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Counting coastal ecosystems as an economic part of development infrastructure

Lucy Emerton

The World Conservation Union in Asia

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Summary

This paper addresses the need to factor the environment into coastal development planning. It contends that the economic calculations that underpin coastal development decisions remain flawed, and fundamentally incomplete, because they omit an important set of costs and benefits — those associated with ecosystem goods and services.

From an economic perspective, coastal ecosystems should be treated, counted and invested in as elements of development infrastructure — as a stock of facilities, services and equipment which are needed for the economy and society to function properly. In order to ensure their productivity and continued support to human development, they need to be maintained and improved to meet both today's needs and intensifying demands and pressures in the future — just like any other component of infrastructure. In contrast, a failure to value ecosystems when choices are made about allocating land, resources and investment funds can incur far-reaching economic costs. It may ultimately undermine many of today's efforts at sustainable and equitable development, integrated management, and long-term reconstruction and economic growth in coastal areas.

The paper describes how recent advances in environmental economic concepts and methods provide an opportunity to better reflect ecosystem costs and benefits in coastal decision-making. It illustrates this with examples taken from the growing body of literature which deals with the economic value of coastal ecosystems in South and Southeast Asia. It is argued that a shift in the way in which development and conservation trade-offs are calculated is required — moving from approaches which fail to factor in environmental costs and benefits, to those which recognise natural ecosystems as an economic part of coastal infrastructure.

Posing the challenge: counting ecosystems as coastal infrastructure

The world's coastal areas contain a striking concentration of human settlement and economic activity. At the global level, nearly half of major cities are located within 50 km of the coast, and population densities are on average more than two and a half times higher than those of inland areas (Millennium Ecosystem Assessment 2005). Of an estimated population of just over 2 billion in South and Southeast Asian countries[1] (World Bank 2005), more than 40% — or 864 million people — live within 100 km of the coast, along a combined coastline length of some 200,000 km (World Resources Institute 2006). This large human population occupy, and use, a series of highly productive coastal systems[2] with valuable natural resources. Asia contains some of the richest and most extensive tropical coastal and marine ecosystems in the world.

It is therefore hardly surprising that the region's coastal zones have long been the focus of intense development. The last two years in particular have seen significant time, effort and funds invested in restoring and improving the coastal infrastructure and settlement that were damaged by the Indian Ocean tsunami of 2004. Yet, in the face of pressing needs for growth, this mandate to develop and (more recently) the rush to rebuild, have come at a significant cost — the widescale loss of coastal ecosystems, and a sharp reduction in the economically valuable goods and services that they provide. Resource over-exploitation, destructive harvesting techniques, habitat clearance and conversion, and land-based and marine sources of pollution have all taken their toll on South and Southeast Asia's coastal environment.

It would be extremely naïve to deny that an inherent tension exists between economic development and natural resource conservation. This tension is fundamentally to do with making choices about how, where and why to produce, consume and invest. Most actors in both conservation and development sectors are well-aware of these trade-offs — and a host of policies, laws and institutional arrangements exist which attempt to balance the competing demands on coastal lands and resources in a way that does not cause undue environmental harm. The dominant approaches and rhetoric under which development planning in coastal areas is now carried out, such as "sustainable development" or "integrated coastal zone management", are founded on such principles.

Economic measures and indicators have a strong influence on how trade-offs in coastal development are conceptualised and decisions are made, and are an important factor when choices are made about how to use and allocate funds, resources and lands. The economic calculations that underpin coastal development decisions however remain flawed, and fundamentally incomplete, because they omit an important set of costs and benefits — the values associated with ecosystem goods and services. From an economic perspective, coastal ecosystems should be treated, and counted, along the same lines as other elements of development infrastructure — as a stock of facilities, services and equipment which are needed for the economy and society to function properly.


