12.11 Recreational, Cultural, and Aesthetic Services from Estuarine and Coastal Ecosystems

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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 recreational, 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 this chapter support the conclusion that the nonmaterial values provided by coastal and estuarine ecosystems in terms of recreational, cultural, and aesthetic services represent a substantial component of human well-being.

12.11.1 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 nonmaterial nature and that affect people in their spiritual, social, and cultural dimensions (Barbier et al., 2011). 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.

Although challenged by the diversity of experiences that are related to the enjoyment of nonmaterial 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 tradeoffs 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, that is, 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 nonmaterial 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 nonmarket benefits in monetary terms is nowadays available to the investigator. A constantly enlarging bulk of valuation studies and guidelines for best practice exists, upon which the reliability of new value estimates can be assessed.

In this chapter, 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 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 chapter is as follows. In Section 12.11.2, the conceptual framework that underlies our classification of the recreational, cultural, and aesthetic benefits of coastal ecosystems is described. Section 12.11.3 introduces the methodological instruments that are used by economists to derive monetary estimates of the values of ecosystem services. Section 12.11.4 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 12.11.4.1), nonconsumptive recreation (Section 12.11.4.2), and cultural and aesthetic services (Section 12.11.4.3). Section 12.11.5 discusses the empirical evidence and policy implications of economic valuation studies from a management perspective, within the context of coral reef ecosystems (Section 12.11.5.1), marine protected areas (MPAs; Section 12.11.5.2), and small island developing states (SIDS; Section 12.11.5.3). Section 12.11.6 discusses the potential of the combination of data sets 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 12.11.7 concludes the chapter.

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

In this chapter, 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 is adopted in this chapter, is that of the anthropocentric value perspective where ecosystems, and their provision of goods and services, are determined by the consumption opportunities that they 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, namely supporting, provisioning, regulating, and cultural services. Supporting services are generally understood as the fundamental structural characteristics that underlie an 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 fuel wood 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 nonconsumptive 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 nonuse, 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').

This chapter subscribes to the MA conceptual framework and in it, we propose to study and discuss the recreational, cultural, and aesthetic services provided by estuarine and coastal ecosystems accordingly (see **Figure 1**).

The two main value components identified in **Figure 1** are recreational, on the one hand, and cultural and aesthetic, on the other. Recreational values, in turn, can be further classified into consumptive and nonconsumptive use. As 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, nonconsumptive 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 nonuse value component (and therefore do 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 provides guidance to the reader through the remaining sections of this chapter. Prior to that, however, we 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.

12.11.3 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 preferences through a wide range of nonmarket 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

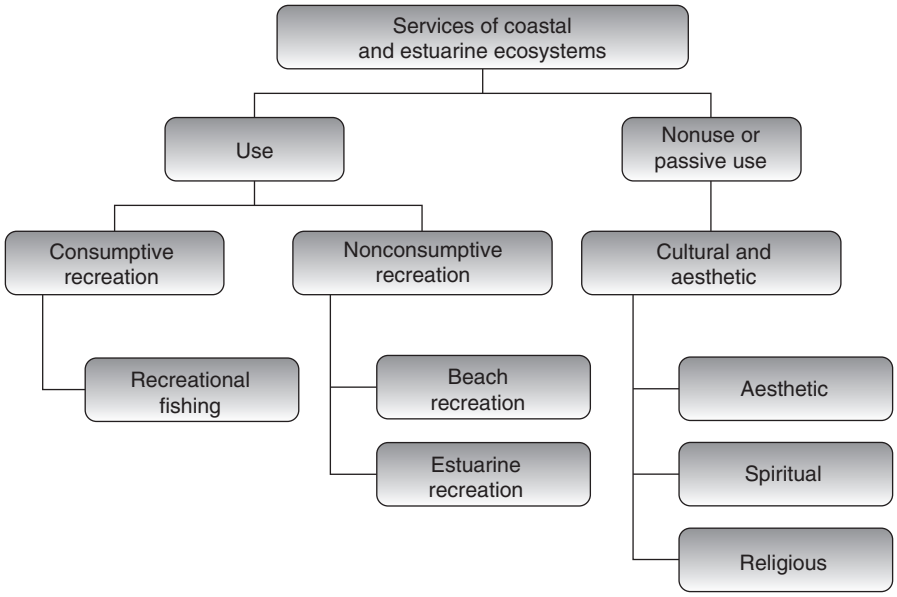

Figure 1 Recreational, cultural, and aesthetic services.

