), values were standardized to 2003 USD per year. Values referring to different years were deflated using appropriate factors from the World Bank Millennium Development Indicators (World Bank 2006), while differences in purchase power among the countries were accounted for by the Purchase Power Parity (PPP) index provided by the Penn World Table (Heston et al. 2006). Values reported in USD for ecosystems that are not located in the United States of America are first converted to units of local currency based on the average exchange rates during the year of the study.

The distribution of value observations across ecosystem services and types is presented in Table 1. Six categories of prevailing ecosystem types are considered: estuarine ecosystems, sandy shores and beaches, mangroves, coral reefs, and other types of coastal ecosystems. The latter mainly includes two types of valuation sites: (i) open coastal waters, where recreational fishing takes place; and (ii) sites that comprise a range of ecosystem types which cannot easily be ascribed to one or more of the remaining categories (e.g., the whole coast of England). To correctly interpret

the number of observations reported in Table 1, one must thus bear in mind that a single observation may pertain to two or more different ecosystem types and/or to two or more service categories. For instance, adding up the observations of the recreational fishing, non-consumptive recreation and cultural/aesthetic values of coastal marshes, one could assume that the total number of observations for coastal marshes should be equal to 40 (= 12 + 22 + 6) when in reality it is only 31, since 9 observations provide a combined value estimate for two different services.

Table 1. Number of value observations per ecosystem type and service

Prevailing ecosystem type	Ecosystem service category			Total
	Recreational fishing	Non-consumptive recreation	Cultural and aesthetic	
Coastal marshes	12	22	6	31
Coral reefs	5	73	15	84
Estuarine	34	51	28	76
Mangroves	9	16	16	27
Sandy shore and beaches	58	196	35	239
Other coastal ecosystems	223	136	99	315
Total	332	482	199	758

The largest number of observations is for non-consumptive recreational activities (482 observations) and recreational fishing (332 observations), which are derived from 122 and 72 studies, respectively. Non-consumptive recreational values are mostly ascertained for sandy shores and beaches (196 observations) while only few observations are available for both non-consumptive and consumptive recreational values of mangroves and coastal marshes. Recreational fishing studies are mostly valuing open coastal waters (which are classified as “other coastal ecosystems” in Table 1), but a substantial number focuses on shellfishing and shore fishing in sandy shores and beaches (58 observations) and on fishing in estuarine waters (34

observations). Considering all three ecosystem services categories in Table 1, a relatively large number of observations are available for sandy shores and beaches (239 observations) and for estuarine waters (79 observations).

4.1 Recreational Fishing

In total, we collected 332 observations from 72 studies containing a valuation of recreational fishing activities in estuarine and coastal ecosystems. Of these, 177 observations from 35 studies focus exclusively on recreational fishing, while the remaining studies provide values aggregated with those for non-consumptive recreational activities (100 observations), passive values (13 observations), or both non-consumptive recreation and passive values (42 observations). Most of the 177 observations focusing exclusively on recreational fishing implemented the travel cost method (100 observations), but a substantial number used stated preference techniques (CVM, 71 observations; CE, 3 observations). The studies examine the recreational values in ten countries, the large majority of observations being from sites in the United States (152 observations). A large number of observations are concentrated in the states of Texas (29 observations), California (29 observations), and Alaska (27 observations).

The collected observations reflect different types of values and recreational experiences. Most studies investigate the values of open sea angling, but some focus on shore fishing (Kawabe and Oka 1996; Kling and Herriges 1995; Whitehead et al. 2008) or shellfishing (Péronnet et al. 2002; Kawabe and Oka 1996; Davy 1998; Appéré and Bonnieux 2003). Some of the studies focus on a single fish species such as salmon (Brown et al. 1980; Cameron and Huppert 1989; Huppert 1989), striped bass (Cameron and Huppert 1989; Snyder 1983; Huppert 1989), Pacific threadfin (Cantrell et al. 2004), or halibut (Carson et al. 1987). The majority of studies,

however, investigate the overall value of the recreational fishing experience, aggregating values for all species that are captured at a specific location.

The mean and median values for recreational fishing in the dataset amount to 408.7 and 143.9 USD/person/year, respectively. Such values are consistent with the findings of a previous literature review conducted by Freeman III (1995) who reported typical values for recreational fishing ranging between 100 and 1,000 USD/person/year. The highest value in the dataset, which amount to 4,399 USD/person/year, was estimated by Cameron (1988) in a combined CVM and TCM study for recreational fishing in the Gulf coast of Texas. The lowest value, which amount to 3.1 USD/person/year, was estimated in a study on shellfishing in various areas in south-central Alaska – see Carson et al. (1987)

The values included in the dataset may either reflect a total consumer surplus for recreational fishing in a site or a marginal variation in value due to a change in the quality of the fishing experience. Conforming to theoretical expectations, the average value per person per year in the 27 studies that elicit a total WTP or consumer surplus for recreational fishing is higher than marginal values and amounts to 680.5 USD/person/year. The average marginal value is 216.3 USD/person/year. From the dataset it is also derived that the value for preventing a decrease in the provision of recreational fishing services amounts to 247.5 USD/person/year and is higher than the average value attributed to an improvement in the fishing experience, which amounts to 177.7 USD/person/year. More information on the values of marginal changes in the provision of the recreational fishing service is provided in the studies summarized in Table 2.

Table 2. Summary of selected valuation studies for recreational fishing

Location	Valued scenario	Valuation method	Individual WTP [USD/person/year]	Source
Long Island, NY, USA	Increase in catch rate	TCM	1 – 30 ^a	Agnello and Han 1992
New Zealand coast, NZ ^c	Increase in catch rate	CVM	3.2 – 60	Wheeler and Damania 2001
Great Salt Pond, RI, USA	Change in environmental quality	CVM	41 – 57	Wey 1990
Thessaloniki, GRE	Change in environmental quality	CVM	45.6	Kontogianni et al. 2003
San Francisco Bay, CA, USA	Increase in catch rate	CVM	73 – 90	Cameron and Huppert 1989
North Carolina, USA ^b	Change in environmental quality	TCM	73 – 207	Whitehead et al. 2008
New Zealand coast, NZ	Increase in license fees	CVM	77 – 81	Kerr et al. 2003
Oahu, HI, USA	Increase in catch rate	CVM	130 – 401	Cantrell et al. 2004
Skagerrak, SWE	Change in environmental quality	CE	133	Eggert and Olsson 2003
Northwest Florida, USA	Increase in catch rate	TCM	176 – 276	Arndorfer and Bockstael 1986
Bretagne, FRA ^b	Change in environmental quality	TCM, CB	191 – 1,437	Appéré and Bonnieux 2003
Texas Gulf Coast, USA	Change in environmental quality	CVM	313 - 2,028	Cameron 1988
North Carolina, USA	Increase in catch rate	TCM	437	Whitehead et al. 2008

Note: ^a Value is expressed in USD/person/trip for 20–100% increase in catch rate; ^b Value for shore fishing; ^c Value for different species (snapper, kingfish, blue cod, kahawai, and rock lobster).

As we can see, the monetary values in Table 2 are classified based on the type of scenario that they consider. Studies estimating the values of increasing fish catch rates, investigate increases ranging from one fish per trip (Arndorfer and Bockstael 1986; Wheeler and Damania 2001), to double catch rates (Agnello and Han 1992; Cameron and Huppert 1989). The average value of increased catch rates is 322 USD/person/year. The changes in environmental quality considered include water quality improvement (Eggert and Olsson 2003; Kontogianni et al. 2003; Wey 1990; Appéré and Bonnieux 2003), reduced congestion of fishing boats (Wey 1990), and changes in beach width due to sea-level rise (Whitehead et al. 2008). The average value of changes in environmental quality in the investigated studies is 290

USD/person/year, which is slightly lower than the average value of increased catch rates.

4.2 *Non-consumptive Recreation*

A large number of valuation studies have endeavored to ascertain the value of estuarine and coastal ecosystems in supporting non-consumptive recreational activities such as sunbathing, swimming, diving, snorkeling, boating, whale watching and other types of recreational activities that are not directly connected to the aquatic environment such as birdwatching and hiking. Although the enjoyment of such services does not involve a direct extractive use of natural resources, some forms of non-consumptive recreational activities have been associated with substantial modifications of the natural ecosystems and degradation in ecosystem quality (Bramwell 2004). This is the case for instance of recreational activities such as the traditional sea, sand and sun experience that is often related to mass tourism (as opposed to more nature-oriented eco-tourism).

Beach tourism and recreation are major components of global tourism. Rising incomes and improved transport technologies are the main drivers of the large growth in the numbers of visits by domestic and international recreationists that many coastal areas worldwide have experienced in the last decades. This type of tourism has led to rapid economic development in various regions, resulting in the creation of accommodation facilities, commercial facilities and infrastructures as well as social and environmental changes.