Indian ocean island © Jerker Tamelander / IUCN

Yet, in reality, the role of natural ecosystems in economic development is at best persistently under-valued, and at the extreme is omitted completely from decision-making. Because this omission is leading to ecosystem degradation and loss, coastal development processes are running down a valuable stock of natural infrastructure — meaning that economic costs and losses are incurred, and important economic benefits are foregone. Ecosystem undervaluation may therefore ultimately undermine many of today's efforts at sustainable and equitable development, integrated management, and long-term reconstruction and economic growth in coastal areas.

The paper describes how recent advances in environmental economic concepts and methods provide an opportunity to make more informed decisions, and can be used to strengthen sustainable development planning in coastal areas. It takes examples from the growing body of literature which deals with the economic value of coastal ecosystems in South and Southeast Asia. The paper argues that a shift in the way in which development and conservation trade-offs are calculated is required — moving from approaches which fail to factor in ecosystem costs and benefits, to those which recognise, count and invest in natural ecosystems as an economic part of coastal infrastructure.

The problem: ecosystem under-valuation as an obstacle to informed decision-making

A review of past patterns of coastal development in the region would reinforce the observation that decision makers have perceived there to be few economic benefits associated with the conservation of natural ecosystems, and few economic costs attached to their degradation and loss. The expansion of agriculture, aquaculture, urban and tourist infrastructure has involved widespread conversion and reclamation of natural habitats. Intensive harvesting of natural resources has been promoted as a means of generating income, employment and foreign exchange earnings, and has placed high and often unsustainable demands on the natural resource base. All of these activities have run down the stock of coastal natural resources, and impacted on the resilience of ecosystems and their ability to provide goods and services.

At the macro-level, undervaluation of ecosystems in economic policy formulation has often hastened processes of coastal environmental degradation and loss — for example through subsidies to fisheries, tax breaks and fiscal inducements to "reclaim" natural habitats, and low or non-existent environmental penalties and fines. It is also worth noting that the problem of ecosystem under-valuation is not confined to "development" planners and decision-makers. Conservation efforts have equally been hindered by an inattention to ecosystem values, making it hard to justify or sustain their activities in economic and development terms, or to compete with other seemingly more profitable (and yet frequently unsustainable) investments, resource options and land uses.

If it is assumed that ecosystems have no value, then such decisions are perfectly rational ones from a financial and economic point of view — there is no net gain from factoring ecosystems into development decisions, and no need for conservation planning to take account of economic considerations. The reality is however not that coastal ecosystems have no economic value, but rather that this value is poorly understood, rarely articulated, and as a result is frequently omitted from decision-making.

Although conventional analysis decrees that the "best" or most efficient allocation of resources is one that maximises economic returns, measures of the returns to different land, resource and investment options have for the most part failed to deal adequately with ecosystem costs and benefits. Most cost-benefit analyses, investment appraisals and other economic calculations therefore remain fundamentally incomplete — and thus misleading in their conclusions as to the relative costs, benefits and returns to different uses of land, resources and investment funds.

Decisions have tended to be made on the basis of only partial information, thereby favouring short-term (and often unsustainable) development imperatives or leading to conservation and development choices that fail to optimise economic benefits. At the worst, in the absence of information about ecosystem values, substantial misallocation of resources has occurred and gone unrecognised (James 1991), and immense economic costs have often been incurred to the coastal populations who depend on ecosystem goods and services.

Environmental economic valuation can provide a powerful tool for placing coastal ecosystems on the agenda of planners and decision-makers. Its basic aim is to determine people's preferences: how much better or worse off they would consider themselves to be as a result of changes in the supply of ecosystem goods and services. By expressing these preferences, and relating them to measures of human well-being, valuation aims to make natural ecosystems directly comparable with other sectors of the economy when investments are appraised, activities are planned, policies are formulated, or land and resource use decisions are made.

When properly measured, the total economic value of ecosystem goods and services frequently exceeds the economic gains from activities which are based on ecosystem conversion or degradation (Barbier 1994). Although calculating the economic value of ecosystems does not necessarily favour their conservation and sustainable use, and economic criteria are only one set of factors among many in decision-making, it at least permits them to be considered as economically productive systems, alongside other possible uses of land, resources and funds. In other words, valuation enables more informed coastal planning and decision-making which considers the full range of opportunities and impacts associated with particular investments, land and resource use choices.