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 preference 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 behavior. These techniques capture only use values, leaving passive values out of consideration.

In the TCM, 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 using various economic and statistical models. Where the individual makes a choice involving more than one site, the discrete choice models use 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 HP method, which estimates the economic value of an environmental commodity such as an attractive view by studying the relation between this attribute and house prices (Palmquist, 1991). HP 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 type 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 diversities 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 the contingent valuation method (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 such as 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 (CEs) (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 (where individuals are asked to rate 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 tradeoff 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; CE 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 (Louviere et al., 2000; Hanley et al., 2002).

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

12.11.4 The Empirical Evidence from an Ecosystem Service Perspective: Recreational, Aesthetic, and Cultural Values

A very comprehensive data set of studies on the valuation of the nonmaterial benefits that people derive from estuarine and coastal ecosystems has been assembled and investigated. In total, 320 primary valuation studies were retrieved and analyzed from online databases and libraries, and through direct contact with authors. The Environmental Valuation Reference Inventory was a particularly useful source. The investigation was not only limited to the analysis of publications in the official scientific literature, but also explored 'gray 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 data set estimates that were published in multiple papers. Overall, 758 observations of either the total or the individual value of recreational, aesthetic, and cultural services can be retrieved. **Figure 2** presents the geographical distribution of the value observations collected.

The valued estuarine and coastal ecosystems are located in 6 continents and 45 countries. By far the largest number of studies focuses on ecosystems located in the United States (67 studies), but a substantial number are from European countries (United Kingdom, 12 studies; France, 7 studies) and Australasia (Australia, 8 studies). We are able to retrieve 23 and 17 studies from Asia and Latin America, respectively, but only 4 studies from African countries. Asian studies are concentrated in Southeast 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 nonmarket valuation techniques. A large number of value observations were obtained with CVM (419 observations) and TCM (234 observations). CE and CB were used for 66 and 39 observations, respectively. Due to the different methodologies adopted and scenarios considered, the value estimates in the data set vary in terms of welfare measure

