5. Economic valuation

Its use in protected area management

Section 1

Introduction

This chapter documents work carried out over the last decade on the economic valuation of protected areas. It highlights key issues and trends in the application of economic valuation techniques to the conservation and sustainable use of protected areas, and draws conclusions of relevance to the Lower Mekong Region. Perceptions of PA economic benefits and costs have changed over time and the use and application of economic valuation in different ecosystems and countries has provided insights and innovations for PA management. This chapter outlines the various techniques and approaches to this valuation work. It includes an annotated bibliography of protected area valuation in Lower Mekong countries, and lists key publications on PA valuation in other parts of Asia and elsewhere.

Section 2

Issues and challenges in valuing protected areas

2.1 The implications of under-valuation for protected area management

Challenge: Wild resources and ecosystems in general, and PAs in particular, have long been undervalued by both economists and PA managers.

The main economic benefits of PAs have traditionally been considered the extractive value of their component resources (if extractive uses are permitted) and tourism earnings (where tourism exists). This limited definition of economic value has had serious negative implications for both the development and conservation decision-making processes that affect PA management.

Economic techniques have long been used to evaluate the worth of land and resources, and the resulting information has been an important determinant in how funds, land, natural products and other resources are allocated and used. Conventional economic analysis decrees that the "best" allocation of scarce resources is that which maximises economic value. This concept of economic value has, however, failed to deal adequately with natural resources and services. It focuses almost exclusively on calculating financial values: the worth of goods as they are bought or sold in the market. Many of the economic, social and environmental benefits associated with environmental goods and services have been omitted from consideration because they have no formal market, price or expressed cash value.

Along with this very limited definition of economic value, only those values associated with the extractive use of component resources (such as commercial forestry, fisheries or mining) and tourism earnings have been seen as economically significant. Similarly, the economic costs of PA management have been very narrowly defined, including only direct expenditures on staff, equipment and operations that are necessary for park management. Little economic importance has been attached to most non-extractive, and almost all non-market, PA values, including their indirect economic costs. This has meant that PAs have been undervalued when land and resource use decisions are made. Where a PA generates no obvious commercial returns, conventional economic analysis suggests that it also has no value.

Traditional economic approaches have not only undervalued PAs, they have also had serious negative implications for PA management. Extractive resource use and tourism are not the primary purpose of most PAs. Their main function is the conservation of wild species and natural ecosystems in order to maintain a flow of (largely non-marketable) goods and services that will secure wider social, economic and environmental benefits. Undervaluation has resulted in these wider economic benefits being under-emphasised in development and conservation policy, planning and management practice.

2.1.1 What PA undervaluation means for development decision-making

Challenge: Focusing only on the extractive or commercial values of wild species and natural ecosystems has meant that PAs have been undervalued in development decision-making.

This is particularly problematic when governments make decisions about the allocation of public funds, the use of state lands and the management of natural resources. Both private and communal PAs are vulnerable to undervaluation, but the vast majority of PAs are state-owned or state-managed, and depend on government decisions. Public policy focuses mainly on tangible, market-based commercial and development returns, not PA conservation. Development thinking has traditionally taken the line that saving the environment implies "sacrificing" the economy, and PAs are among the natural resources most often described as "worthless" (CNPPA 1995).

- The establishment and maintenance of PAs has been difficult to justify in economic and development terms. In most countries the development imperative favours uses of land, natural resources and funds that yield immediate and demonstrable financial returns. Given society's increasing demands for employment, income and infrastructure, development decisions tend to maximising short-term economic gains. When PAs are undervalued, their conservation appears to be less desirable in development terms. Because it is difficult to demonstrate the high economic value of PAs or to make the case for PAs as an option that economically benefits land, resource and investment, it is also difficult to argue for their establishment, to ensure that they are managed sustainably and with conservation goals in mind, or to defend them against de-gazetting, encroachment and conversion to other land and resource uses.
- PAs are typically a low priority in macro-economic and sectoral decision-making. Allocation of government budgets is biased towards sectors and economic activities that make a demonstrable contribution to national income, output and employment. Because PAs are seen as having little economic or development value, and generate few obvious financial benefits or public revenues, they receive low

budget allocations from central government, and low investment in the human resources, capital and infrastructure necessary to maintain them. Meanwhile, the goals, policies, programs and projects of sectors perceived to be "productive" tend to drive national economic decision-making. PA concerns are usually not considered. At worst, macro-economic and sectoral economic policies can harm PAs through promoting more "valuable," yet environmentally unsustainable, uses of land and natural resources.

2.1.2 What PA undervaluation means for conservation decision-making

Challenge: The undervaluation of natural goods and services can undermine financial equity, and the efficiency and sustainability of PA management.

PA management has often failed to maximise economic benefits. As a result, both PA managers and those who exploit wild species and ecosystems are financially unable, or economically unwilling, to support PA conservation over the long term.

- The potential to generate income or to charge fair prices for PA goods and services has compromised PA budgets and earning capacity. Attempts to generate revenues from PAs have usually emphasised the direct commercial value of land and resources, often at the cost of capturing other benefits. Yet PAs yield other economic benefits, many of which are worth far more than commercial uses and are more environmentally sustainable. Examples include natural products with as yet untapped or undeveloped markets or opportunities for adding value, the provision of ecosystem services, and the generation of non-use benefits. Because such benefits are undervalued or unvalued in monetary terms, they also tend to remain uncaptured, even where there is willingness or ability among consumers to pay for them, or where a clear market potential exists. This is often inequitable; in many cases there is no reason why the beneficiaries of PA goods and services should not pay for them. It also means that, frequently, PAs have few financial resources for conservation activities.
- There has been little concerted effort to identify or counterbalance the economic threats and trade-offs that endanger PAs. Because PA goods and services are undervalued they also tend to be underpriced by the market, in themselves and relative to other, unsustainable, products and commodities. In many cases markets are distorted by policies and instruments that subsidise or artificially inflate prices and values in other sectors of the economy. Failure to recognise the full value of PAs or to reflect this in markets and prices means that conservation-related products and activities continue to be unfairly discriminated against in consumption and production decisions, because they appear less valuable or profitable. The private trade-offs that influence land and resource decisions are not based on a full appreciation of PA values. This results in economic activities being carried out in ways and at levels that threaten PA species and ecosystems.
- Little recognition of both PA benefits and costs has meant that insufficient tangible economic values are generated to provide incentives for conservation, especially at the local community level. There has been little recognition of the economic losses involved — the alternative, unsustainable, economic activities foregone — in setting aside land and resources in PAs. Along with the undervaluation of PA resources, this has often resulted in situations where insufficient tangible economic benefits are generated from PAs at the local level to compensate for opportunity costs or to provide lasting economic incentives for conservation.