Fishing boats, Thailand © Jerker Tamelander / IUCN

One reason for the persistent under-valuation of coastal ecosystem is that, traditionally, concepts of economic value have been based on a very narrow definition of benefits. Economists have tended to see the value of natural ecosystems only in terms of the raw materials and physical products they generate for human production and consumption (especially focusing on commercial activities and profits). These direct uses however represent only a small proportion of the total value of coastal ecosystems, which generate economic benefits far in excess of just physical products or marketed commodities. Confining concepts of ecosystem value to these benefits alone would constitute a huge underestimation, and covers only the tip of the proverbial iceberg.

Over the last decade or so, the concept of total economic value (Figure 1) has become one of the most widely-used frameworks for identifying and categorising ecosystem benefits (Pearce 1990, Barbier et al 1997). Instead of counting only easily observable commercial values, it also encompasses subsistence and non-market values, ecological functions and non-use benefits. As well as presenting a more complete picture of the economic importance of ecosystems, it can be used to demonstrate the high and wide-ranging costs associated with their degradation, which extend beyond the loss of direct values.

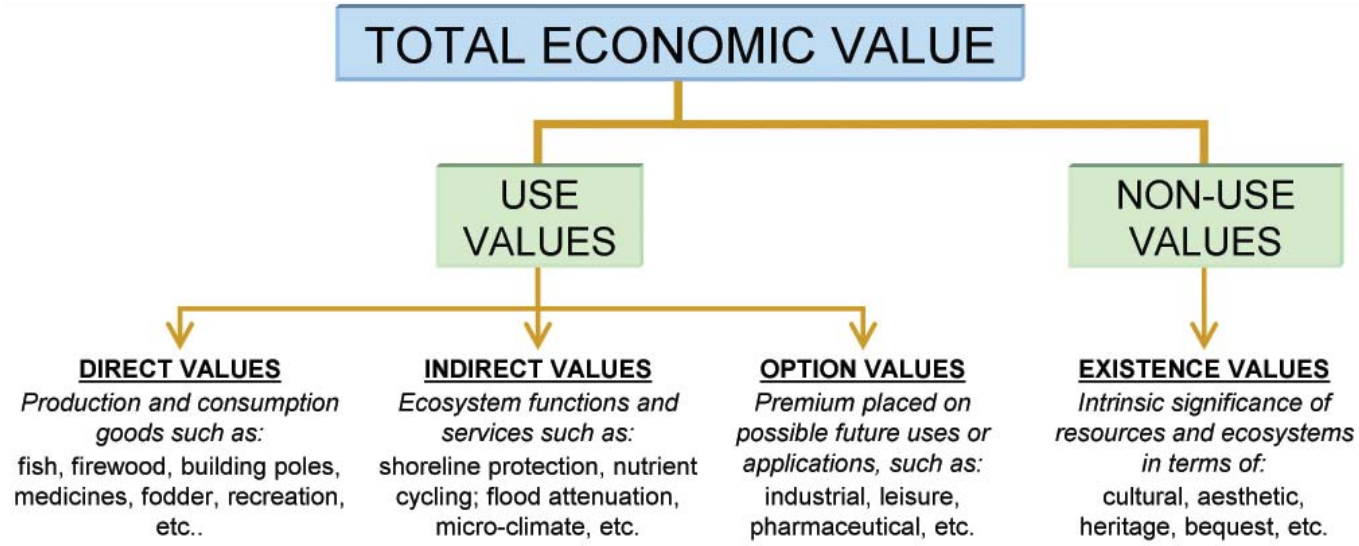


Figure 1: The total economic value of coastal ecosystems

Looking at the total economic value of a coastal ecosystem essentially involves considering its full range of characteristics as an integrated system — its resource stocks or assets, flows of environmental services, and the attributes of the system as a whole (Barbier 1994). Broadly defined, the total economic value of coastal ecosystems includes:

- **Direct values.** The raw materials and physical products that are used directly for production, consumption and sale — at both subsistence and commercial levels. Examples include fish, crustaceans and other marine species; firewood; construction materials; medicines; fodder; tourism and recreational resources.