A large number of studies investigate the value of sea, sand and sun recreation in beach resorts. Of the 47 studies of the values of sandy beaches that we collected, 146 observations from 31 studies focus exclusively on non-consumptive recreational activities. The remaining 50 observations provide combined estimates of non-

consumptive recreational and passive values (24 observations), non-consumptive and consumptive recreation (24 observations), or of all three service types (2 observations).

The beach valuation studies in the dataset may be classified into two broad categories: studies aimed at the determination of the demand curve of recreational use of beaches (e.g., Bell and Leeworthy 1990; Bin et al. 2005; Blackwell 2007) and studies that aim at the elicitation of the welfare impact of a marginal change in ecosystem health or quality of the recreational experience. Such marginal changes include (i) improvement of seawater quality, (ii) beach renourishment program or coastal erosion protection measure (see Table 3), (iii) other types of improved conditions such as reduced congestion (Lin 1994), (iv) improved access (Oh et al. 2008), or maintenance programs (Alberini et al. 2005; Bateman et al. 2001; Pitt 1997), or finally (v) a WTP to avoid the degradation in the quality of their recreational experience due, for instance, to harmful algal blooms (Nunes and van den Bergh 2004). Table 3 provides an overview of the valuation studies focusing on water quality improvement, beach renourishment, and erosion control.

As far as the non-consumptive beach recreation studies are concerned, the mean value standardized to USD (2003) is 178.9 person/year. The median value is 55.9 USD/person/year. Confirming our expectations, the average total WTP of individuals is higher than their marginal WTP for a change in ecosystem quality. In the former case, the mean and median values elicited in the valuation studies are 499.7 and 142.5 USD/person/year respectively. In the case of the valuation of marginal changes, the sample mean and median values amount to 80.4 and 41.1 USD/person/year respectively. Among the marginal valuation studies whose results are reported in Table 3, the highest values are found for beach renourishment, with 271.8

USD/person/year, and the lowest for water quality improvement, amounting to 38.5 USD/person/year. Finally, valuation studies focusing on erosion protection elicited intermediate values (113.7 USD/person/year).

Table 3. Summary of selected valuation studies for non-consumptive beach recreation

Location	Valued scenario	Valuation method	Individual value [USD/person/year]	Source
Boston, MA, USA	Improved water quality	CE	2.9-36.8	Bockstael et al. 1989
England and Wales, GBR	Improved water quality	CE	3.9	Mourato et al. 2003
New Jersey, USA	Beach renourishment	CVM	5.2-5.6	Silberman and Klock 1988
South-west Scotland, GBR	Improved water quality	CB	9.7	Hanley et al. 2003
Davao, PHL	Improved water quality	TCM	14.7-20.8	Choe et al. 1996
Norwich, Lowestoft & Great Yarmouth, GBR	Improved water quality	CVM	16.8-73.9	Georgiou et al. 1998, 2000
Kay Biscayne & Virginia Key, FL, USA	Beach renourishment	CVM	23.8-29.9	Shivlani et al. 2003
Delaware, USA	Beach renourishment	CVM	28.5-94.3	Falk et al. 1994
South Carolina, USA	Beach Renourishment	CVM	28.6-47.3	Judge et al. 1995
New Hampshire, USA	Erosion control	CVM	33.8	Lindsay et al. 1992
Southern North Carolina, USA	Beach Renourishment	CB	61.2-1,089.7	Whitehead et al. 2008
Nam Rin, THA	Erosion control	CVM	64.0-64.6	Saengsupavanich et al. 2008
Tybee island, GA, USA	Erosion control	CE	87.0-212.1	Landry et al. 2003
Tokyo Bay, JPN	Improved water quality	CVM, TCM	362.7	Kawabe and Oka 1996

Table 4 contains observations regarding primary economic valuation studies that focus on the value assessment of non-consumptive recreation benefits from estuarine ecosystems. In total, we collected 51 observations from 9 studies, several of them focusing on particularly relevant sites such as the Chesapeake Bay (Bockstael et al. 1989; Feitelson 1992), the Albemarle Lagoon and Pamlico Estuary system

(Whitehead et al. 2000; Huang et al. 1997), and the Peconic Estuary (Johnston et al. 2002).

Table 4. Summary of the valuation studies for non-consumptive, recreational use of estuarine ecosystems

Location	Valued scenario	Valuation method	Individual value [USD/person/year]	Source
Foce dell'Isonzo, ITA	Picnicking, walking and wildlife viewing	CVM, TCM	4.2-7.1 ^a	Marangon et al. 2002
Estuaire de l'Orne, FR	Environmental and recreational uses	CVM, TCM	22.5-105.0	Scherrer 2003
Albemarle estuary & Pamlico Lagoon, NC, USA	Various recreational uses and water quality improvement	CB, TCM	39.1-138.7 ^b	Whitehead et al. 2000
Peconic Estuary, NY, USA	Swimming, boating, birdwatching and wildlife viewing	TCM	62.8-141.4	Johnston et al. 2002
Chesapeake Bay, MD, USA	Recreational boating and water quality improvement	CVM	66.8 ^b	Lipton 2004
Albemarle estuary and Pamlico Lagoon, NC, USA	Various recreational uses and water quality improvement	CB, CVM, TCM	82.8-237.2 ^b	Huang et al. 1997
Upper Narragansett Bay, RI, USA	Swimming, recreational fishing, & other recreational uses	CVM	109.7-209.7 ^b	Hayes et al. 1992
Chesapeake Bay, MD, USA	Water quality improvement	CVM	121.0 ^b	Bockstael et al. 1989
Chesapeake Bay, MD, USA	WTP for waterfront, water access or access to navigable water	CE	1,935-33,567 ^c	Feitelson 1992

Notes: ^a The lower and upper bound values are expressed as a WTP per trip and CS per trip, respectively; ^b Value is a combined estimate of different service types; ^c Value is expressed as the net present value of the service for a household.

According to our dataset, the mean individual values for recreation in estuarine ecosystems are 83.5 USD/person/year. In addition, if we use primary valuation studies on estuarine ecosystems that combine the of both non-consumptive recreational benefits with consumptive recreation and passive values, then mean individual values range up to 143.0 USD/person/year. Alternatively, total economic values range from 129,836 USD/year, which is the estimated value of picnicking, walking and wildlife

viewing in the protected area of the Isonzo estuary in the Veneto region of Italy (Marangon et al. 2002), to 31.4 million USD/year, which is the estimated value of birdwatching and wildlife viewing in the Peconic estuary (Johnston et al. 2002).

4.3 *Cultural and Aesthetic Services*

4.3.1 *Aesthetic Values*

An undeveloped shoreline that offers open space and scenic beauty may significantly contribute to the well-being of people residing in nearby locations. Particularly in urban areas, coastline management/protection is an important public policy issue and the development of tools for the assessment of the aesthetic value of the shoreline may provide policy makers with a useful tool to facilitate debates and informed decision making.

The hedonic pricing method has been applied in several studies to the valuation of the aesthetic value of estuarine and coastal ecosystems. In the hedonic theory of housing markets, the proximity to open space or the sea shore is one of the attributes that make up the housing bundle, and its price is implicit in the overall price of dwelling units. Assuming market clearance, market price – transaction price – can be disaggregated and expressed in terms of a wide set of attributes with respect to the dwelling unit in consideration.

Various hedonic pricing studies demonstrate that the aesthetic value of estuarine and coastal ecosystems may have a substantial economic significance. Parsons and Wu (1991) analyzed the sell price of 1,435 houses located in proximity to the Chesapeake Bay coast in Anne Arundel County, MD, with the purpose of determining welfare losses due to house displacement under a new state program limiting new development in a 1,000 foot buffer zone from the water. Three types of coastal

amenities were considered: water frontage, water view, and distance from the shore. The authors found high values for lost coastal amenities, particularly for lost frontage and water view. The total losses aggregated over the whole county were estimated in 19.1 million USD (1983 USD) for the years 1986-1990 and 5.9 million USD for the years 2000-2004.

Morgan and Hamilton (2009) describe a methodology aimed at distinguishing between the benefits derived by households from accessing the beach and from enjoying a scenic view. In the context of a hedonic pricing study focusing on Pensacola Beach in Florida, they find that households are willing to pay 1,334 USD for a one-degree increase in property viewshed.

A study conducted by (Hamilton (2007) on coastal areas of Germany further reveals that the type of coastal landscape has a significant effect on scenic view values. With a focus on tourist accommodations, she estimates that the conversion of 1 km of open coast to dykes would result in a loss varying between 410,252 and 1,017,806 euro depending on location and model specification.