2.2 Advances in environmental valuation

Achievement: Over the last decade definitions of economic value have widened to cover a much broader range of goods and services yielded by PAs, including non-use values and environmental services.

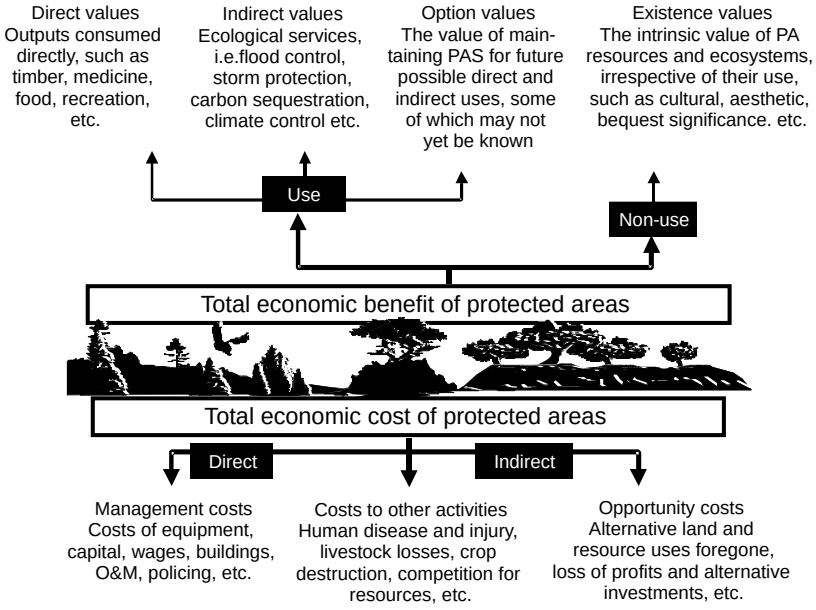
The concept of PA economic costs has similarly been extended beyond direct management expenditures to incorporate indirect and opportunity costs.

2.2.1 The total economic value of protected areas

The concept of total economic value (TEV) emerged in the mid-1980s and is now widely used to identify the economic benefits associated with PAs (Phillips 1998). Instead of focusing only on direct commercial values, TEV encompasses the non-market values, ecological functions and non-use benefits associated with PAs (Figure 1, Box 1). As well as presenting a more complete picture of the economic importance of PAs, it clearly demonstrates the high and wide-ranging economic costs associated with their degradation, which extend far beyond the loss of direct use values.

When considering PA economic values, it is important to include economic costs as well as economic benefits (Hitchcock 2000). Significant advances have been made in defining and conceptualising PA costs over recent years. The total economic cost of PAs is now seen as being greater than just direct management expenditures, encompassing both opportunity costs and losses to other economic activities incurred by the presence of PAs (Box 1). As is the case with benefits, this wider definition has brought a much more complete understanding of PA economic values.

Figure 1. Total economic value (TEV)



2.2.2 Techniques for valuing protected area goods and services

Achievement: Parallel to the advances made in the definition and concept of PA economic benefits and costs are techniques for quantifying these values and expressing them in monetary terms.

Although methods for valuing environmental goods and services began to be developed as far back as the 1970s, they only began to enter mainstream environmental economics and be widely applied to PAs in the late 1980s. Various manuals and overviews of the application of economic valuation techniques to PAs (CNPPA 1995, Dixon and Sherman 1990, Munasinghe 1994, Phillips 1998) and their component species and ecosystems (Aylward 1991, Bann 1997, Barbier 1991, Barbier et al. 1997, Pearce 1992, Pearce and Moran 1994, Rietbergen-McCracken and Abaza 2000, Spurgeon and Aylward 1992, Winpenny 1991), have been produced. These publications outline a wide range of methods for valuing both market and non-market PA goods and services (Box 1).

Box 1. Commonly-used tools for valuing PA goods and services

Market prices: The simplest and most straightforward way of valuing PA goods and services is to look at their market prices: what they cost to buy or what they are worth to sell. Although this method can be useful, in many cases biodiversity has no market, or is subject to prices that are highly distorted. In such cases alternative methods must be used. Market prices were used to value the goods yielded by mangrove ecosystems in the Indus River Delta, Pakistan. Fuelwood and fodder use rates by adjacent villagers were quantified, and values were ascribed according to prevailing commodity prices in local markets (Hecht 1999).

Effect on production: Economic processes often rely on PA resources as inputs, or on the essential life support provided by biodiversity services. Where PA goods and services have a market, it is possible to assess their value to the output or income of these initiatives. Soil erosion resulting from loss of natural vegetation in Mount Kenya Forest Reserve was valued using this technique. Annual rates of soil loss resulting from deforestation and forest encroachment were calculated, and related to the decline in downstream tourism, fisheries, agricultural and hydro-electric production and the resulting foregone income (Emerton 1998b).

Replacement costs: Even where PA goods and services have no market, alternatives or substitutes can often be bought and sold. These replacement costs can be proxies for PA resource and ecosystem values, although they usually represent only partial estimates, or underestimates. Venezuela's Canaima National Park (NP) safeguards a catchment feeding hydro-electric developments. The value of this services was calculated by estimating the cost of replacing hydro-electricity with petrol-based power generation. These additional expenditure are a minimum estimate of the value of the forest's catchment protection services (McNeely 1989)

Damage costs avoided: The reduction or loss of PA goods and services frequently incurs costs in terms of damage to, or reduction of, other economic activities. These costs represent the economic losses foregone by conserving PAs. The Anolis lizard is important in pest control for export crops in the Antilles because it feeds on insects. The market price of agricultural output lost to pests in the absence of services provided by the Anolis lizard was calculated in order to assess its value in terms of damage costs avoided (Narain and Fisher 1994).