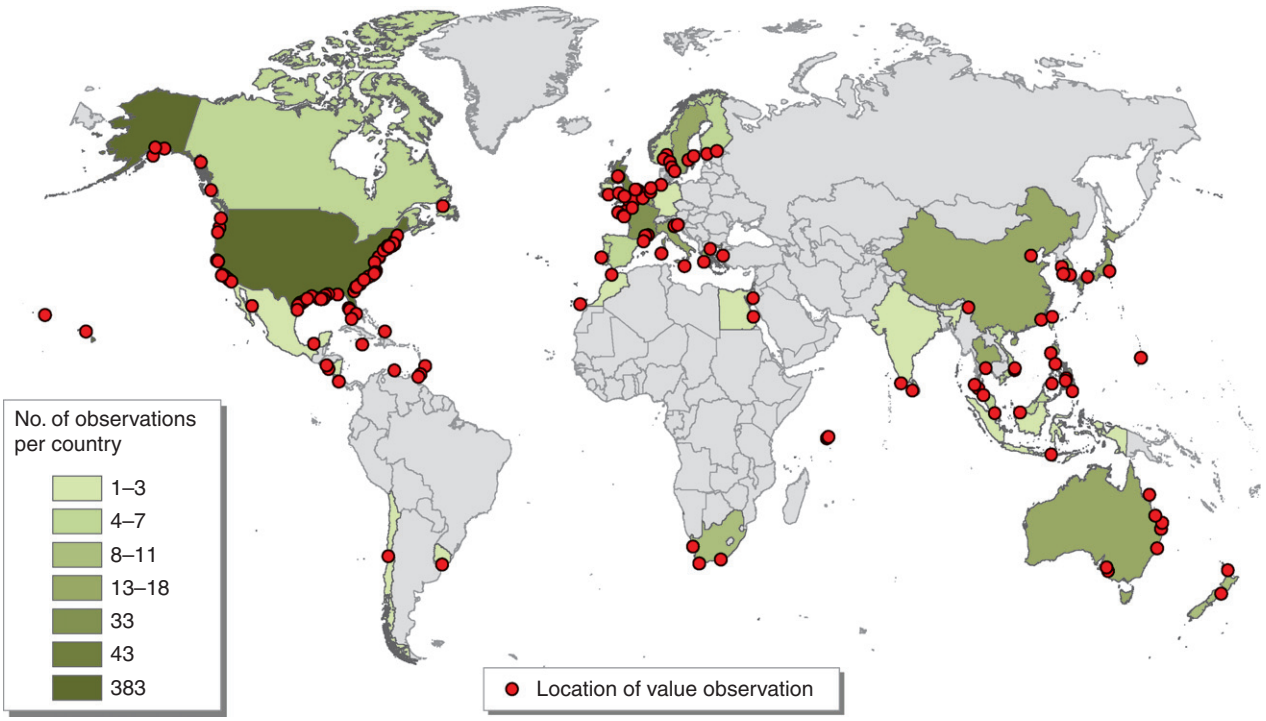

Figure 2 Overview of the geographical location of the collected value observations.

type, metric, and measurement units. In some of the studies, the total WTP 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 the 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. (2010), 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 purchasing power among the countries were accounted for by the purchasing 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, coastal marshes, coral reefs, and other types of coastal ecosystems. The latter mainly includes two types of valuation sites: (1) open coastal waters, where recreational fishing takes place and (2) sites that comprise a range of ecosystem types that 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, nonconsumptive 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 nine observations provide a combined value estimate for two different services.

The largest number of observations is for nonconsumptive recreational activities (482 observations) and recreational fishing (332 observations), which are derived from 122 and 72 studies, respectively. Nonconsumptive recreational values are mostly ascertained for sandy shores and beaches (196 observations), while only a few observations are available for both nonconsumptive and consumptive recreational values of mangroves and coastal marshes. Recreational fishing studies mostly value 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 service 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).

12.11.4.1 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 nonconsumptive recreational activities (100 observations), passive values (13 observations), or both nonconsumptive recreation and passive values (42 observations). Most of the 177 observations focusing exclusively on recreational fishing implemented the TCM (100 observations), but a substantial number used stated preference techniques (CVM, 71 observations; CE, 3 observations). The studies examine the recreational values in 10 countries, the large majority being observations 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 (Kling and Herriges, 1995; Kawabe and Oka, 1996; Whitehead et al., 2008) or shellfishing (Kawabe and Oka, 1996; Davy, 1998; Péronnet et al., 2002; 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 (Snyder, 1983; Cameron and Huppert, 1989; 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.

Table 1 Number of value observations per ecosystem type and service

	Ecosystem service category			
Prevailing ecosystem type	*Recreational fishing*	*Nonconsumptive recreation*	*Cultural and aesthetic*	*Total*
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 mean and median values for recreational fishing in the data set 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 (1995), who reported typical values for recreational fishing ranging between 100 and 1000 USD/person/year. The highest value in the data set, which amounts to 4399 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 amounts 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 data set may reflect either 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 data set, 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**.

As seen in **Table 2**, the monetary values 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 (Cameron and Huppert, 1989; Agnello and Han, 1992). The average value of increased catch rates is 322 USD/person/year. The changes in environmental quality considered include water-quality improvement (Wey, 1990; Appéré and Bonnieux, 2003; Eggert and Olsson, 2003; Kontogianni et al., 2003), reduced congestion of fishing boats (Wey, 1990), and changes in beach width due to a rise in sea level (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.

12.11.4.2 Nonconsumptive Recreation

A large number of valuation studies have endeavored to ascertain the value of estuarine and coastal ecosystems in supporting nonconsumptive 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 nonconsumptive 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, for recreational activities such as the traditional sea, sand, and sun experience that are 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 few 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 nonconsumptive recreational activities. The remaining 50 observations provide combined estimates of nonconsumptive recreational and passive values (24 observations), nonconsumptive and consumptive recreation (24 observations), or of all three service types (2 observations).