4.3.2 Spiritual and religious Values

Although people's perception of the constituents of their well-being reflects the geographic, cultural, and ecological environment in which they live, spiritual and religious values provided by ecosystems are essential for human well-being in all contexts. Spiritual and religious values are very important to a large range of people around the world. They can be interpreted as a significant driving force that characterizes social relations through their effects on the structure of preferences, in particular affecting perspectives with respect to observations of and interactions with ecosystems. Spiritual benefits derived from ecosystems may be linked to the issue of health and well-being. Furthermore, one's sense of security or social

belonging/partnership may be affected by the loss of a relevant ceremonial or spiritual site, with a consequent weakening of social relations in a community. The conservation of spiritual and religious values provided by ecosystems can also have an influence on the perceptions of freedoms and choice. Ultimately, such values can be considered the constituents factors in the motivation of citizens toward nature conservation and natural resource management.

Despite the recognition of the importance of spiritual and religious values, these values are often not represented in the decision-making process (Verschuuren 2006). This fact may be associated with the non-material nature of the benefits involved, and may also be a result of the difficulty, if not impossibility, of expressing the magnitude of these benefits in monetary terms. Within this context, if one agrees to proceed with a non-monetary valuation approach, there then exists the need for consensus on the exact nature of the *metrics* to be used in such an exercise. There are some examples of attempts in this direction, which include the way that nature is perceived, how it is integrated into religious and cultural experience, and the intangible nature of the spiritual connection between people and nature (de Groot et al. 2002). Other studies which examine these issues often appear in the fields of sociology, anthropology and the social science aspects of environmental studies.

The scarce and fragmented nature of empirical information on the magnitude of spiritual and religious values provided by natural ecosystems can explain the high difficulty in the translation and integration of spiritual and religious values into policy formulation. Another relevant contributory factor to this governance issue is that of the notion of “feeling of ownership”; spiritual values are often understood only by “insider groups”, with policies being either drafted or led by “outsider groups”. As a result, there can exist a significant asymmetry of information that can result in the

misallocation of resources with respect to the protection of key ecosystems that play a role in the provision of spiritual and religious values.

Another challenge to the valuation of spiritual and religious values and its integration into policy analysis is its inherently “synthetic” nature. The importance attached to the natural habitat can be affected by the manner in which the culture organizes the importance of language, governance, knowledge bases, arts and expressions. In a particularly illustrative quote, Schama (1995) writes, “Landscapes are culture before they are nature; constructs of the imagination projected onto wood, water, and rock”. The importance of culturally defined non-material, spiritual values is often understated due to the complex and synthetic nature of its definition.

With respect to spiritual values, it becomes necessary to identify and evaluate potential trade-offs. This can be a particularly difficult task. Multi-criteria analysis and participatory resource appraisal have been used recently to evaluate spiritual values (Verschuuren 2006). However, it is difficult for research, and particularly advocacy, to present economic arguments and avoid a moral argument. Indeed there is a stated difference between (1) research for economic valuations of ecosystems and (2) analyses of their spiritual importance, the latter of which is only recently being integrated into effective decision making.

In recent years, there has been increased research efforts geared towards the disentanglement, mapping and quantification of the magnitude of spiritual and religious values. This has allowed for some important values to be integrated into national policy. In Australia, for example, the aboriginal people were able to integrate spiritual values into management policy of Sacred National Sites; Carter and Bramley (2002) provide one of the few examples of this integration into the policy setting with respect to World Heritage values of the Great Sandy Region, Australia.

The IUCN has recently sought to characterize Sacred National Sites worldwide, and these sites are categorized based on use values, wilderness level, religious activity, and other factors (Wild and McLeod 2008). For example, in Malawi, the Nyika National Park Large area contains four sacred sites, which local people still use for rainmaking ceremonies; in Japan, the Kii Mountains National Parks and WHS contain several Shinto and Buddhist temples, sacred sites and pilgrimage trails for both faiths in continuous use for over one millennium, and in India, the Great Himalayan National Park includes many places of religious importance for Hinduism (Wild and McLeod 2008).

These few studies represent an important movement toward clarity and consistency in the quantification of religious and spiritual values derived from ecosystems. This is a necessary first step to the incorporation of such values into policy and management frameworks. The general trend has been to push for an integration of spiritual and cultural values into valuation science analyses, particularly where there exists a clearly defined relation between human welfare and ecosystem function (Harmon 2003; Vanclay 2002). The valuation literature, however, has given more focus on the economic valuation of the passive, non-use values, which shall be discussed in detail in the following sub-section.

4.3.3 *Cultural/Passive values*

Of the total number of observations that build up the dataset, 199 include an estimate of cultural values of estuarine and coastal ecosystems. Most of the observations combine value estimates for passive values and recreational fishing (13 observations), non-consumptive recreation (60 observations), or both consumptive and non-consumptive recreation (42 observations). We could collect in total 84 observations from 29 independent studies that are exclusively focused on existence

and option ecosystem values. Most of the observations express the WTP to avoid deterioration in the current conditions (47 observations) or to achieve an improvement with respect to the current status (20 observations). These observations are summarized in Table 5. All of the observations were elicited by means of stated preference methods, mostly CVM (73 observations). Choice experiment was implemented in five studies, yielding 11 observations (Eggert and Olsson 2003; van Beukering 2006; Windle and Rolfe 2005; Johnston et al. 2001; Birol and Cox 2007). Most of the observations combine different types of non-use values (i.e., existence, option and bequest), but some of them focus specifically on existence values (Silberman and Klock 1988; Silberman et al. 1992) or option values (Johnston et al. 2001; Anoop and Suryaprakash 2008). Some of the studies aim at the elicitation of the WTP of non-users for passive ecosystem values (Bockstael et al. 1986; Hartje et al. 2001; Windle and Rolfe 2005; Seenprachawong 2003), while other focus on the non-use values that recreationists may hold in addition to their use values (Anoop and Suryaprakash 2008; Lee and Han 2002; Bann 2000).

The services of a certain ecosystem can contribute to the well-being of people that live far away from it and do not have the opportunity to directly or indirectly use its services. Windle and Rolfe (2005), for instance, selected a survey population living at 700 km distance from the study site – the Fitzroy estuary in the Great Barrier Reef catchment in Australia – to estimate the value associated with the protection of its environmental health. Survey respondents elicited an average WTP of 2.3 USD/person/year for a one percent improvement in the environmental health of the estuary.

Table 5. Summary of selected valuation studies for non-use services

Location	Valued scenario	Valuation method	Individual value [USD/person/year]	Source
Coastal biomes, ZAF	Conservation of biodiversity	CVM	1.8 - 45.9	Turpie 2003
Montego Bay Park, JAM	Non-use values	CVM	2.2	Dharmaratne et al. 2000
Fitzroy estuary, AUS	Improvement of environmental quality	CE	2.3	Windle and Rolfe 2005
Montego Bay Park, JAM	Biodiversity improvement	CVM	3.2 - 5.0	Spash et al. 1998
German Wadden Sea, GER	Prevention from deterioration	CVM	9.6	Hartje et al. 2001
Ashtamudi estuary, IND	Option value	CVM	13.6 - 18.6	Anoop and Suryaprakash 2008
Tubbataha Marine National Park, PHI	Bequest and existence of biodiversity	CVM	16.1 - 57.9	Subade 2005
Severn estuary, GBR	Habitat improvement and species protection	CE	17.7 - 46.6	Biol and Cox 2007
Saipan, Northern Mariana Islands	Increase in culturally significant fish	CE	23.2	van Beukering 2006
Dutch Wadden Sea, NED	Restoration of natural conditions	CVM	27.4 - 38.0	Spaninks et al. 1996
British Columbia, CAN	Passive value of oil spill prevention	CVM	34.8	Rowe et al. 1985
Prince William Sound, AK, USA	Passive value of preventing oil spill	CVM	36.1- 276.7 ^a	Carson et al. 1992
Washington State, USA	Passive value of oil spill prevention	CVM	40.6	Rowe et al. 1985
Sant'Erasmo, Venice, ITA	Non-users' WTP for improved quality	CVM	41.0 ^a	Alberini et al. 2005
Phi Phi Islands, THA	Non-users values	CVM	54.0	Seenprachawong 2003
Chesapeake Bay, MD, USA	Non-user benefits from water quality improvement	CVM	55.0	Bockstael et al. 1989
Barbados National Park, BRB	Non-use values	CVM	57.9	Dharmaratne et al. 2000
Skagerrak, SWE	Biodiversity improvement/reduction	CE	61.4 - 143.3	Eggert and Olsson 2003
Thermaikos Bay, GRE	Existence and bequest values	CVM	62.3 - 63.1	Kontogianni et al. 2003
Muthurajawela & Negombo lagoon, LKA	Existence, option and bequest values	CVM	66.4 - 473.7	Wattage and Mardle 2008
Prince William Sound, AK, USA	Passive value of preventing oil spill	CVM	67.8 - 68.1 ^a	Carson et al. 1997
Laholm Bay, SWE	Reduced eutrophication	CVM	83.0	Frykblom 1998
Belgian coast, BEL	Passive value of oil spill prevention	CVM	115.5 - 151.6 ^a	Biervliet et al. 2005

Notes: ^a Value is expressed as a one time payment for a household unit

Finally, the average WTP elicited in the studies focusing solely on cultural values amounts to 191.6 USD/person/year. Such a value is lower than the average WTP

found for recreational fishing but slightly higher than those for beach recreation and recreation in estuarine waters.