- **Indirect values.** The ecological functions which maintain and protect natural and human systems and provide essential life support. These obviously vary for different types of coastal ecosystems, but include services such as protecting shorelines from storms, waves and tidal surges; guarding against coastal erosion; cycling nutrients; attenuating floods; sequestering carbon; regulating micro-climate; and providing nursery, breeding sites and shelter to various animal species.

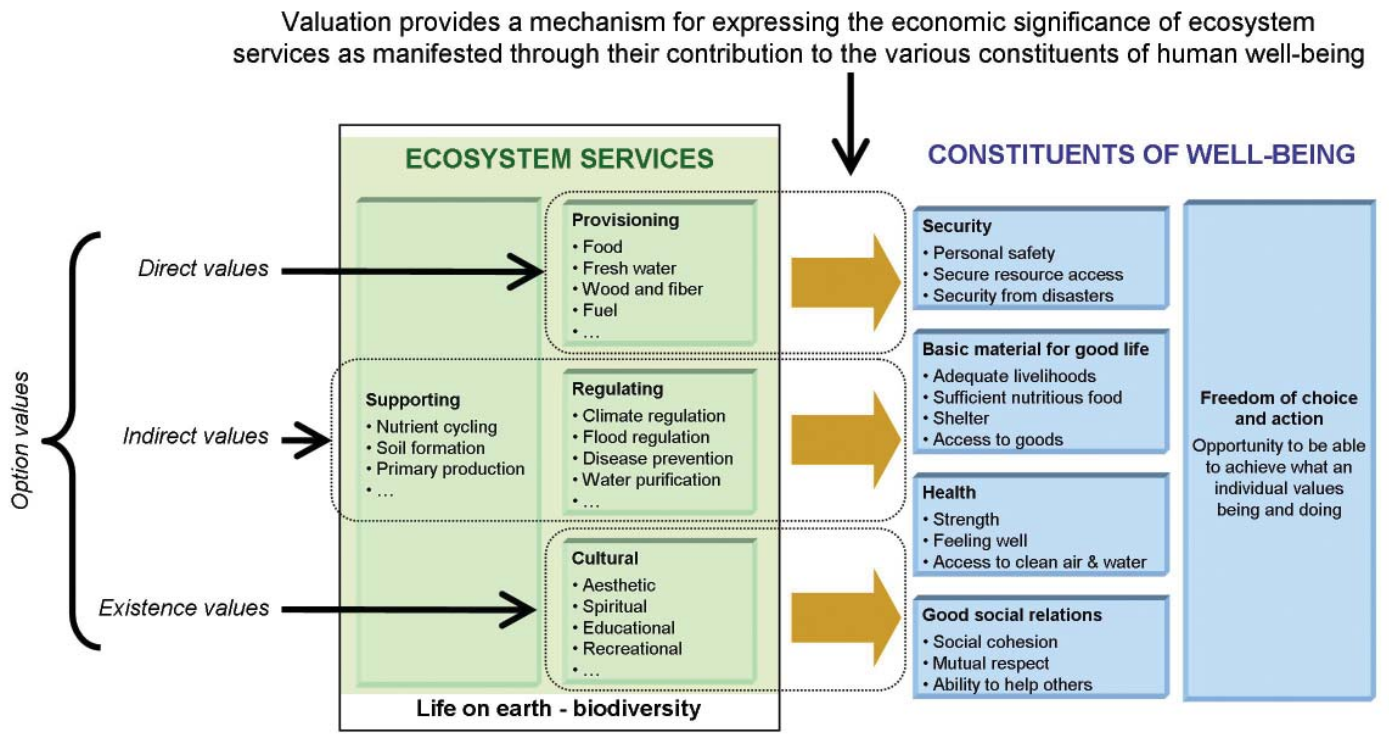
- **Option values.** The premium placed on maintaining a pool of landscapes, species and genetic resources for future possible uses which have economic value. By definition, many future use options for coastal ecosystems cannot be known now, because they have not yet been identified, discovered or developed. Examples include new industrial, pharmaceutical or agricultural applications of wild species; future tourism developments; or novel possibilities for resource utilisation.