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[b]	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[c]	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[c]	Change in environmental quality	TCM, CB	191–1437	Appéré and Bonnieux (2003)
Texas Gulf Coast, USA	Change in environmental quality	CVM	313–2028	Cameron (1988)
North Carolina, USA	Increase in catch rate	TCM	437	Whitehead et al. (2008)

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

Table 3 Summary of selected valuation studies for nonconsumptive 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	61.2–1089.7	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)

The beach valuation studies in the data set 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 (1) improvement of seawater quality; (2) beach renourishment programs or coastal erosion protection measures (see **Table 3**); (3) other types of improved conditions such as reduced congestion (Lin, 1994); (4) improved access (Oh et al., 2008) or maintenance programs (Pitt, 1997; Bateman et al., 2001; Alberini et al., 2005); and, finally, (5) a WTP to avoid the degradation in the quality of the 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 nonconsumptive 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 4 contains observations regarding primary economic valuation studies that focus on the value assessment of

Table 4 Summary of the valuation studies for nonconsumptive, 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, and 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	1935–33567[c]	Feitelson (1992)

[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.

nonconsumptive recreation benefits from estuarine ecosystems. In total, we collected 51 observations from nine 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 (Huang et al., 1997; Whitehead et al., 2000), and the Peconic Estuary (Johnston et al., 2002).

According to our data set, 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 nonconsumptive recreational benefits with both consumptive recreation and the 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).

12.11.4.3 Cultural and Aesthetic Services

12.11.4.3.1 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 policymakers with a useful tool to facilitate debates and informed decision making.

The HP 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 seashore is one of the attributes that makes 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 HP studies demonstrate that the aesthetic value of estuarine and coastal ecosystems may have a substantial economic significance. Parsons and Wu (1991) analyzed the selling price of 1435 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 1000-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 to be 19.1 million USD (1983 USD) for the years 1986–90 and 5.9 million USD for the years 2000–04.

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 an HP study focusing on Pensacola Beach in Florida, they find that households are willing to pay 1334 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 EUR depending on location and model specification.

12.11.4.3.2 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, particularly 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 freedom and choice. Ultimately, such values can be considered the constituent 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 nonmaterial 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 nonmonetary 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 a 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 great 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 could 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 nonmaterial, 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 tradeoffs. This can be a particularly difficult task. Multicriteria 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 have been increased research efforts geared toward 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 International Union for Conservation of Nature (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 World Heritage Site (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 (Vanclay, 2002; Harmon, 2003). The valuation literature, however, has focused more on the economic valuation of the passive, nonuse values, which is discussed in detail in the following subsection.

12.11.4.3.3 Cultural/passive values

Of the total number of observations that build up the data set, 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), nonconsumptive recreation (60 observations), or both consumptive and nonconsumptive recreation (42 observations). In total, we can collect 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). CE was implemented in five studies, yielding 11 observations (Johnston et al., 2001; Eggert and Olsson, 2003; Windle and Rolfe, 2005; van Beukering, 2006; Birol and Cox, 2007). Most of the observations combine different types of nonuse 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 nonusers for passive ecosystem values (Bockstael et al., 1986; Hartje et al., 2001; Seenprachawong, 2003; Windle and Rolfe, 2005), while others focus on the nonuse values that recreationists may hold in addition to their use values (Bann, 2000; Lee and Han, 2002; Anoop and Suryaprakash, 2008).

The services of a certain ecosystem can contribute to the well-being of people who 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 700 km away 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 1% improvement in the environmental health of the estuary.

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 the values for beach recreation and recreation in estuarine waters.

12.11.4.3.4 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 nonconsumptive), 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 of theoretical expectations, the average value elicited in the observations that combine nonconsumptive recreation and other types of ecosystem services is higher than in the subsample focusing solely on nonconsumptive recreation. For example, the mean value for the subsample combining nonconsumptive recreation and passive uses is 407.3 USD/person/year, while the mean value for nonconsumptive recreation and recreational fishing amounts to 429.5 USD/person/year. On the other hand, the mean value for the subsample 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

Table 5 Summary of selected valuation studies for nonuse 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	Nonuse 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	Birol 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	Nonusers' WTP for improved quality	CVM	41.0[a]	Alberini et al. (2005)
Phi Phi Islands, THA	Nonuse values	CVM	54.0	Seenprachawong (2003)
Chesapeake Bay, MD, USA	Nonuser benefits from water quality improvement	CVM	55.0	Bockstael et al. (1989)
Barbados National Park, BRB	Nonuse 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 and 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)

[a] Value is expressed as a one-time payment for a household unit.