4.3.4 *Synthesis*

In this section we reviewed the economic valuation literature on services provided by estuarine and coastal ecosystems along the lines of recreational (consumptive and non-consumptive), cultural and aesthetic service categories. The resulting monetary value estimates seem to give unequivocal support to the notion that there are positive and significant recreational, cultural and aesthetic values associated with estuarine and coastal ecosystems. Furthermore, and in confirmation to theoretical expectations, the average value elicited in the observations that combine non-consumptive recreation and other types of ecosystem services is higher than in the sub-sample focusing solely on non-consumptive recreation. For example, the mean value for sub-sample combining non-consumptive recreation and passive uses is 407.3 USD/person/year, while the mean value for non-consumptive recreation and recreational fishing amounts to 429.5 USD/person/year. On the other hand, the mean value for sub-sample combining valuation studies that focus only on recreational fishing is 216.3 USD/person/year.

With a view to management and policy, it is also possible to conduct such assessments from alternative perspectives based on commonalities and shared governance challenges, including the formulation of commonly accepted policies such as payments for ecosystem services. In the following section we discuss and review the literature from three policy-anchored perspectives, each of which embeds all of the ecosystem services under consideration. With recognition that the three categories by definition are not mutually exclusive, we refer to: (a) coral reef ecosystems, (b) Marine Protected Areas (MPA), and (c) Small Island Developing States (SIDS).

5 The Empirical Evidence from a Management Perspective: Coral Reefs, Marine Protected Areas and Small Island Developing States

5.1 *Coral Reefs*

Existing within multiple regions and political jurisdictions, coral reefs and their habitats support the highest marine biodiversity in the world (Obura and Grimsditch 2009). Considered the most diverse ecosystems of the ocean (Debenham 2007), coral reefs occupy approximately only 0.1-0.5% of the ocean floor (Moberg and Folke 1999). Nevertheless, coral reef ecosystems are a significant source of welfare to both developing and developed countries. Embedded within coral reef ecosystems exist considerable recreational, cultural and aesthetic values to both local and international communities. Today, it is estimated that more than 500 million people depend on them for a host of ecosystem services (Obura and Grimsditch 2009).

At the same time, coral reef ecosystems face significant threats of degradation. It is estimated that 70% of the world's coral are threatened or have been destroyed (Obura and Grimsditch 2009). Climate change in particular is considered to be one of the greatest threats, with mass coral bleaching due to increasing sea temperatures responsible for much of the present loss of coral cover (Brander et al. 2007; Obura and Grimsditch 2009). In addition, human activities such as destructive fishing practices, land-based pollution and non-sustainable tourism act in synergy to place the world's coral reefs under multiple threats. It can also be argued that a source of the sub-optimal use of coral reef resources (and hence their degradation) is their open access, public good nature which can result in their under-valuation in relevant decision-making (Brander et al. 2007).

The significant levels of services provided by coral reefs to both national and international communities, the non-market based characteristics of some of these services, and the associated multiple threats and challenges, have all resulted in an increasing literature on coral reef valuation. The policy thrust of such studies have their justification in (1) a quantitative estimation of the welfare changes associated with coral reef degradation (2) the incorporation of more realistic values into decision-making processes and (3) an investigation into the potential for the increased financing of conservation activities. The third category in particular has led to a focus on the valuation of recreational services provided by coral reef ecosystems, with an aim to the capture of greater levels of consumer surplus so as to better aid conservation and ultimately serve the economic interests of the local community stakeholders.

Table 1 shows that we collected 84 observations from 25 coral reefs valuation studies using either stated or revealed preference valuation methods. Of these, 64 observations focus solely on non-consumptive recreational activities, while the remaining studies provide combined observations with passive uses (6 observations) or consumptive recreation (3 observations). In addition to these, we collected 9 observations focusing solely on non-use and passive values, and 2 observations on recreational fishing only. Most coral reefs valuations are from the Caribbean (Dharmaratne et al. 2000; Parsons and Thur 2008; Edwards 2009; Rudd et al. 2001) and from the Coral Triangle region (Nam and Son 2004; Yeo 2004; Arin and Kramer 2002; Asafu-Adjaye and Tapsuwan 2008; Svensson et al. 2008). Several valuation studies focused also on the Great Barrier Reef in Australia (Carr and Mendelsohn 2003; Driml 1999; Kragt et al. 2006; Windle and Rolfe 2005), and on coral reefs in the Red Sea (Cesar 2003; Wielgus et al. 2003), and Hawaii (Cesar and van Beukering

2004). Table 6 presents an overview of valuation studies assessing the marginal value attributed to a change in the quality or quantity of the non-consumptive recreational experience in coral reef ecosystems.

Table 6. Summary of selected valuation studies on coral reef recreation

Location	Valued scenario	Valuation method	Individual value [USD/person/year]	Source
Turks and Caicos Islands	Improvement in wildlife viewing	CE	5.64 ^b	Rudd 2002
Great Barrier Reef, AUS	Environmental degradation	CB	11.3	Kragt et al. 2006
Hon Mun islands, VNM	Avoid degradation of quality	CVM	12.4-12.7	Nam and Son 2004
Saipan, Northern Mariana Islands	Increase in reef recreation	CE	17.5 ^c	van Beukering 2006
Montego Bay Park, JAM	Avoid degradation of quality	CVM	24.0	Dharmaratne et al. 2000
Barbados National Park, BRB	Avoid degradation of quality	CVM	44.3-223.8	Dharmaratne et al. 2000
Whale Island, VNM	Quality improvement	CVM	60.6 ^b	Svensson et al. 2008
Bonaire, ANT	Quality change for scuba divers	CVM, CE	116.5	Parsons and Thur 2008
Eilat coral reefs, ISR	Increase in biodiversity and water quality	CE	- ^a	Wielgus et al. 2003

Notes: ^a The estimated total economic value per year is 713,921-3,395,878 USD/year; ^b Value is expressed as WTP per person per trip referring; ^c Value is estimated for local users only.

The mean and median individual values for the observations focusing solely on non-consumptive recreation are 700.4 and 138.3 USD/person/year, respectively. Both values are higher than those previously reported for beach recreation in Section 4.2. The studies comparing the values of residents and repeat users with those of international tourists found lower individual values for the former (Dharmaratne et al. 2000; Seenprachawong 2003; Cesar and van Beukering 2004; Nam and Son 2004). However, none of the studies differentiate between single-purpose and multi-purpose visits.

Similarly to the previous findings for beach recreation, the economic values of coral reefs ecosystems show a great deal of variation. Mathieu et al. (2003) estimates

that for recreation in small marine protected areas in the Seychelles islands, which extend for less than 10 km of coastline and receive less than 400 visitors per year, there exists a value range from 4,322 to 11,924 USD/year (Port Launey marine park) and from 3,151-13,102 USD/year (Baie Terney marine park). The highest values in the dataset amount to 3,230 million USD/year and were estimated for the Great Barrier Reef in Australia, which extends for several thousands kilometers and hosts every year about two million tourists (Carr and Mendelsohn 2003). The positive correlation between total value, ecosystem size, and yearly number of visits is presented in Figure 3.

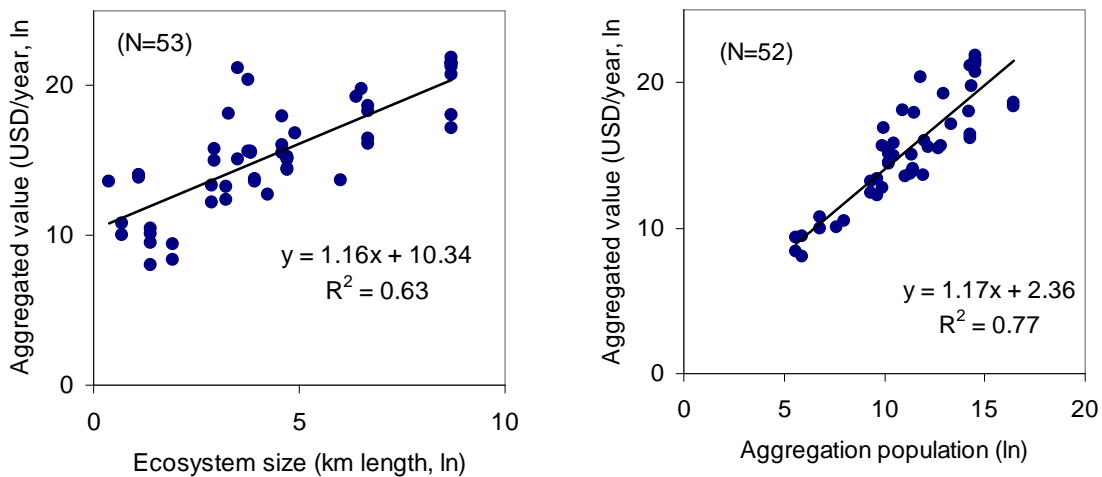


Figure 3. Correlation between economic values of recreation in coral reefs and ecosystem size and number of recreationists