Mitigative or avertive expenditures: It is almost always necessary to take action to mitigate or avert the negative effects of the loss of PA goods and services, so as to avoid economic damage. These mitigative or avertive costs can be used as indicators of the value of conserving PAs in terms of expenditures avoided. Coastal marshes and mangroves are important in shoreline stabilisation, erosion control, flood and storm protection on Mahé Island in the Seychelles. The value associated with these functions was calculated by applying a preventive expenditure approach. In the absence of wetlands services it would be necessary to construct groynes and flood barriers to offset or mitigate coastal erosion and damage to infrastructure, the cost of which was used as a proxy for the value of coastal marsh and mangrove services (Emerton 1997).

Travel costs: PAs typically hold a high value as a recreational resource or destination. Although in many cases no charge is made to view or enjoy natural ecosystems and species, people still spend time and money to reach PAs. This spending — for transport, food, equipment, accommodation, time, etc. — can be calculated, and a visitation rates can be compared to expenditures. These travel costs reflect the value that people place on leisure, recreational or tourism aspects of PAs. The travel cost method was applied to Dhaka Zoological Garden in Bangladesh. A visitor questionnaire collected data on origin, distance travelled, income and expenses. Several demand curves were constructed using regression analysis to describe the relationship between travel costs and number of visits, yielding information on willingness to pay per visitor (Hecht 1999).

Contingent valuation: Even where PA goods and services have no market price, and no close replacements or substitutes, they frequently have a high value to people. Contingent valuation techniques infer the value that people place on goods and services by asking them their willingness to pay for them (or willingness to accept compensation for their loss) under the hypothetical scenario that they would be available for purchase. Contingent valuation techniques are one of the few methods that can be used to assess option and existence values.

Contingent valuation was used to estimate the value of Kenya's elephants. A survey was administered to visitors to major national parks and lodges asking such questions as "Would you be willing to pay $100 (or more, or less) to contribute towards elephant conservation?" and "How much would the cost of your safari have to be reduced by if elephant populations decreased by a half?". Tourist consumer surplus accruing from viewing elephants was thus calculated (Brown and Henry 1989)

Two other approaches to environmental valuation may have some application to PAs, but they require such extensive data and analysis that they are rarely used. This, and their relatively low relevance to developing countries, means that they have only limited suitability to PA management practice. By establishing a dose-response relationship between environmental loss and decreased human productivity, the human capital approach to valuation adds up the loss of earnings, and other (such as medical) costs in order to calculate costs associated with the degradation or loss of environmental goods and services. Hedonic methods measure the differentials in property prices and wages between locations, and isolate the proportion of this difference that can be ascribed to the quality and provision of environmental goods and services.

Section 3

Using valuation for protected area management

Achievement: Many examples now exist of the application of economic valuation techniques to wild species, ecosystems and PAs in different countries (Table 1 and Section 5).

Perhaps the most important conclusion arising from this work is that valuation is not an end in itself — rather, it is a tool which provides useful information and recommendations for decision-making. By demonstrating and analysing economic benefits and costs, and relating these to real-world conservation and development issues, valuation has provided important insights for on-the-ground PA management.

3.1 Quantifying protected area economic benefits and costs

A better understanding of the value of PA economic benefits costs has many practical applications. Valuing PAs underlines the fact that they constitute far more than a static biological reserve. They form a stock of natural capital, which if managed sustainably can yield in perpetuity a wide range of direct and indirect economic benefits to human populations. Not only has valuation of benefits helped to place PAs firmly on the agenda of economic planners and decision-makers, but it has made a strong case for increased investment in PAs in the interests of economic development and social equity. Valuation has also highlighted the fact that PAs do not give rise to a stream of pure environmental benefits. A better understanding, and broader definition, of these costs has provided important information for understanding and addressing the economic causes of PA degradation and loss.

3.1.1 The economic value of non-marketed PA goods and services

Achievement: The use of valuation techniques to demonstrate the economic benefits of PAs that have traditionally been ignored in decision-making has been a major achievement.

Especially, being able to show that it is possible to express the value of non-market benefits in cash terms has underlined the fact that the economic worth of PAs extends beyond direct, commercial resource uses, and has helped to present a more complete picture of the economic significance of PAs at local, national and global levels.

One important, yet long undervalued, benefit of PAs is their economic importance for surrounding human communities. Because most community resource utilisation comprises non-marketed goods and services, such benefits have rarely been factored into monetary estimates of PA values. Yet, as Arntzen (1997) for example demonstrates for the case of Botswana rangelands, local-level consumption of non-marketed products, ignored in conventional economic analysis, typically represent a considerable use value.

A major constraint to the valuation of community PA benefits has been the inability of traditional market-based methods to deal with the fact that much local resource use takes place at the subsistence level, outside formal market systems. Furthermore, as Emerton (1996) points out for the case of PA forest use among a pastoralist community in East Africa, cash is not always the most appropriate indicator of value in subsistence economies. Increasingly, efforts are being made to adapt valuation techniques to these conditions by developing methodologies which do not rely on cash measures to calculate the value of local resource use. IIED (1997) document a wide range of innovative valuation methodologies, and their application in Africa, Asia and Latin America, which have been used to value the "hidden harvest" of local resource use. Lynam et al. (1991) also apply non-cash numeraires which reflect local perceptions of wealth rather than market prices to the community utilisation of miombo woodland resources in Southern Africa. Such techniques have also been applied specifically to PA values. Kramer et al. (1997) for instance modify contingent valuation techniques and quantify the economic costs and benefits to adjacent villagers of establishing a new forest PA in Madagascar by soliciting estimates of both forest product values and loss of PA resource use that are expressed in terms of sacks of rice.

One particularly important set of non-marketed PA resources, often contributing significant value at the local level, is non-timber forest products (NTFP). Underestimation of the importance of NTFP has proved a major constraint to the sustainable management of forest PAs, and has been the subject of several valuation studies. Godoy et al. (1993) review various estimates of the value of NTFP utilisation in Africa, Asia and Latin America, and show that in many cases they constitute one of the highest values in forests. Grimes et al. (1994) likewise demonstrate that the value of NTFP is many times higher than other components of rainforest value in Ecuador, and Mogaka et al. (2001) show that in Namibia non-timber woodland products have a value in excess of $180 million a year, more than 450 times more than commercial logging. Peters et al. (1989) directly compare timber and non timber values in the Peruvian Amazon, finding a "net present conservation value" for sustainable NTFP use of nearly $7,000 per hectare, far higher than the returns from clear-cut timber harvesting.