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 the recognition that the three categories by definition are not mutually exclusive, we refer to (1) coral reef ecosystems, (2) MPAs, and (3) SIDS.

12.11.5 The Empirical Evidence from a Management Perspective: Coral Reefs, MPAs, and SIDS

12.11.5.1 Coral Reefs

Existing within multiple regions and political jurisdictions, coral reefs and their habitats support the most 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 reefs 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 nonsustainable tourism act in synergy to place the world's coral reefs under multiple threats. It can also be argued that a source of the suboptimal use of coral reef resources (and hence their degradation) is their open-access, public good nature, which can result in their undervaluation 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 has its 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 the aim of capturing 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 reef valuation studies using either stated or revealed

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[a]	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[b]	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[a]	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	–[c]	Wielgus et al. (2003)

[a] Value is expressed as WTP per person per trip referring.
[b] Value is estimated for local users only.
[c] The estimated total economic value per year is 713 921–3 395 878 USD/year.

preference valuation methods. Of these, 64 observations focus solely on nonconsumptive recreational activities, while the remaining studies provide combined observations with passive uses (six observations) or consumptive recreation (three observations). In addition to these, we collected nine observations focusing solely on nonuse and passive values, and two observations on recreational fishing only. Most coral reef valuations are from the Caribbean (Dharmaratne et al., 2000; Rudd et al., 2001; Parsons and Thur, 2008; Edwards, 2009) and from the Coral Triangle region (Arin and Kramer, 2002; Nam and Son, 2004; Yeo, 2004; Asafu-Adjaye and Tapsuwan, 2008; Svensson et al., 2008). Several valuation studies also focused on the Great Barrier Reef in Australia (Driml, 1999; Carr and Mendelsohn, 2003; Windle and Rolfe, 2005; Kragt et al., 2006), 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 nonconsumptive recreational experience in coral reef ecosystems.

The mean and median individual values for the observations focusing solely on nonconsumptive recreation are 700.4 and 138.3 USD/person/year, respectively. Both values are higher than those previously reported for beach recreation in Section 12.11.4.2. 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 multipurpose visits.

Similarly to the previous findings for beach recreation, the economic values of coral reef ecosystems show a great deal of variation. Mathieu et al. (2003) estimate that for recreation in small MPAs in the Seychelles islands, which extend over less than 10 km of coastline and receive less than 400 visitors per year, there exists a value range from 4322 to 11 924 USD/year (Port Launey Marine National Park) and from 3151 to 13 102 USD/year (Baie Terney Marine Park). The highest values in the data set amount to 3230 million USD/year and were estimated for the Great Barrier Reef in Australia, which extends for several thousand kilometers and hosts every year about 2 million tourists (Carr and Mendelsohn, 2003). The positive correlation between total value, ecosystem size, and yearly number of visits is presented in **Figure 3**.

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

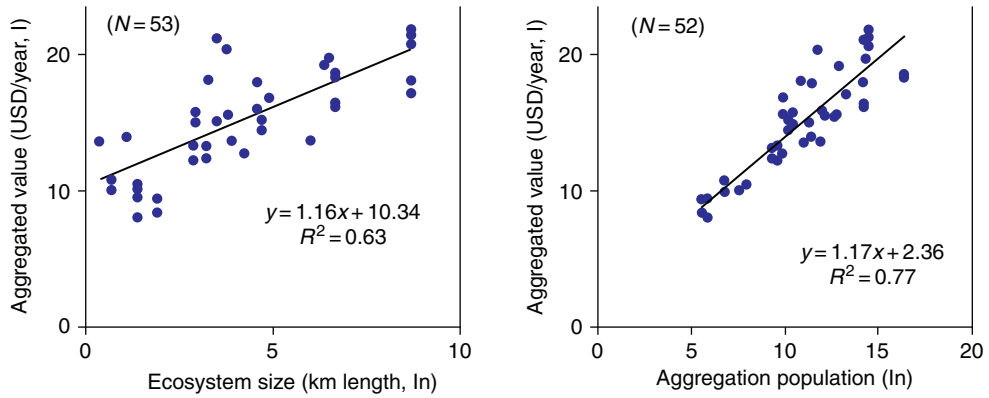

Figure 3 Correlation between economic values of recreation in coral reefs and ecosystem size and number of recreationists.