- **Existence values.** The intrinsic value of ecosystems and their component parts, regardless of current or future possibilities to use them. Coastal ecosystems provide sites and landscapes, and contain a range of plant and animal species, which people value simply because they exist — not just because of the products and services they generate. Examples include historical or cultural sites and artefacts; aesthetic appeal; considerations of local, national or global heritage; or perceptions of bequest for future generations.

A lack of suitable methods has also in the past exacerbated the under-valuation of coastal ecosystems. Economists have conventionally calculated the value of goods and services in terms of their market prices – how much they cost to buy, or what they are worth to sell. Many ecosystem goods and services (particularly subsistence-level benefits, indirect, option and existence values) are however never traded, are undervalued by the market, are subject to prices which are highly distorted, or have characteristics of public goods which mean that they are not adequately allocated or priced by the free market. For these reasons, their value cannot be expressed accurately via market prices.

Parallel to the advances made in the definition and conceptualisation of total economic value, techniques for quantifying ecosystem values and expressing them in monetary terms have also moved forward over the last decade[3]. Today a wide range of methods are available, and used, for valuing ecosystem benefits. These include approaches which relate changes in the quality of quantity of ecosystem goods and services to changes in the output of a marketed good or service (production function approaches), look at the ways in which the value of ecosystem goods and services are reflected indirectly in people's expenditures or in the prices of other market goods and services (surrogate market approaches), assess the market trade-offs or costs avoided of maintaining ecosystems for their goods and services (cost-based approaches) or ask consumers to state their preference directly (stated preference approaches). As described in the next section, the development of these methods have enabled a wide range of formerly unvalued or undervalued coastal ecosystem benefits to be expressed in monetary terms.

Taking this concept of total economic value, which essentially defines and categorises the different benefits of natural ecosystems, we can in turn articulate the economic contribution of ecosystem services to various elements of human well-being. The Millennium Ecosystem Assessment (2005) offers a useful framework for understanding these linkages, underlining that ecosystems underpin human well-being (including the basic material needs for a good life, health, good social relations, security, and freedom of choice and action) through provisioning, supporting, regulating, and cultural services (Figure 2).



Source: Adapted from Millennium Ecosystem Assessment 2005

Figure 2: Linkages between ecosystem services and human well-being

From an economic perspective these ecosystem services, in turn, correspond to different elements of total economic value, including direct values (provisioning services), indirect values (supporting and regulating services), existence values (cultural services), and option values (their possible uses and applications in the future). Valuation attempts to determines people's preferences, and measure various indicators of their well-being. It therefore provides a mechanism for expressing the economic significance of these links — the value of ecosystem services as manifested through their contribution to the various constituents of human well-being. This allows the value of ecosystems to be articulated both as natural capital, as well as through the flow of goods and services they yield. Whereas the maintenance of coastal (and other) ecosystems sustains this stream of services which make an economic contribution to human well-being, their degradation both leads to a decline in economic benefit flows, and represents the loss of a capital asset.


Fish catch, Thailand © Jerker Tamelander / IUCN

The definition of a framework within which ecosystem benefits can be conceptualised and understood, and the development of methods by which value them, has spawned a growing body of studies on the economic value of coastal ecosystems. These attempts at valuation have provided important insights on the economic importance of ecosystems to coastal development and human well-being. The paragraphs below summarise recent valuation studies carried out in South and Southeast Asia. It is worth noting that mangroves, together with coral reefs, remain the main focus of the ecosystem valuation literature for South and Southeast Asia. To date there remains a dearth of information on the total economic value[4] of other coastal ecosystems such as lagoons, estuaries, coastal wetlands and forests, seagrass beds, beaches and sandy shores.