Table 1. Key case studies of economic valuation techniques

Reference	Country and sector/ecosystem	Valuation method
Abala 1987	Kenya: wildlife, tourism, PAs	TCM
Adger 1997	Vietnam: mangroves	MP, RCM, EOP
Adger et al. 1995	Mexico: forests	MP, EOP
Ahmad et al. 1993	Malaysia: tourism, PAs	CVM
Ahmad 1993	Djibouti: forests, PAs	MP
Andersson and Ngazi 1995	Tanzania: marine and coastal, fisheries, PAs	MP, EOP
Arntzen 1997	Botswana: rangelands, drylands, wildlife, PAs	EOP
Barbier et al. 1991	Nigeria: wetlands	MP, RCM
Bellu and Cistulli 1997	Italy: PAs, forests, tourism	CVM, TCM

Bennett and Reynolds 1993	Malaysia: mangroves, PAs, tourism	MP
Berg et al. 1998	Sri Lanka: Coral reefs, fisheries, tourism	CVM, EOP, MAE, RCM
Bojo 1996	Ghana, Kenya, Namibia Zimbabwe: PAs, wildlife	MP
Bostedt and Mattsson 1995	Sweden: forests, tourism, PAs	CVM
Brown and Henry 1989	Kenya: PAs, wildlife	CVM, TCM
Cabrera et al. 1998	Mexico: mangroves	MP, EOP
Casellini et al. 1999	Vietnam: wildlife	MP
Cesar 1996	Indonesia: coral reefs	MP, EOP
Clayton and Mendelsohn 1993	U.S: wildlife, PAs, tourism	CVM
Costanza et al. 1989	U.S: wetlands	CVM, EOP, RCM
Day 2000	South Africa: wildlife, PAs, tourism	CVM, MP
De Lacy and Lockwood 1994	Australia: PAs	TCM, CVM
Dixon et al. 1993	Netherlands Antilles: marine, tourism, PAs	MP, TCM
Durojaiye and Ikpi 1988	Nigeria: PAs	TCM
Eaton and Sarch 1997	Nigeria: wetlands	MP
EFTEC 2000	Peru: PAs	CVM, TCM
Emerton 1996	Kenya: forests, wildlife, PAs	NM-CVM
Emerton 1998a	Uganda: wildlife, PAs, tourism	MP, OC
Emerton 1998b	Kenya: wildlife, forests, PAs	MP, EOP, RCM, TCM, CVM
Emerton and Mfunda 1999	Tanzania: wildlife, PAs, tourism	MP, OC
Englin and Mendelsohn 1991	U.S.: forests, tourism, PAs	TCM
Gammage 1997	El Salvador: mangroves	MP, EOP
Grandstaff and Dixon 1986	Thailand: PAs, tourism	TCM, CVM
Gren et al. 1994	UK, Sweden: wetlands	CVM, RCM, MAE
Grey 1998	Australia: forests	MP
Grimes et al. 1994	Ecuador: forests	MP
Higgins et al. 1997	South Africa: fynbos, PAs, tourism	MP
Howard 1996	Uganda: wildlife, forests, PAs	MP, OC
Kramer 1994	Madagascar: forests, tourism, PAs	NM-CVM, TCM
Lal 1990	Fiji: mangroves	EOP, OC
Langford et al. 1997	UK: wildlife, marine CVM	
Lee 1998	Korea: wetlands, marine and coastal	MP
Loomis 2000	U.S: wildlife, tourism, PAs	CVM
Lynam et al. 1991	Zimbabwe: forests	NM-CVM
Maille and Mendelsohn 1993	Madagascar: PAs, tourism	TCM
Menkhaus 1993	India: PAs, wildlife	CVM, TCM
Moran 1994	Kenya: wildlife, tourism, PAs	CVM
Navrud and Mungatana 1994	Kenya: wetlands, wildlife, tourism, PAs	CVM, TCM
Norton-Griffiths and Southey 1995	Kenya: wetlands, wildlife, tourism, PAs	MP, OC
Othman and Abdullah 1991	Malaysia: wetlands, wildlife, PAs, tourism	MP
Peters et al. 1989	Peru: forests	MP
Purushothaman et al. 2000	India: forests, PAs	MP
Ruitenbeek 1992	Cameroon, Costa Rica, Ecuador, Nigeria, Philippines: forests	MP
Saichoono 1995	Zambia: wildlife, tourism, PAs	CVM, OC

Smith et al. 2000	Peru: forests, agriculture	MP, CVM
Tejam and Ross 1997	Philippines: marine and coastal	CVM
Tobias and Mendelsohn 1991	Costa Rica: forests, tourism, PAs	TCM
Tri et al. 1996	Vietnam: mangroves	MP, EOP, MAE
Turpie et al. 1999	Malawi, Mozambique, Namibia, Zambia: wetlands, PAs	CVM, MP, EOP, MAE, RCM
Von Moltke and Spanninks 2000	China: wildlife	MP

CVM: Contingent Valuation Methods; EOP: Effect on Production; MAE: Mitigative and Avertive Expenditures; MP: Market Prices; NM-CVM: Non-market CVM; OC: Opportunity Costs; RCM: Replacement Cost Methods; TCM: Travel Cost Methods

Achievement: The ability to place monetary values on PA ecosystem services is very important.

It has helped make the point that PAs have an economic value even when they are not managed under extractive regimes. Perhaps most famous is the study by Costanza et al. (1997), who present an estimate of the value of the world's ecosystem services as $33 trillion a year, equivalent to nearly twice the combined national income of all the countries of the world. Environmental services have also been valued at the site-specific level, for several different types of ecosystems. Gren (1995), for example, discusses the value of Swedish wetlands for nitrogen abatement, suggesting that the high resulting values show that the returns from investment in wetland conservation significantly exceed those from sewage treatment plants. Kramer et al. (1997) evaluate the watershed catchment protection functions of a protected forest in Eastern Madagascar, and Emerton (1998b) uses replacement cost and effect on production techniques to value the watershed catchment functions of Mount Kenya Forest Reserve at more than $14 million a year. These studies all show that, in many cases, the indirect economic benefits of PA ecosystems can be demonstrated to be far higher than values yielded by consumptive uses.