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 and 94.3 USD/person/year for CVM and CE, respectively. The average value estimated with TCM is substantially higher and amounts to 1147.4 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 an effect may constitute an important criticism of the reliability of primary valuation studies (Bateman and Jones, 2003).

Notwithstanding the range in 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 would be 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, and 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.

12.11.5.2 Marine Protected Areas

One strategy that has been developed as a response to the ongoing degradation of marine ecosystems is that of the MPA. MPAs can exist in many different forms, with each defined by the level of human activity allowed within its boundaries (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). MPAs can be established and protected through individual, national, or regional systems (Salm et al., 2000). As 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 characterized by a wide range of objectives that include fisheries restoration and sustainability, biodiversity protection, and tourism targets (Salm et al., 2000; Pomeroy et al., 2004). 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 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 recognized 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 interlinkage between MPA establishment and the tourism sector is an important and increasingly recognized one. The tourism sector can both produce the greatest value added to an MPA and be the first to benefit from its establishment (Kelleher, 1999). An MPA can lead to an expansion of nature-based recreation and tourism activities, thereby providing new job opportunities for local communities. (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.) This expansion can occur as a result of both (1) an arousal of new interest as the protected area is established and (2) 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 nonmarket 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 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. Martínez-Espiñeira and Amoako-Tuffour (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

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[a]	Yacob et al. (2009)
Pulau Redang, MYS	Diving, snorkeling	CVM	5.0–6.8[a]	Yacob et al. (2009)
Bako, MYS	Hiking	CVM	5.9	Marikan and Radam (2006)
Taean-Haean, KOR	Hiking, resting	CVM	7.6[b]	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[b]	Lee and Han (2002)
Curieuse, SYC	Boating, snorkeling, diving	CVM	34.1	Mathieu et al. (2003)
Montego Bay, JAM	Recreational values	CVM	24.0[b]	Dharmaratne et al. (2000)
Ile Coco, SYC	Boating, snorkeling, diving	CVM	36.7	Mathieu et al. (2003)
Manuel Antonio, CRI[d]	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[b]	Parsons and Thur (2008)
Barbados, BRB	Recreational values	CVM	44.3–223.8[b]	Dharmaratne et al. (2000)

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

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) observed that hotel-managed marine reserves may similarly achieve the objectives of nature conservation and economic sustainability.

There exist various policy implications of valuation studies such as these. First, they provide quantifiable and growing evidence that there is an increasing potential for eco-tourism 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. Second, eco-tourism 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 nonmarket 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.

12.11.5.3 Small Island Developing States

Most of the world's biodiversity 'hotspots' are to be found in the developing world (Myers et al., 2000). 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 (McElroy et al., 1990; Bass, 1993; UN, 2007; van Beukering et al., 2007; Teelucksingh and Nunes, 2009). 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), in terms of both 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 utilized, 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 that 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 data set 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 exist within an environmental vulnerability to marine and terrestrial degradation, this focus can both quantify the implied potential economic losses to the tourism sector and illustrate the ability to capture tourism values with a target to local community benefits.

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, depending

Table 8 Primary environmental valuation studies of recreational, cultural, and aesthetic ecosystem services in Small Island Developing States