Coastal resources that form major inputs into commercial activities are for the most part relatively straightforward to identify, observe and measure. Over time, significant data have been generated about their contribution to production, income, employment and foreign exchange earnings. As a result, most people are well aware of the role that resource-based industries (such as fisheries and tourism) play in coastal economies, and these values are commonly (although often incompletely) reflected in most national-level economic statistics and development indicators. Consideration of coastal ecosystem values in decision-making, and the incorporation of cost and benefit data into economic and financial statistics and indicators, has however for the most part been limited to these values.

There is much less comprehension — and far fewer data — about just how important these goods and raw materials are in terms of their multiplier effects at national and local levels. In the Seychelles, for example, coastal and marine biodiversity contribute up to a quarter of all employment opportunities, one third of government revenues and two thirds of foreign exchange earnings (Emerton 1997).

Marine and coastal tourism, the largest industry in the Maldives, directly accounts for 20% of GDP and its wider effects help produce 74% of national income (WTTC 2005). Tourism contributes more than 60% of foreign exchange receipts, over 90% of government tax revenue comes from import duties and tourism-related taxes, and almost 40% of the workforce is employed in the industry. The national and global values associated with marine and (to a lesser extent) forest resources in Samoa have been estimated to account for almost one third of GDP (Mohd-Shahwahid 2001).

Although as yet no studies have been carried out in South and Southeast Asia which look at the contribution of coastal ecosystems in their entirety to the macroeconomy, various data underline the importance of specific coastal areas to sectoral output and income. For example the value of one mangrove area in Sarawak is estimated at around $25 million a year when fishery, forestry and tourism revenues are included (Bennett and Reynolds 1993), and studies carried out in southern Thailand derive very high values of $27,000-35,000 per hectare for the total contribution of mangroves to the economy (Sathirathai and Barbier 2001)

The role of natural resources in livelihoods is also typically significant (especially among poorer households) — although, again, is rarely recorded in formal statistics or indicators of economic output and growth, or factored into the investment appraisals or cost benefit analyses informing development activities in coastal areas. Mangrove forests have been shown to sustain more than 70 direct human activities, ranging from fuelwood collection to artisanal fisheries (Dixon 1989). In parts of Indonesia traditional use of mangrove products has been valued at over $3,000/ha/year, comprising up to half of income among the poorest households (Ruitenbeek 1992). Estimates from Thailand cite local use values of between $230/ha/year (Christensen 1982) and $1,200/ha/year (Sathirathai 1998), contributing about $1,500 per household in southern parts of the country (Sathirathai op cit) — equivalent to almost a quarter of per capita GDP.


Fishermen Muthurajawela, Sri Lanka © Sriyanie Miththapala

What is much more poorly understood is the enormous contribution that mangroves and other coastal ecosystems make in terms of safeguarding production and consumption, reducing vulnerability, and strengthening resilience. Just as most valuation efforts have covered only marketed resources and ignored subsistence-level use and non-traded products, the economic value of ecosystem services has traditionally remained largely undocumented, and omitted from decision-making. Where estimates have been made, it is clear that in many cases these benefits far outweigh direct use values. When only forestry and fisheries benefits are included, the annual value of mangroves has been estimated to average between $500 and $2,500/ha/year (Dixon 1989); looking at the goods and services associated with complete mangrove ecosystems typically yields much higher values of two to four times this amount (Primavera 1997).