Challenge: Because option and existence benefits are so intangible, they have proved to be the most difficult components of PAs to value.

A small number of studies have applied valuation techniques to quantify these benefits. In a modification of CVM techniques, Brookshire et al. (1983) estimate the option and existence value of wildlife resources in Wyoming by measuring the willingness to pay for licences to hunt grizzly bears and big-horn sheep. Stevens et al. (1991) also use CVM techniques to assess existence values for the bald eagle, Atlantic salmon, wild turkey and coyote in North America. Dixon (1990) documents a study carried out in Virgin Islands NPs that estimates their existence benefits at almost $5 million a year in terms of nearby land values. He also attempts to quantify the existence value of Khao Yai NP, Thailand using the value of wild elephants as an indicator. This value was estimated at some 120 million baht per year. Tejam and Ross (1997) use CVM techniques to quantify the aesthetic and quality-of-life values placed by urban dwellers on maintaining environmental quality in Batangas Bay, Philippines.

3.1.2 PAs and national economies

PAs not only generate local economic benefits, they also typically yield considerable off-site benefits. A major obstacle to PA management has been the failure of macro-economic and sectoral planners to see PAs as making a significant contribution to national economic activity and development goals. As Adger et al. (1995) demonstrate, in Mexico, forests have a high total economic value, but much of this value is not considered by central decision-makers because it accrues outside the country's national boundaries, or outside formal markets.

Achievement: Valuation has provided the means to demonstrate the importance of PAs in national development and economic growth, and has showed how this information can be used to influence mainstream development decisions and economic indicators.

Mogaka et al. (2001) value the contribution of the forest sector to Eastern and Southern African national economies and highlight the shortcomings of traditional estimates of economic output and growth. They point out that if official statistics are consulted, it would be easy to imagine that forests have little economic value, because in no Eastern or Southern African country is their recorded contribution to GDP more than 3 per cent. In Kenya, for example, in addition to forest sector earnings of just $2 million a year, informal indigenous timber extraction is thought to be worth nearly $8 million, local household forest use has a value of more than $94 million, and forest PA-based leisure and tourism has the potential to earn more than $30 million. Grey (1998) reaches similar conclusions for Australia, showing how the total economic value of forests to the Australian national economy is far in excess of conventional government estimates.

These types of arguments for rethinking national economic statistics can also be applied specifically to PAs. There are many examples of the significant, but largely unrecorded, contribution of PAs to national development goals. Australia's PAs, for example, earn at least $1 billion a year — more than 30 times the cost to government of running them (Phillips 1998). Belize receives a quarter of its GDP from PA tourism (CNPA 1995), Nepal's PA tourism earnings are 3 times more than the national parks' budget of $3 million (Munasinghe 1994), and PAs in Kenya account for just under a tenth of national wage employment and over a third of foreign exchange earnings (Emerton 1999).

3.1.3 The economic justification for PAs

Achievement: Economic valuation has also been able to provide strong, and much needed, arguments for PAs as a profitable and economically beneficial use of land, resources and investment funds.

Demonstrating the total economic value of PAs can make a convincing case for the conservation of wild species and ecosystems. Higgins et al. (1997), for example, value South Africa's mountain fynbos ecosystems in order to argue for increasing funding and protection, including the control of alien invasive species. Ruitenbeek (1992) uses a total economic value approach to calculate a "rainforest supply price" to justify forest conservation in Cameroon and Tingsabadh (1996) values biodiversity in five Provinces of southern Thailand in order to justify conservation. Spurgeon (1998) shows how valuation can be used to support ecosystem rehabilitation and protection in coastal and marine habitats.

Specifically for the case of PAs, the valuation of economic benefits can be used to defend the gazetting of new locations or to argue against changes in their protected status. Emerton et al. (1999) calculate the economic value of ecosystem services and livelihood benefits from Nakivubo wetland in Kampala, Uganda at more than $1.5 million a year, using the results to make a strong case for it to be protected as part of the city's green belt. Brown and Henry (1989) use travel cost and contingent valuation methods to calculate the annual viewing value of Kenya's elephants at between $25 and 30 million, thus arguing for increased investment in elephant conservation and PA management. Navrud and Mungatana (1994) use a similar approach to quantify the value of wildlife in Lake Naivasha NP, Kenya, at up to $15 million a year and to demonstrate that PAs provide a significant and much-needed source of revenue for government.

3.1.4 The economic costs of PA degradation and loss

Achievement: Estimating the value of economic costs of failing to conserve PA species and ecosystems has helped to increase the priority accorded to PAs in economic decision-making.

Dixon et al. (1996), for example, estimate the value of environmental losses caused by various development and infrastructure projects in Asia, and show how this information can influence project planning and implementation. Berg et al. (1998) examine the economic consequences of coral mining in Sri Lanka; the resulting loss of ecosystem services and tourism opportunities is as much as $7.4 million, and far exceeds the benefits from alternative developments. Cabrera et al. (1998) quantify the costs of destructive harvesting for mangrove goods and services in the Terminos Lagoon, Mexico, and Costanza et al. (1989) use valuation to estimate the current loss of Louisiana wetlands at $77–544 million a year. Englin and

Mendelsohn (1991) make the point that even small changes in environmental quality can affect PA values. They use hedonic and travel cost methods to quantify the impacts of changing site quality on the recreational value of forest protected areas in the U.S.

Natural resource or green accounting presents a framework for using the results of valuation to modify national income systems so as to incorporate the economic effects of environmental degradation and loss. Adger and Grohs (1994) present a modified Net National Product for Zimbabwe which takes account of the costs of environmental degradation, finding that traditional national income estimates overstate the value of agricultural sector output by approximately 10 per cent. Bartelmus et al. (1992) show how accounting for the environmental impacts of agriculture, forestry, energy and mining activities brings down recorded Net Domestic Product (NDP) by 3–10 per cent in Papua New Guinea. Van Tongeren et al. (1991) apply natural resource accounting techniques to Mexico and conclude that environmentally-adjusted NDP is up to 13 per cent lower than official national income estimates. Although there are as yet few examples of the application of natural resource accounting to PAs, these techniques are starting to be applied, and could provide important policy and management information for protected areas (Cacha 1994).