A recent, comprehensive review of valuation studies on recreation in coral reefs and a meta-analysis of their results are presented in Brander et al. (2007). The authors used 100 observations from 52 studies and tested the potential of the methodology for the transfer of value estimates to sites where primary valuations are not available. Their findings indicate that the area of dive sites and the number of visitors are among the main factors influencing the individual WTP of recreationists per visit to a coral

reef site. Furthermore, they observed that different valuation methods produce widely different values, with CVM producing significantly lower estimates. The findings of the present study confirm that stated preference methods (CVM and CE) produce substantially lower values than TCM. The average individual WTP estimates for stated preference methods amount to 59.8 USD/person/year for CVM and 94.3 USD/person/year for CE. The average value estimated with TCM is substantially higher and amounts to 1,147.4 USD/person/year. A somewhat more troubling result of the study by Brander et al. is the high importance played by authorship effects in determining value estimates. In their analysis, about 65% of the total variance in coral reef recreation values can be attributed to differences between authors. Such effect may constitute an important criticism to the reliability of primary valuation studies (Bateman and Jones 2003).

Notwithstanding the range in variability of the estimates, varying across changing factors such as geographical location, the precise type of recreational activity and the definition of the user, the valuation studies presented here as a sample of the existing literature demonstrate that there is a significant potential revenue capture of coral reef recreational activities. Alternatively, we can say that there is a potentially significant welfare loss should coral reef degradation trends continue. These benefits/losses can be defined directly in terms of the recreationist users of the resource but should also be linked to the welfare of the local communities who depend on the resources of the ecosystem. In fact, most studies lack a uniform, clear perspective on the valuation of coral reefs as a key, distinct resource supporting the livelihood of the local communities. Therefore, available economic valuation estimates on coral reef recreational services should generally be regarded as providing lower bounds to the unknown value of these ecosystems.

5.2 *Marine Protected Areas*

One strategy that has been developed as a response to the ongoing degradation of marine ecosystems is that of the “Marine Protected Area” (MPA). MPAs can exist in many different forms, with each defined by the level of human activity allowed within its boundaries¹. MPAs can be established and protected through individual, national or regional systems (Salm et al. 2000). A tool for the management of human activities within a marine area rather than the management of the marine resources themselves, MPAs have been and continue to be established worldwide (Morin Dalton 2004; Laffoley 2008).

The precise structure of the limitations of human activity within an MPA depends upon the management targets for which the restricted area was established (Morin Dalton 2004). MPAs can be characterised by a wide range of objectives that include fisheries restoration and sustainability, biodiversity protection, and tourism targets (Pomeroy et al. 2004; Salm et al. 2000). While the role of MPAs as a tool for fisheries management is often the focus of much of the academic literature (Morin Dalton 2004), MPAs are more often designated as “multiple-objective” (Salm et al. 2000).

Notwithstanding the accepted role of MPAs in ecosystem conservation and management, less than 10% of the existing protected areas are in fact succeeding in the achievement of their management objectives (Pomeroy et al. 2004). The ability of MPAs to effectively achieve their objectives depends on a range of factors that include the clear and proper definition of those objectives, the existence and

¹ See IUCN (2008) for a comprehensive list of protected area management categories. At its most generic level, an MPA can be defined as the application of boundaries to a portion of the sea, and often some associated shoreland habitat, within which human activities are limited or restricted by an explicit legal or regulatory framework (Laffoley 2008).

enforcement of the appropriate regulatory framework, and acceptance of the MPA by local communities (Salm et al. 2000). In addition, the success or failure of an MPA also depends to some extent upon the management of the area outside of its boundaries. Lack of financial sustainability and improper management of self-financing mechanisms can also be a constraining factor. Finally, it is also recognised that when used in conjunction with other marine and coastal management tools, MPAs can contribute to a synergistic effect that can act as a pillar to marine conservation (IUCN 2008).

The interlinkages between MPA establishment and the tourism sector is an important and increasingly recognised one. The tourism sector can both produce the greatest value added to an MPA and also be the first to benefit from its establishment (Kelleher 1999). An MPA can lead to an expansion of nature-based recreation and tourism activities², thereby providing new job opportunities for local communities. This expansion can occur as a result of both (a) an arousal of new interest as the protected area is established and (b) an increase in the quality itself of the marine resources and habitats to which tourists are attracted. As employment and economic benefits accrue to the local communities, this can provide an excellent incentive for conservation on a local scale.

In order to reap financial benefits of the tourism and eco-tourism sector, MPA access must be adequately priced. With the existence of a significant non-market component to the welfare generated by eco-tourism services, existing market structures may not fully map this value. Hence the need for primary valuation studies

² Of course, any expansion of the tourism industry around an MPA must be done within accepted codes of environmental practice that have been explicitly defined by the MPA management.

that can reveal existing consumer preferences and surpluses for this type of activity. Pricing mechanisms based on such valuations can lead to sustainable self-financing.

The value of eco-tourism in MPAs has been investigated in several valuation studies. Some of them focused on existing or proposed protected areas and evaluated whether the establishment of a user fee system or an increase in the existing entrance fee could be used as policy tool to capture the visitors' consumer surplus and allow for such natural reserves to be financially sustainable. Table 7 presents a series of valuation studies that implemented stated preference methods to determine the WTP for park visits and suggest various pricing policy to collect such funds. Other studies implemented the travel cost methodology to assess the consumer surplus of recreation in natural parks. Reid-Grant and Bhat (2009) estimated a total consumer surplus of 980 USD/person/trip for visiting the Montego Bay Park in Jamaica. Martinez-Espineira and Araña (2008) evaluated in 504–638 USD/person the value of a trip to the Gros Morne National Park in Newfoundland, Canada. Bhat (2003) estimated that the establishment of a marine reserve in the Florida Keys would both increase the yearly number of trips undertaken by tourists and increase by 69% the use value per trip (523 USD/person/trip). In addition, Bhat (2003) found that the maintenance cost to preserve the current environmental quality in a marine reserve in the Florida Keys amounts to only 2% of the annual recreation benefits that the reserve would generate under an optimal entrance fee policy. Moreover, the protected area does not need to be necessarily managed by a public authority; Svensson et al. (2008) observe that hotel managed marine reserves may similarly achieve the objectives of nature conservation and economic sustainability.

Table 7. Stated preference valuation studies on marine protected areas

Marine protected area or natural reserve	Valued recreational activities	Valuation Method	Individual WTP [USD/person/trip]	Source
Mu Ko Similan, THA	Diving, snorkeling	CVM	-	Asafu-Adjaye and Tapsuwan 2008
Turks and Caicos Islands	Wildlife viewing	CE	-	Rudd et al. 2001
Pulau Payar, MYS	Diving, snorkeling	CVM	4.7-5.1 ^d	Yacob et al. 2009
Pulau Redang, MYS	Diving, snorkeling	CVM	5.0-6.8 ^d	Yacob et al. 2009
Bako, MYS	Hiking	CVM	5.9	Marikan and Radam
Tae-an-Hae-an, KOR	Hiking, resting	CVM	7.6 ^a	Lee and Han 2002
Baie Terney, SYC	Boating, snorkeling, diving	CVM	21.6	Mathieu et al. 2003
Manuel Antonio, CRI ^c	Not specified	CVM	9.2	Adamson-Badilla and Castillo 1998
Alona beach, PHL	Diving, snorkeling	CVM	11.8	Arin and Kramer 2002
Anilao, PHL	Diving, snorkeling	CVM	11.8	Arin and Kramer 2002
Sainte Anne, SYC	Boating, snorkeling, diving	CVM	25.6	Mathieu et al. 2003
Port Launey, SYC	Boating, snorkeling, diving	CVM	28.4	Mathieu et al. 2003
Mactan island, PHL	Diving, snorkeling	CVM	16.3	Arin and Kramer 2002
Hallyo-Haesang, KOR	Hiking, resting	CVM	20.7 ^a	Lee and Han 2002
Curieuse, SYC	Boating, snorkeling, diving	CVM	34.1	Mathieu et al. 2003
Montego Bay, JAM	Recreational values	CVM	24.0 ^a	Dharmaratne et al. 2000
Ile Coco, SYC	Boating, snorkeling, diving	CVM	36.7	Mathieu et al. 2003
Manuel Antonio, CRI ^b	Recreational values	CVM	24.5	Adamson-Badilla and Castillo 1998
Komodo, IDN	Boating, wildlife viewing	CVM	26.0	Walpole et al. 2001
Bonaire, ANT	Diving	CVM, CE	116.5 ^a	Parsons and Thur 2008
Barbados, BRB	Recreational values	CVM	44.3-223.8 ^a	Dharmaratne et al. 2000

Notes: ^a Value is expressed in USD/person/year; ^b International visitors only; ^c Domestic visitors only; ^d Lower value is for domestic tourists, upper value is for international tourists.