Indian ocean reefscape © Jerker Tamelander / IUCN

Even though the valuation of indirect benefits typically requires much more complex methodologies and data sets than are required for the valuation of direct benefits, recent years have seen an increasing number of studies that attempt to articulate the value of coastal ecosystem services, and which highlight their economic significance. Taking both local level uses and indirect values, the mangroves of Koh Kong Province in Cambodia are estimated to generate benefits of between $500-$1,600/ha/year (Bann 1997). Mangroves in Rekawa, Sri Lanka yield values of something over $1,000/ha/year (Gunawardena and Rowan 2005), about three quarters of which is accounted for by their contribution to lagoon and coastal fisheries, and most of the remainder by erosion control and buffer against storm damage. In Sri Lanka, the costs and damages arising from the degradation of coastal wetlands are estimated to rise to over a thousand dollars per hectare in terms of lost water purification and flood attenuation services (Emerton and Kekulandala 2003).

Since the 2004 Indian Ocean tsunami, a great deal of attention has been focused on the function, and economic value, of coastal vegetation as a buffer against storms and waves. Although many of the claims that have been made about the role of ecosystems such as mangroves in mitigating or minimising the impact of extreme events such as the tsunami appear to have been massively overstated (Wells and Kapos 2006, Kerr et al 2006), the protective functions of ecosystems in moderating the action of less extreme storm and wave events and in limiting coastal erosion and storm damage are widely accepted (UNEP-WCMC 2005a,b, 2006). In Southern Thailand, mangrove coastline protection and stabilisation services are thought to be worth up to $3,000/ha/year, and carbon sequestration just under $100/ha/year (Sathirathai op cit). Mangrove erosion control services have been calculated to be worth some $600/household/year for coastal communities in Irian Jaya (Ruitenbeek 1992). Studies carried out in the south of Vietnam show that the net present value of mangroves in protecting against extreme weather events lies at around $5,000/km2 (Tri et al 1998).

Option and existence benefits are notoriously difficult to value for any type of environmental resource, and it is therefore not surprising that few studies have been carried out in Asia. The few estimates that have been made do however indicate that such values are likely to be substantial. Mangroves in Benut, Johor State in Malaysia have been estimated to generate non-use values of almost $7,500/ha/year — more than five times as much as their combined direct and indirect values (Bann 1999). Studies carried out on the Andaman coast of Thailand indicate that almost two thirds of residents are willing to pay to protect coastal ecosystems for future use, even if they do not use them now, indicating the economic values placed on non-use benefits (Seenprachawong 2002).

Future challenges: investing in ecosystems as coastal development infrastructure

This growing literature on the economic value of coastal ecosystems in Asia represents a major step forward in information and understanding. It has helped to demonstrate and articulate much more clearly the linkages between ecosystems and economic indicators of human well-being. Studies show that just as the economic and development benefits of well-managed or intact coastal ecosystems are substantial, so the economic costs of ecosystem degradation and loss can be substantial. The main concern is the resulting disruption of the ecological and economic goods and services normally generated by undisturbed systems (Barbier and Cox 2003).

Although economic valuation can in theory provide a powerful and convincing tool for placing ecosystems on the agenda of coastal planners and decision-makers, it is yet to reach its full potential. A number of important — but in no way insurmountable — challenges still remain. One major constraint is that most valuation studies remain largely academic exercises. In contrast to the considerable advances that have been made in developing conceptual frameworks and methodologies for environmental valuation, there has been far less progress in applying the results to real-world coastal policy, planning and management. Still, valuation studies which explicitly tackle coastal management issues and trade-offs in South and Southeast Asia are rare, and remain the exception rather than the rule[5].

Valuation is not an end in itself, but a means to an end — better and more informed decision-making. However high the value of ecosystem benefits is demonstrated to be in theory, this has little meaning unless it actually translates into changes in real-world policy and practice. Yet a better understanding, and more accurate quantification, of the economic benefits of ecosystem conservation (and economic costs of ecosystem degradation and loss) is still reflected weakly in the policies, markets and prices which determine the trade-offs and decisions faced by public policy-makers, private landholders and resource users whose actions have the potential to influence coastal ecosystem status. There remain few incentives or requirements to take account of ecosystem values when calculating land, resource or investment trade-offs, or to conserve coastal ecosystems in the course of planning and carrying out economic activities.