3.1.5 The economic costs of PA management

Achievement: An important achievement in the application of economic valuation to PAs has been the quantification of their full economic costs.

It is clear that in many cases the indirect and opportunity costs of PAs are far higher than the direct management expenditures which have traditionally been the focus of PA budgeting and cost estimation. Dixon (1990) for example estimates the total economic costs incurred by Khao Yai NP in Thailand and finds that opportunity costs in terms of local resource use foregone are, at some 27 million baht a year, almost nine times higher than direct management costs. Howard (1996) likewise shows that the $110 million a year opportunity costs of PA conservation to the Ugandan economy are much higher than management costs, and far exceed revenues generated by PA agencies. This is both an achievement and a challenge for PA managers.

Challenge: Valuation has also demonstrated that the presence of PAs can incur significant losses to other economic activities in neighbouring areas.

Dixon (1990) for example documents the indirect costs of Kangaroo Island NP in Australia in terms of losses caused to adjacent landowners due to the movement of park animals onto agricultural land. Estimating the losses arising from competition over grazing, fencing costs, ammunition and time required to carry out culling, restrictions on private land development and fire hazards arising from activities in the park, he calculates these costs at $100,000 a year — almost as large as the operating expenditures of the NP itself. Emerton (1998b, 2001) presents several estimates of PA wildlife-related agricultural losses in rural Kenya, calculating crop losses at more than $1 million a year around Mount Kenya Forest Reserve, disease transmission to domestic animals in Laikipia District at $27 per sq. km, livestock kills and injuries around the Maasai Mara National Reserve at $100 per sq. km and farm damage of more than $250 per household around Shimba Hills National Reserve.

3.2 Using economic values for protected area conservation achievement

The ultimate aim of applying valuation techniques to protected area species and ecosystems is to highlight the ways in which economic issues can be addressed, economic tools used, and PA management strengthened. One of the most useful achievements of recent work has been the use of valuation techniques to identify ways of better capturing and distributing PA benefits and costs, to highlight needs and niches for setting in place economic incentives for PA conservation, and to point to mechanisms for raising sustainable finance for PA management.

3.2.1 Economic disincentives to PA conservation

The application of valuation techniques to calculate PA benefits and costs provides important information about where and why there exist economic disincentives to conservation. As Munasinghe (1994) points out, when valuing PAs to generate management information there are two main questions to be asked: who are the losers and winners when PAs are conserved, and when PAs are over-exploited. As long as land and resource users incur a net benefit from PA degradation they continue to have a strong disincentive to conserve PAs. Cesar (1996) illustrates how the private gains from environmentally destructive fishing activities in Indonesia are so high that people have few incentives to stop them, even though the wider social and economic costs arising from coral reef degradation are also high.

Where people incur a net cost from PAs they are also unlikely to be economically willing (or able) to support conservation. Typically local communities and government wildlife agencies bear many of the direct and indirect costs of PAs, which are often disproportionately large compared to benefits received. This presents major economic disincentives to PA conservation. Emerton (1998a) illustrates this point by valuing the economic costs and benefits accruing from the operations of Lake Mburo NP in Uganda, showing that local communities face a net economic loss from of $0.3 million a year and that government revenues are inadequate to cover more than a quarter of the annual costs of running the park. She concludes that this imbalance of costs and benefits both jeopardises the ability of the Uganda Wildlife Authority to manage the PA effectively, as well as presenting local economic disincentives to conservation. Similarly, Andersson and Ngazi (1995) value the costs and benefits to local fishing communities of establishing a Marine Protected Area at Mafia Island, Tanzania, highlighting the need for compensation mechanisms to offset local resource use foregone. Saichoono (1995) uses contingent valuation techniques to assess community economic costs and benefits from the Mumbwa Game Reserve in Zambia, and demonstrates both a land use conflict between local users and wildlife, and the need to compensate villagers for economic losses incurred by the PA. Othman and Abdullah (1991) also value the local economic trade-offs in conserving Tasek Bera Wetland in Malaysia, demonstrating the conflicts between maintaining local resource use and developing the area for agriculture and energy provision.

3.2.2 Improving existing protected area prices and markets

Achievement: By highlighting cases where PA conservation incurs net economic costs or losses, valuation has also been used to point to ways of providing economic incentives for conservation.

Mechanisms that attempt to factor the full value of PAs into existing prices and markets have significant potential to increase the economic gains from conservation. PA goods and services are often undervalued in the market, as Gray (1997) illustrates for the case of forest royalty rates in Africa and Asia. Gray argues that low prices fail to reflect the full value of forest resources, maximise income or encourage sustainable forest management. It has become clear that PAs often must be managed for multiple benefits and markets, rather than strict protection. Only then can they generate sufficient economic incentives and revenue to ensure their continued existence and compete with alternative, destructive land and resource uses. Freese and Trauger (2000) illustrate this point by evaluating the growing commercial markets for wildlife and other components of biodiversity in North America, showing that they can provide important incentives for conservation if they are well-managed.

Challenge: PA benefits for tourism and recreation are often undervalued by existing pricing systems, in spite of considerable scope for revenue generation.

In many cases valuation has helped identify niches for marketing PAs tourism benefits, or indicate appropriate prices. Bellu and Cistulli (1997) look at the economic value of forest recreation in the Liguria Region of Italy, where no entry fees are currently charged, and argue that the extremely high values suggest that there is a market for forest-based tourism. Pearce (1997) examines the recreational value of PAs in Africa and argues that the levels at which park entry fees are set undervalue wildlife because they fail to maxim-

ise income or fully capture tourist willingness to pay. Abala (1987) reaches a similar conclusion, using travel cost methods to demonstrate that visitor willingness to pay for the recreational services of Nairobi NP in Kenya is far in excess of the entry fees charged. Moran (1994) applies contingent valuation techniques to calculate wildlife viewing values for Kenya's PAs, recommending the level to which prices should be raised in order to capture more of this tourist consumer surplus.

3.2.3 Identifying new markets and funding for PAs

Challenge: Many of the economic values attached to PAs are not captured, because no markets or prices exist for them.