There exist various policy implications of valuation studies such as these. Firstly, they provide quantifiable and growing evidence that there is an increasing potential for ecotourism benefits (and by extension, welfare benefits to local communities who

are also being limited in their use of the resource) with the establishment of MPAs. Secondly, ecotourism in MPAs has a high and generally largely unexploited potential to raise revenue for conservation through user-based financing mechanisms. Finally, it is necessary to determine how these non-market benefits can directly benefit the local communities whose access to the protected area and its resources is by definition also being limited; this is a policy instrument question that, while not targeted by the present valuation studies, also needs to be addressed. This perspective becomes of particular interest since while much of the conservation arguments associated with MPA establishment target the present or potential commercial uses and benefits, there also exist equally important (though less tangible) spiritual and cultural benefits associated with the protection and preservation of a marine area and its associated habitat and species.

5.3 *Small Island Developing States*

Most of the world's biodiversity "hotspots" are to be found in the developing world (Myers et al. 2000). Small Island Developing States (SIDS) in particular are seen as one of the sites where global biodiversity is most in danger (UNEP 2003). Geographically, SIDS are spread across the continents of Africa, Asia, and Latin America and the Caribbean (LAC). A 2008 UN Report classified 51 states into the SIDS category (UN 2007).

SIDS generally share a number of economic and environmental characteristics that make them highly vulnerable to exogenous impacts (Bass 1993; van Beukering et al. 2007; McElroy et al. 1990; Teelucksingh and Nunes 2009; UN 2007). Small populations are coupled with high population densities, concentrated in coastal zone areas which comprise much of the small land areas. An inevitably high ratio of coastal to total land area means that island ecosystems are frequently characterized as

‘fragile’, with a delicate balance existing between highly coupled terrestrial and marine ecosystems (McElroy et al. 1990). They are also known to be extremely vulnerable to environmental degradation (van Beukering et al. 2007), both in terms of endogenous shocks as ecosystem changes occur, as well as exogenous environmental shifts caused by natural disasters and climate change impacts. There is a heavy reliance on natural resource exploitation, leading to an economic vulnerability. SIDS can also exhibit a high degree of vulnerability to the world economy due to the existence of “monocrop”-type economies, and a dependence on international trade for the absorption of exports and as a source of imports.

Due to geographical advantage, marine and coastal habitats play a particularly important role in SIDS. For many small islands the marine environment can be the most important economic resource (Bass 1993). It is commonly accepted that the marine resources available to island states can, if properly utilised, significantly contribute to the sustainable development of the region (Dolman 1990). If marine resources are left unmanaged or at best managed in a less than holistic sense, it is the poorer, rural coastal communities of the small island economies of the region and their future generations who will suffer the most. While provisioning services through fisheries resources are particularly important to local communities, tourism (and, increasingly, eco-tourism) can play significant roles in island economies

There exists a sparse dataset on primary valuation studies in SIDS; while some focus on local community values, most of them focus on the potential capture of tourism values for sustainable practices. In the context of an abundance of desirable coastal habitats that exists within an environmental vulnerability to marine and terrestrial degradation, this focus can both quantify the implied potential economic

losses to the tourism sector as well as illustrate the ability to capture tourism values with a target to local community benefits.

Table 8. Primary environmental valuation studies of recreational, cultural and aesthetic ecosystem services in Small Island Developing States (adapted from Teelucksingh and Nunes (2009))

Location	Valued scenario	Valuation method	Individual WTP [USD/person/year]	Source
Eastern Caribbean (across 4 islands)	WTP by eco-tourism dependent businesses for the protection of eco-tourism sites	CVM	149.45 ^a	Allport and Epperson 2003
Tobago	WTP for an improvement in coastal water quality for beach recreationists (1) snorkellers (2) non-snorkellers	CE	(1) 44.09 (2) 13.85	Beharry-Borg and Scarpa 2009
Dominican Republic	Tourists' WTP for agro-tourism (1) in organic farming systems (2) in conventional farming systems (3) for both systems	CVM	(1) 317.62 (2) 308.88 (3) 541.99	Herrera Catalino and Lizardo 2004
Barbados	WTP by Users for Barbados National Park	CVM	44.3 – 223.8	Dharmaratne et al. 2000
Barbados	Non-Use Values for Barbados National Park	CVM	57.92	Dharmaratne et al. 2000
Jamaica	WTP by Users for Montego Bay Park	CVM	24	Dharmaratne et al. 2000
Jamaica	Non-Use Values for Montego Bay Park	CVM	2.158	Dharmaratne et al. 2000
Puerto Rico	WTP for trips to a national forest	CVM	102.64	Loomis et al. 2007
Puerto Rico	WTP for trips to a national forest	TCM	16.01	Loomis et al. 2007
Papua New Guinea	Existence value and use value for tropical rainforests (1) local community (2) US community	CVM	(1) 39.22 - 95.61 (2) 3.59 – 8.34	Manoka 2001
Sainte Anne, Seychelles	Tourists' WTP for visits to marine parks (use values)	CVM	25.61	Mathieu et al. 2003
Port Launay, Seychelles	Tourists' WTP for visits to marine parks (use values)	CVM	28.30	Mathieu et al. 2003
Baie Ternay, Seychelles	Tourists' WTP for visits to marine parks (use values)	CVM	21.63	Mathieu et al. 2003
Curieuse, Seychelles	Tourists' WTP for visits to marine parks (use values)	CVM	34.05	Mathieu et al. 2003
Ile Coco, Ile La Fouce, Ilot Platte, Seychelles	Tourists' WTP for visits to marine parks (use values)	CVM	36.65	Mathieu et al. 2003
Micronesia	Total Economic Value of mangroves (1) Household WTP for a management tax (2) Household WTP for a use permit	CE	(1) 75.69 ^b (2) 41.80	Naylor and Drew 2001
Netherland Antilles (Bonaire)	Economic loss of scuba divers to a decline in reef quality (1) decline to "good" quality (2) decline to "medium" quality (3) decline to "poor" quality	CE	(1) 64.723 (2) 208.477 (3) 286.215	Parsons and Thur 2008
Jamaica	Marine (coral reef) biodiversity	CVM	4.82	Spash et al. 1998
Netherland Antilles (Curacao)	Marine (coral reef) biodiversity	CVM	3.32	Spash et al. 1998

Notes: ^a Note that this value, representing the WTP by businesses, is not comparable to the other values of this table which represent WTP by individuals; ^b These values represent WTP by individual households, not individual consumers.

Within this context, we analyze a selection of 10 primary valuation studies conducted in SIDS that address biodiversity's role in the provision of recreational, cultural and aesthetic ecosystem services. Table 8 contains a synthesis of these studies, with WTP per person per year, standardized to 2003 USD, presented for each case. The values in Table 8 vary, dependent upon the valued scenario, the targeted group and the valuation method. Most of these studies addressed recreational and other values associated with marine ecosystems, with a focus on tourism and eco-tourism activities in particular. Given that SIDS have geographic advantage in marine habitat, this observation is not a surprising one, but reflects a focus on what may be (or potentially be) one of the main productive sectors of a small island developing economy.

Dharmaratne et al. (2000) present estimated user and non-use values in the context of marine parks in Jamaica and Barbados. The Barbados estimates are in general higher than the Jamaican ones, in particular the non-use values which for the Jamaican case are negligible. Mathieu et al. (2003) estimate the use values of tourists with respect to 5 marine parks in the Seychelles, which range between 21.63 – 36.65. Spash et al. (1998) estimate the value of marine biodiversity in the context of two marine parks in Jamaica and Curacao. These values are small, in particular in the context of a comparison with the similarly valued scenarios of Mathieu et al. (2003) and Dharmaratne et al. (2000). Parsons and Thur (2008) value economic loss as a result of reef quality decline; not surprisingly, there is a significant increase in these values as reef quality worsens. Beharry-Borg and Scarpa (2009) estimate the WTP of beach recreationists for an improvement in water quality across two user groups,

snorkellers and non-snorkellers, with much higher values calculated for the snorkellers group.