Location	*Valued scenario*	*Valuation method*	*Individual WTP (USD/person/year)*	*Source*
Eastern Caribbean (across four 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	CE		Beharry-Borg and Scarpa (2009)
	(1) snorkelers		(1) 44.09	
	(2) non-snorkelers		(2) 13.85	
Dominican Republic	Tourists' WTP for agro-tourism	CVM		Herrera Catalino and Lizardo (2004)
	(1) in organic farming systems		(1) 317.62	
	(2) in conventional farming systems		(2) 308.88	
	(3) for both systems		(3) 541.99	
Barbados	WTP by users for Barbados National Park	CVM	44.3–223.8	Dharmaratne et al. (2000)
Barbados	Nonuse 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	Nonuse 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	CVM		Manoka (2001)
	(1) local community		(1) 39.22–95.61	
	(2) US community		(2) 3.59–8.34	
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	CE		Naylor and Drew (2001)
	(1) Household WTP for a management tax		(1) 75.69[b]	
	(2) Household WTP for a use permit		(2) 41.80	
Netherland Antilles (Bonaire)	Economic loss of SCUBA divers to a decline in reef quality	CE		Parsons and Thur (2008)
	(1) decline to 'good' quality		(1) 64.723	
	(2) decline to 'medium' quality		(2) 208.477	
	(3) decline to 'poor' quality		(3) 286.215	
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)

[a] 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.

Adapted from Teelucksingh, S., Nunes, P., 2009. The "ménage-à-trois" of biodiversity, human welfare and developing countries: Can valuation techniques reveal the true nature of this relationship? Paper presented at the 11th Annual BIOECON Conference on "Economic Instruments to Enhance the Conservation and Sustainable Use of Biodiversity", Venice, Italy.

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 nonuse 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 nonuse values which, for the Jamaican case, are negligible. Mathieu et al. (2003) estimate the use values of tourists with respect to five marine parks in the Seychelles, which range between 21.63 and 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 decline in reef quality; 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, snorkelers and non-snorkelers, with much higher values calculated for the snorkelers group.

We identify four studies with a more terrestrial focus (Manoka, 2001; Naylor and Drew, 2001; Herrera Catalino and Lizardo, 2004; Loomis et al., 2007). 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 that of the US community though, if generalized to total population estimates, the WTP by the US national community would, by definition, be relatively much higher than that of PNG. 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 utilized one methodological approach, with CVM adopted as the main methodological tool. Some studies used CE (Naylor and Drew, 2001; Parsons and Thur, 2008; Beharry-Borg and Scarpa, 2009), 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 nonuse 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 (nonuse) values. Dharmaratne et al. (2000) estimated both use values and nonuse 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 (Naylor and Drew, 2001; Loomis et al., 2007), or incorporated local values together with international ones into the analysis (Spash et al., 1998; Beharry-Borg and Scarpa, 2009). 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 finding. The Convention on Biological Diversity recognizes that eco-tourism 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 on 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 data set 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, in an 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.

12.11.6 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) (*see* Chapter **12.04**).

An important dimension in transferring economic values for ecosystem services is the so-called up-scaling valuation method (Brander et al., 2010). In the scaling-up valuation exercise, economic values from a particular study site are transferred to another geographical setting, such as a national or subregional 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, and regional networks) and services thus provided at 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 for member states of the European Union and are aggregated at the regional level of the Nomenclature of Territorial Units for Statistics (NUTS 2).

The eight regions with the highest number of tourist arrivals per year (more than 6 million 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 in terms of both 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 nonmarket 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 data set that is described in the present work. A semi-logarithmic model specification is assumed for the regression of the WTP/