Both public and private investment in ecosystem conservation remains low, across the region — despite a strong emphasis on the importance of building coastal infrastructure. The belief that infrastructure development lies at the heart of economic growth and poverty reduction in South and Southeast Asia is frequently reiterated by government decision-makers and representatives of development banks and donors[6] (see for example ADB 2006, ASEAN 2002). Yet natural ecosystems are rarely, if ever, seen as part of these investment needs, or as a source of development and economic returns. Budgets to conservation remain low, and continue to be positioned as pure “conservation” funding rather than investments in vital development infrastructure.

Until such benefits and returns are not just expressed, but also reflected in conservation and development planning, policies and management practice, there is a real risk that coastal ecosystems will continue to be degraded and lost, however great their value has been demonstrated to be on paper. In contrast, if ecosystems are recognised as assets which yield a flow of services that are required for the economy and society to function properly, the human, social and financial capital that is required to sustain them (and which they, in turn, sustain) also needs to be allocated to their upkeep. In order to ensure their productivity and continued support to human development, ecosystems need to be maintained and improved to meet both today’s needs as well as intensifying demands and pressures in the future — just like any other component of infrastructure.

Muthurajawela, Sri Lanka © Sriyanie Miththapala

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Notes

[1] Taken to include Bangladesh, Brunei Darussalam, Cambodia, India, Indonesia, Malaysia, Maldives, Myanmar, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, Viet Nam.

[2] This paper adopts the definition of coastal systems given in the Millennium Ecosystem Assessment (2005): "Coastal systems refer to the interface between ocean and land, extending seawards to about the middle of the continental shelf and inland to include all areas strongly influenced by proximity to the ocean. Coastal systems include coral reefs, intertidal zones, estuaries, coastal aquaculture, and seagrass communities".

[3] See for example ADB 1996, Pearce 1992, Pearce and Moran 2004, Rietbergen-McCracken and Abaza 2000, Winpenny 2001.

[4] Although there is a large body of studies considering the value of specific marketed resources or commercial economic activities found within these ecosystems (mainly fisheries and aquaculture, and to some extent tourism), information on the economic importance of the ecosystems in their entirety, encompassing their full range of goods and services, remains largely lacking.

[5] Notable exceptions include work carried out in the Philippines which compares the costs and benefits of mangrove preservation with those generated by alternative uses such as aquaculture and forestry, in order to assess the economic efficiency of alternative management regimes (Gilbert and Janssen 1996 and 1998, Janssen and Padilla 1999), and a study which develops and applies a framework to assist in selecting economically optimal mangrove management strategies in Irian Jaya (Ruitenbeek 1992). Several studies also use valuation to factor considerations of ecosystem values into estimates of the profitability of the various commercial activities which take place in mangrove areas, including the assessment of alternative mangrove management regimes in Cambodia (Bann 1997) and an extended cost-benefit analysis of a shrimp culture development in Sri Lanka (Gunawardena and Rowan 2005).

[6] A recent keynote address made by the ADB's Vice President of Operations summarises well the priority accorded to infrastructure investments among development agencies: "To say that infrastructure development has impact is to state the obvious. No industrial country has advanced to such status without developing solid infrastructure facilities. And no low-income country has managed to escape poverty in the absence of infrastructure. There is no question that, for a developing country, infrastructure investment will pave the way for growth and thus poverty reduction. Poverty reduction and economic development depend on sustained growth, which in turn depends on productive activities supported by roads, railways, seaports and airports, power generation and transmission and other infrastructure services. In addition to economic growth, infrastructure development has a very tangible impact on people's daily lives, and especially on the lives of poor people." (ADB 2006).

IUCN
The World Conservation Union

The World Conservation Union in Asia

The IUCN Asia region covers 23 countries, stretching from Pakistan in the West to Japan in the East, Indonesia in the South to Mongolia in the North. IUCN maintains offices in Bangladesh, Cambodia, China, Lao PDR, Nepal, Pakistan, Sri Lanka, Thailand and Vietnam.The Asia Regional Office is in Bangkok, Thailand.

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