The application of valuation techniques has proved useful in identifying cases where there is potential to capture PA values through the development of new markets and prices, and to thereby generate new sources of finance for PAs. Several studies have used valuation of the global benefits generated by PAs to justify increased international funding for conservation. Kumari, for example, calculates the TEV of forests (1995) and wetlands (1996) in North Selangor, Malaysia to make the case for increased international financing to secure global benefits. Norton-Griffiths and Southey (1995) value the opportunity costs of the Maasai Mara National Reserve to the Kenyan economy at some $203 million a year. They show that domestic revenues are insufficient to offset these losses and argue that the preservation of global benefits justifies more external donor support.

Achievement: Valuation has also helped to identify a range of businesses, enterprises and cost-sharing arrangements through which PA management agencies can tap into private sector investment and finance. This will decrease the burden on existing government budgets and funding sources.

Suharso (2000) describes how the high conservation values of Kutai NP in East Kalimantan, Indonesia have generated donations of more than $300,000 from nearby private industries for PA management. Riedmiller (1999) describes how the high commercial value of Chumbe Island Coral Park in Zanzibar has stimulated private sector management of the park. Emerton and Mfunda (1999) value PA goods and services around the Serengeti NP in Tanzania, and show that the development of new wildlife-based joint ventures between the private sector and local communities have more than tripled existing returns to conservation.

Valuation has also highlighted the potential of developing new markets that trade in the indirect and option values associated with PA species and ecosystems. These can harness additional sources of funding. Mendelsohn and Balick (1995) quantify the value of tropical forest species for as-yet-undiscovered pharmaceutical applications, estimating that screening and collection of all tropical plant species could yield market values of as much as $4 billion to private drug companies and as much as $147 billion to society as a whole.

The non-consumptive values yielded by PA ecosystem services have also been studied, leading to the identification of new markets and income-generating possibilities. Acharya (1998) highlights the ways in which valuation can be linked to recognising, quantifying and setting in place systems for capturing the value of wetland ecosystem services. The World Bank (2001) describes how the valuation of tropical forest benefits in Latin America has enabled land-owners in Costa Rica to charge a private hydro-electric provider for watershed catchment services; similar fees are charged for flood control services in El Salvador and hydrological benefits in Colombia. Sedjo (1999) examines the links between economic valuation and emerging markets in carbon sequestration. Looking at the Patagonia region of Argentina, he uses a present value approach to identify the various types of institutional arrangements that might be required to provide a market for the carbon sequestration services provided by forests.

3.3 Limitations to the economic valuation of PAs

Economic valuation techniques have generated extremely important information for PA management. They highlight costs and benefits which in the past have often been ignored by development and conservation planners, decision-makers and policy-makers. Valuation, however, only provides a set of tools to make better and more informed decisions about PA management; it is not an end in itself, and it has a number of shortcomings.

Challenge: Valuation is usually incomplete. Some PA benefits will always be unquantifiable, either because the necessary scientific, technical or economic data is not available or because they refer to attributes such as human life, religious or cultural significance, the valuation of which raises serious ethical questions.

Hitchcock (2000) argues that valuation can be dangerous for protected area management when it focuses attention on financial values at the expense of non-market values, some of which can (or should) never be quantified. The inability of valuation techniques to deal adequately with PA non-use benefits is a particularly contentious issue. Brown and Moran (1993), for example, argue that economic valuation is essentially a utilitarian approach, and has shortcomings in terms of cultural, intrinsic and primary aspects of value. Likewise, Green and Tunstall (1991) contend that, although the valuation of use benefits is relatively well-developed, a number of theoretical and methodological problems make it difficult to reliably estimate non-use values.

Economic valuation is also partial because it is only one of many sources of information for PA planning and decision-making, and not always the most important one. As Erickson (2000) explains, even if species and ecosystems have been assigned dollar values by economists, valuation will not guarantee their protection. In some cases there are strong arguments against using valuation for PA planning and decision-making. O'Neill (1997) contends that environmental managers do not consider valuation when they make their day-to-day decisions, even though economic theory suggests that monetary valuation is necessary in decision-making. Examining a number of arguments for the monetary valuation of biodiversity, he shows that none are satisfactory. He concludes that while there may still be problems in environmental decision-making, failing to use monetary values is not one of them.

Challenge: There are also practical problems in applying many economic valuation techniques to PA management. They require large amounts of data and human resource capacities that are simply not available to many PA planners.

Carson (1998), for example, explores the practical difficulties (including funding, capacity and time constraints) in applying complex techniques such as contingent valuation methods to biodiversity and protected area valuation. Spaninks and van Beukering (1997) use the example of valuing mangrove goods and services in Pagbilao Bay in the Philippines. They argue that although valuation methods are available in principle, a lack of data and quantitative knowledge can constrain valuation in practice.

Challenge: Even where the economic valuation of PAs is possible and practical, the results often contain omissions and inaccuracies.

Valuation techniques are particularly limited in their ability to account for social and distributional issues. Economic valuation is usually based on a particular person's or group's conception of what a PA good or service is worth at a specific point in time. It may not be universally valid, or be able to be extrapolated to different groups, areas or species or over time. Adamowicz and Beckley (1998) highlight the difficulties of valuing use of forest resources among indigenous communities, citing potential problems that arise from sacred or taboo goods, variations in property rights and difficulties in aggregating individual responses from indigenous and non-indigenous populations. Lintott (1996) looks specifically at valuation within the context of "green" accounting, and argues that it often ignores issues of poverty and inequality.

Challenge: Valuation exercises are heavily influenced by the purposes for which they have been carried out.

The desire to promote a conservation agenda sometimes means that results are biased towards demonstrating the high value of PA goods and services. As Phillips (1998) points out, very few valuation studies consider the costs of PAs as well as their benefits. Chomitz and Kumari (1998) show how, for tropical forests, attempts at valuation often overestimate the quantifiable benefits of conservation. Simpson and Sedjo (1996) assess the value of biodiversity for new product research, arguing that in many cases the value of biodiversity in these applications is overestimated, and in reality has a negligible value.

Challenge: There is no guarantee that economic valuation will bring results that support PA conservation.