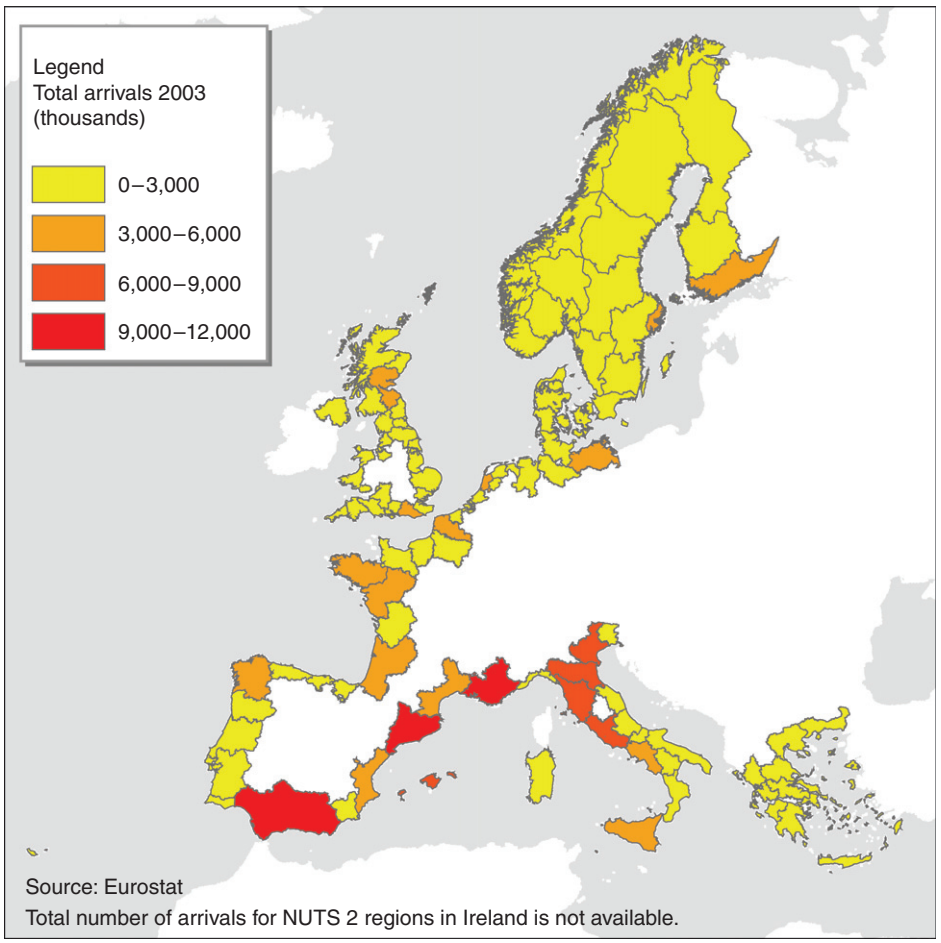

Figure 4 Total number of tourist arrivals in European regions during the year 2003.

person/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 12.11.4, is expressed as a function of 13 explanatory variables. The explanatory variables capture (1) 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; (2) site characteristics, such as the ecosystem type and whether the value is for nonconsumptive recreation or recreational fishing; and (3) characteristics of the context in which the valued ecosystems are placed, such as gross domestic product (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 nonconsumptive 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**.

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 these countries is high and also as the tourism industry in particular 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 the 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).

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*	*Aggregated value (million USD/year)*
Belgium	165.14	2 269 796	374.83
Denmark	169.72	6 814 569	1156.59
Finland	78.93	17 455 685	1377.76
France	188.55	56 544 023	10 661.27
Germany	118.53	6 580 242	779.94
Greece	399.76	22 600 413	9034.64
Ireland	271.9	10 792 300	2934.44
Italy	281.54	52 360 663	14 741.68
Netherlands	165.42	9 195 870	1521.15
Norway	230.18	8 604 340	1980.51
Portugal	176.45	14 665 924	2587.74
Spain	175.25	58 614 899	10 272.02
Sweden	122.67	43 780 405	5370.42

From Bigano, A., Hamilton, J.M., Lau, M., Tol, R., Zhou, Y., 2007. A global database of domestic and international tourist numbers at national and subnational level. International Journal of Tourism Research 9, 147–174.

12.11.7 Conclusions

This chapter focused on the contribution of coastal and estuarine ecosystems to human well-being via their provision of nonmaterial 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 policymaking 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, nonconsumptive recreation, and cultural and aesthetic services. The literature was then reviewed from a management perspective, with a particular focus on three cases that are particularly important to the provision of these types of services: coral reef ecosystems, MPAs, and SIDS. Finally, the ability to transfer values from study sites to policy sites via meta-analyses, and the upscaling 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 a 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 nonconsumptive recreational activities, while the HP 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 ones that are capable of capturing nonuse values.

With respect to specific ecosystem services, the review revealed that both nonconsumptive 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 nonconsumptive 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 WHS 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 finding in terms of the three perspectives adopted of coral reefs, MPAs, and SIDS. 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 conduct 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, nonmaterial 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 data set of primary valuation studies, which 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 and 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 nonmaterial services; (2) some emphasis given to the valuation of spiritual and religious values, in terms of both 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 'upscaling' 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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