We identify four studies with a more terrestrial focus (Herrera Catalino and Lizardo 2004; Loomis et al. 2007; Manoka 2001; Naylor and Drew 2001). Herrera Catalino and Lizardo (2004) estimated the positive externalities from sustainable agriculture in the context of the potential for agro-tourism. Loomis et al. (2007) estimated the values associated with domestic user trips to a national forest, with an interesting perspective of a comparison of the application of two methods (CVM and TCM) for the same valued scenario. It is interesting to note that estimates resulting from both methods varied widely. Manoka (2001) estimated existence and use values for tropical rainforests across two very diverse communities – one from Papua New Guinea (PNG) and the other from Portland, USA. The WTP values for the PNG community were considerably higher than for the US community though, if generalized to total population estimates, the WTP by the US national community would by definition be relatively much higher to that of Papua New Guinea. Finally, Naylor and Drew (2001) estimated the total economic value of mangrove services in Micronesia. WTP estimates for the protection and use of the habitat through two schemes were presented: (1) through a management tax and (2) through a use permit. Given that the WTP for the management tax was considerably higher than that for the use permit, a key conclusion of the paper was that, despite the importance of provisioning services and direct use values to communities, there is also considerable weight placed on indirect use values from the ecosystem services, and on the existence values of the habitat.

Many of the identified studies utilised one methodological approach, with CVM adopted as the main methodological tool. Some studies used CE (Beharry-Borg and

Scarpa 2009; Naylor and Drew 2001; Parsons and Thur 2008), with one study adopting the TCM (Loomis et al. 2007). With the CVM as one of the few valuation methodologies capable of capturing both (direct and indirect) use values and non-use values (or total ecosystem services) of an environmental resource, some of the studies using this approach addressed values beyond recreational ones to also capture cultural and aesthetic (non-use) values. Dharmaratne et al. (2000) estimated both user values and non-use values associated with two Caribbean marine parks. Manoka (2001) focused on both existence and use values of tropical rainforests. Spash et al. (1998) estimated WTP for coral reef quality in two Caribbean case studies, with values that included amenity ones.

Tourists or international users were the focus of most of the analyzed studies. However, some studies either concentrated entirely on local community values (Loomis et al. 2007; Naylor and Drew 2001), or incorporated local values together with international ones into the analysis (Beharry-Borg and Scarpa 2009; Spash et al. 1998). Furthermore, Allport and Epperson (2003) analyzed the eco-tourism potential from the supply side rather than the demand side, with a focus on the WTP of eco-tourism associated businesses for the protection of eco-tourism sites upon which they are dependent.

Many of the SIDS studies focused on tourists' WTP for the use of biodiversity resources. In the context of political jurisdiction over highly desirable marine environments, this is not a surprising find. The Convention on Biological Diversity recognizes that ecotourism is a vital growing segment of the tourism industry, and is increasingly viewed as an important tool for promoting sustainable livelihoods, cultural preservation, and biodiversity conservation (Honey 2006). Thus, valuation studies with a focus upon the potential of the development of these industries in SIDS

are vital components of future sustainable policy. However, this must be done in the context of benefits accrued to local communities. A noteworthy feature of the valuation studies in the SIDS dataset is a relative lack of focus on local community benefits from the biodiversity resources (Teelucksingh and Nunes 2009). In a “developing country” and more specifically a SIDS context, one important element of valuation is to see the distribution of benefits to the local population, or the benefit-sharing component of the ecosystem services provided by the biodiversity resources. The present valuation studies do not reflect this aspect and further research work is welcome here.

6 Scaling up Coastal Recreation Values

The transfer of economic values of individual estuarine and coastal ecosystem services from a particular study site to another – but similar – site has become a common economic valuation methodology. The values estimated for estuarine and coastal ecosystem services in an original site (the study site) can be applied to an area where there is a need to be informed about the economic value of these ecosystems (the policy site).

An important dimension in transferring economic values for ecosystem services is the so called up-scaling valuation method (Brander et al. 2008). In the scaling-up valuation exercise, economic values from a particular study site are transferred to another geographical setting, such as a national or sub-regional scale. Local values are therefore not applied in another local context, but instead are used to estimate the values of all ecosystems (or ecosystem services) of similar characteristics in a certain region.

The word “upscaling” already reveals that (spatial) scale is a vital component of this method. On the supply-side, ecosystems themselves vary in spatial scale (e.g.

small individual patches, large continuous areas, regional networks) with services thus provided at these different levels. On the demand-side, beneficiaries of ecosystem services also vary in terms of their location distribution. The spatial scale over which ecosystem services are provided and received is determined by the spatial scale over which an ecosystem function has effect and the spatial scale of (potential) beneficiaries. Consideration of the spatial scale of the provision and beneficiaries of ecosystem services is also an important element in the calculation of the total economic value of these services (i.e., the aggregation of values across relevant areas and populations). In addition, accounting for spatial scale may be of further use in the formulation of policies to aid the management of ecosystem services, for example in the identification of winners and losers, the need for compensation/incentives, and the design of policies such as payments for environmental services. Against this background, we propose to explore the potential of this methodology in the derivation of aggregate, total economic values for coastal recreation services in Europe.

Since several of the world's leading tourist destinations are located in coastal regions of Europe and the Mediterranean, an analysis of tourist trends and recreation values in European countries offers a good example of the opportunities of coastal tourism and recreation. Figure 4 presents the total number of both domestic and international tourist arrivals in various coastal regions of Europe during the year 2003. The data are derived from the statistics collected by Eurostat (ec.europa.eu/eurostat) for member states of the European Union and are aggregated at the regional level of the Nomenclature of Territorial Units for Statistics (NUTS2).

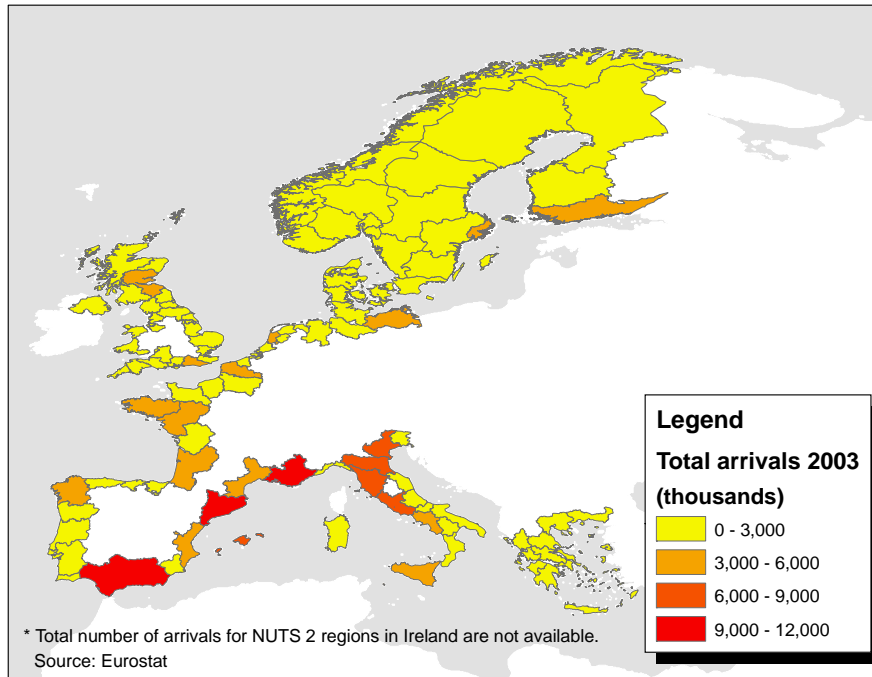


Figure 4. Total number of tourist arrivals in European regions during year 2003

The eight regions with the highest number of tourist arrivals per year (more than six millions arrivals in each of them) are all located in the Southern Mediterranean regions of Spain, France, and Italy. Coastal tourism is a leading economic sector in the Mediterranean region both in terms of revenues and occupation. In Spain, for instance, 83.4% of the 53.5 million tourists sojourning in the country in 2006 visited either one of the four Mediterranean coastal regions or the Canary Islands; 1.5 million people were employed in the coastal tourism sector (European Commission 2007).

The non-market values of coastal recreation in Europe were investigated by Ghermandi and Nunes (2009) based on the meta-regression of 315 value observations, a subset of the dataset that is described in the present work. A semi-logarithmic model specification is assumed for the regression of the willingness to pay (WTP) per person per year for recreational activities in the valued sites. The model is specified as follows:

$$\ln(y_i) = a + b_V X_{vi} + b_S X_{si} + b_C X_{ci} + u_i \quad (1)$$

where $\ln(y_i)$ is the natural logarithm of the endogenous variable (USD/person/year); the subscript i is an index for the value observations; a is a constant term; b_V , b_S and b_C are vectors containing the coefficients of the explanatory variables X_V (valuation study characteristics), X_S (site characteristics), and X_C (context characteristics); and u is an error term that is assumed to be well-behaved. In the meta-regression the value observations are assumed to be independent. In the semi-logarithmic model the coefficients measure the constant proportional or relative change in the dependent variable for a given absolute change in the value of the explanatory variable. For the explanatory variables expressed as logarithms, the coefficients represent elasticities, that is, the percentage change in the dependent variable given a one-percentage change in the explanatory variable.

The individual value for recreational services, standardized to PPP-adjusted USD/person/year according to the procedure described in Section 4, is expressed as a function of 13 explanatory variables. The explanatory variables capture (i) characteristics of the valuation study, such as the valuation method and whether the observation represents a total value for recreational services or a marginal value for a change in the quality or quantity of the level of provision, (ii) site characteristics, such as the ecosystem type and whether the value is for non-consumptive recreation or recreational fishing, and (iii) characteristics of the context in which the valued ecosystems are placed, such as GDP per capita and population density at country level. A series of geo-climatic and biodiversity variables were included in the model as well.

The results of the meta-regression largely confirm *a priori* expectations: the value attributed to marginal changes in the level of provision of recreational services is

statistically lower than the total value; values expressing the WTP of a household are higher than those referring to single individuals; income effects and a positive correlation with biodiversity richness were identified; and recreation values are found to be positively correlated with surface air temperature. The value attributed by individuals to the recreational fishing experience is statistically higher than that of non-consumptive recreational activities.

As a second step of the analysis, the individual recreation values are scaled up to assess the average values of coastal recreation in 14 European countries. The results of the scaling up are presented in Table 9.

Table 9. Values for coastal recreation in various European countries

Country	Average value for coastal recreation (USD/person/year)	Total number of visitors per year ^a	Aggregated value [million USD/year]
Belgium	165.14	2,269,796	374.83
Denmark	169.72	6,814,569	1,156.59
Finland	78.93	17,455,685	1,377.76
France	188.55	56,544,023	10,661.27
Germany	118.53	6,580,242	779.94
Greece	399.76	22,600,413	9,034.64
Ireland	271.9	10,792,300	2,934.44
Italy	281.54	52,360,663	14,741.68
Netherlands	165.42	9,195,870	1,521.15
Norway	230.18	8,604,340	1,980.51
Portugal	176.45	14,665,924	2,587.74
Spain	175.25	58,614,899	10,272.02
Sweden	122.67	43,780,405	5,370.42

Notes: ^a Source: Bigano et al. (2007) and referring to year 1995

The highest values per person per year are found in Mediterranean countries, Greece (399.8 USD/person/year) and Italy (281.6 USD/person/year) in particular. This is partly due to the fact that the meta-regression shows that the values of coastal recreation are higher in hot climates. Values in Ireland (271.9 USD/person/year) and Norway (230.2 USD/person/year), however, are also high in spite of the low

temperatures with respect to Mediterranean countries. This suggests that a different type of tourism may take place there, where climatic conditions are less crucial and tourists may be willing to pay more in order to enjoy the values of the natural landscape in a more pristine and less densely populated environment. The values in Finland (78.9 USD/person/year) and Sweden (122.7 USD/person/year) are lowest among the considered countries, suggesting that here the cold climate again plays a crucial role in determining tourist demand.

Table 9 provides estimates of the aggregated economic values for all yearly visitors in the coastal regions of each considered country. High economic values are found in Mediterranean countries due to the fact that the estimated individual WTP in those countries is high and the tourism industry particularly developed there. High values are found in Italy (14,741.68 million USD/year), France (10,661.27 million USD/year), Spain (10,272.02 million USD/year), and Greece (9,034.64 million USD/year). From the results of the analysis, one can identify the great importance that coastal tourism plays in Mediterranean regions of Europe. The staggering rapidity in the growth of coastal tourism in the Mediterranean and other regions worldwide, however, has often come at the price of large social and environmental impacts, which have led several authors to question its sustainability (Bramwell 2004).

7 Conclusions

This paper focused on the contribution of coastal and estuarine ecosystems to human well-being via their provisions of non-material services in the form of recreation, culture and aesthetics. With the underlying aim of the sustainable management of environmental resources, the monetary valuation of these services is essential to the

policy-making process. There exists an extensive empirical literature that focuses on this fact.

Empirical studies from an ecosystem service perspective were first discussed, with a focus on recreational fishing, non-consumptive recreation, and cultural and aesthetic services. The literature was then reviewed from a management perspective, with a particular focus to three cases that are particularly important to the provision of these types of services: coral reef ecosystems, Marine Protected Areas and Small Island Developing States. Finally, the ability to transfer values from study sites to policy sites via meta analyses, and the up-scaling that can be adopted to apply valuation estimates to larger spatial scales, was discussed in the context of coastal tourism and recreation in Europe.

The geographic distribution of the available studies reflects the diffusion of the practice of environmental valuation rather than a distribution of coastal ecosystem values. The majority of studies are from the USA. While a relatively large number of studies are from Europe, Asian countries, and Australia, it was particularly difficult to retrieve studies from Africa and from south of the Equator. If we generally apply the categories of “developed” versus “developing” countries, we can alternatively say that many of the retrieved studies undertook valuation exercises in the developed world. It is essential that more research takes place in developing countries, to better assess the interactions between ecosystems and human well-being in the very regions that are not only contributing to the loss of environmental resources and the resultant ecosystem services by explicit economic decision-making, but who may also bear the brunt of the consequences of such loss through welfare changes to community livelihoods.

A range of valuation methods have been applied depending on the ecosystem service under investigation. Stated and revealed preference methods were widely implemented in the valuation of both consumptive and non-consumptive recreational activities, while the hedonic pricing method was more appropriate to the valuation of the aesthetic value of viewshed for residents and tourists in coastal areas. Stated preference methods are the only methods that are capable of capturing non-use values.

With respect to specific ecosystem services, the review revealed that both non-consumptive and consumptive recreational activities are major components of the cultural values of estuarine and coastal ecosystems. The large number of valuation studies retrieved revealed that different values are derived from different types of recreational activities (mass tourism vs. eco-tourism), different ecosystem types (beaches vs. coral reefs), and from different levels of environmental quality at the recreation site. The average values found for beach recreation (178.9 USD/person/year) and non-consumptive recreation in estuarine waters (83.5 USD/person/year) are lower than the average value for recreational fishing (408.7 USD/person/year) and recreation in coral reef ecosystems (700.4 USD/person/year). Due to the large aggregating population, however, the total values are larger for beach recreation than for recreational fishing. The average value elicited in the literature for existence, option and bequest of estuarine and coastal ecosystems is 191.6 USD/person/year. The aesthetic value derived from the enjoyment of scenic views is found to significantly affect the price of both residential housing and tourist accommodation in the proximity of estuarine and coastal ecosystems. Finally, although we could trace no valuation studies specifically focusing on the spiritual and religious values of estuarine and coastal ecosystems, these types of values have been increasingly integrated into management frameworks in recent years and under

international agreements such as the World Heritage Site definitions and the IUCN Sacred National Site categories.

The empirical discussion from the management perspective revealed that there exists significant revenue capture potential from existing levels of consumer surplus of eco-tourists and local recreationists. This is a particularly important find in terms of the three perspectives adopted of coral reefs, marine protected areas and small island developing states. The general trend of the literature was a focus on welfare gains / losses of the recreationist users (generally foreign tourists) of the local resources. While these can undoubtedly translate into revenue gains that can better aid conservation efforts, management structures and sustainable use, explicit interpolation to the local community stakeholders of the resources under study was, in the main, absent from the analyses.

The described meta-analytical methodology for benefit transfer and scaling up of the recreational values of estuarine and coastal ecosystems in the context of various European countries is presented as an example of how the information available in the large number of primary valuation studies in the literature can be used to inform economically efficient and sustainable decision-making. We argue that benefit transfer may provide a suitable alternative to conducting primary valuation studies where financial resources are limited and the acceptable transfer errors are relatively large, but recognize that there is a need for improved scaling up techniques and validity tests of benefit transfer estimates.

In conclusion, non-material values provided by coastal and estuarine ecosystems in terms of recreational, cultural and aesthetic services represent a substantial component of human well-being. A large global dataset of primary valuation studies that utilize a variety of valuation methodologies and which can be discussed from

both the service and the management perspective supports this fact. Furthermore, it is possible to scale-up existing valuation studies from both the demand- and supply-side perspectives to better approximate the more aggregate levels of both the provision of the benefits as well as the beneficiaries themselves. Against this background, we can identify important avenues for future research in terms of (1) further refinements to the existing valuation methods to better capture the monetary valuations of non-material services (2) some emphasis given to the valuation of spiritual and religious values, both in terms of methods and applications, and the integration of these values into existing policy structures (3) more attention paid to the quantification of benefits to the local community stakeholders of the resource and (4) further work on “up-scaling” existing values to better approximate the more aggregated spatial scales at which ecosystem services, and their beneficiaries, can be found. This can represent a suggested roadmap to the essential “next steps” of the valuation of recreational, cultural and aesthetic services from estuarine and coastal ecosystems.

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