Batagoda et al. (2000) use the case of Singharaja Forest Reserve in Sri Lanka to illustrate the dangers of incomplete valuation exercises. In this case calculating only the value of NTFPs underestimates the total economic value of the forest reserve, making conservation seem a less profitable option than clear-felling. They emphasise that biodiversity conservation in protected areas will often be justifiable only on the basis of a full total economic valuation that is accompanied by other scientific and ethical reasoning. In some cases the recommendations arising from valuation studies, especially when they concern instruments to increase the commercial or extractive exploitation of wild species, can prove damaging to PAs because they lead to resource over-exploitation. This is illustrated by Freese and Trauger (2000), who demonstrate that using valuation to identify and promote markets in wildlife products can have a negative effect on biodiversity conservation. If poorly managed, such markets can in fact lead to biodiversity loss.

Section 4

Lessons learned for protected areas in the Lower Mekong

A number of important lessons can be learned from a review of available techniques for environmental economic valuation, and of their application to PA goods and services, for the Lower Mekong region. PAs have long been undervalued in economic terms; as a result PA values are not reflected adequately in decisions about public or private land, resource use and investment or in the policies, prices and markets that influence these decisions. As a result, the free market cannot be relied upon to provide sufficient economic incentives or financing for PA conservation. Valuation highlights the full economic importance of PAs, identifies cases where undervaluation constrains PA management, and points to tools that can be used to ensure that PA values are incorporated into development and conservation decision-making.

- **Economic planning decisions frequently undervalue, and thereby marginalise, protected areas.** The main economic importance of PAs has traditionally been seen in terms of the commercial extraction of resources and tourism. Because this underestimated their value, PAs were seen as having little importance in economic decision-making. This has made it difficult to justify PA establishment, to defend PAs against de-gazetting and conversion to other land uses, to make the case for PAs as an economically beneficial land, resource and investment option, or to integrate PAs into mainstream development planning and budgeting.
- **Undervaluation has compromised the financial and economic equity, efficiency and sustainability of protected areas.** PA decision-making has also underemphasised economic values, and made few attempts to demonstrate or capture these values in the interests of conservation. Failure to recognise the need and the potential to generate income has compromised the budgets of government PA agencies. Not considering the indirect and opportunity costs of PA conservation has resulted in situations where adjacent communities and others are economically unable (or unwilling) to support conservation. Inadequate effort has been made to counterbalance the economic threats and trade-offs that endanger PAs.
- **Over the last decade, definitions of the economic benefits and costs of PAs have been extended.** The concept of Total Economic Value (TEV) has been developed and applied to PAs. TEV incorporates many of the PA values that were traditionally ignored in economic decision-making. PA

economic benefits are now defined as extending beyond direct commercial values, and include non-use values, non-market values and environmental services. PA economic costs are now defined as extending beyond direct management expenditures, and include opportunity costs and indirect losses to other economic activities.

- **Over the last decade, innovative valuation methodologies have been developed and applied to PAs.** Just as definitions of the economic costs and benefits of PAs have been extended, a range of new methodologies has developed with which to quantify these values in monetary terms. There are now many examples of the valuation of PA goods and services, covering most countries and types of ecosystems, and utilising a broad range of valuation methodologies.
- Valuation increases the emphasis accorded to PAs in mainstream economic and development thinking. Estimates of value have helped to put PAs on the agenda of economic planners and policy-makers, who make many of their decisions based on the monetary returns of resource, land and investment options. Valuation information has also been used to modify traditional national economic statistics and development indicators to incorporate PA goods and services; for example, through the application of natural resource or green accounting techniques.
- **Valuation helps to justify PAs in development terms. Valuation can show, and quantify, the actual and potential contribution** of PAs to national economic growth, employment and income, to local livelihoods, to commercial profits and to industrial activities. It also helps translate the full costs of PA degradation and loss into social and development terms, providing a convincing argument for PAs.
- **Valuation helps identify the economic causes of PA degradation and loss.** Comparison of PA values, and analysis of their distribution among different groups, identifies who gains and who loses from PA conservation and degradation. It indicates where PA-degrading economic activities are profitable or economically attractive, and where PA conservation is unprofitable or economically unattractive.
- **Valuation indicates the full revenue needs for PAs.** These needs extend beyond direct cash expenditures to the indirect and opportunity costs incurred by PAs.
- **Valuation identifies ways of improving existing markets and prices for PA goods and services and developing new ones.** Quantifying the total economic value of PAs can show where goods and services are currently underpriced by the market. It can also indicate where there is potential to develop new markets or prices to charge PA beneficiaries or to capture PA benefits as cash values. As well as generating revenues, prices and market measures can provide an effective means of regulating the demand for resources and of providing incentives for sustainable management.
- **Valuation helps to increase community benefits from PAs, and to put in place local economic incentives for conservation.** Valuation of community-level economic benefits and costs can identify the type and magnitude of the local trade-offs involved in conserving PAs. It can also show where current levels of benefits are inadequate to offset PA-related costs. It shows where the need, and the potential, exists to increase the level of economic benefits flowing from PAs to local communities.
- **Valuation underpins innovative financing and cost-sharing arrangements for PAs.** By demonstrating the high economic value of PAs, and of their component goods and services, valuation can provide justification for raising funding levels and for sharing PA costs among central government, the private sector, consumers of PA goods and services, and the international community. This increases and diversifies the financial sustainability of PAs and reduces their dependence on traditional sources of funding and management agencies.
- **Although economic valuation yields many useful insights for PA management, it has a number of methodological and practical limitations.** Valuation is not an end in itself; it is merely a tool for making better and more informed decisions about PA management. In many cases the results of PA valuation are of necessity incomplete, because they cannot (or should not) value particular aspects of PA benefits and costs, because they lack data, or because they are only one of a number of perspectives and information sources which determine PA decision-making. Many valuation methodologies require a great deal of time, money, equipment and training, which are not available within the context of limited PA budgets, staffing and human resource capacities.

Section 5
References

5.1 References, including examples of valuation from the Lower Mekong Region

Adger, W. N. 1997. Sustainability and Social Resilience in Coastal Resource Use. Working Paper GEC 97-23, Centre for Social and Economic Research on the Global Environment: London.

Sustainable development is defined in this paper as a set of necessary constraints in the areas of efficiency, equity and resilience of social and natural systems. This is novel in its emphasis on social resilience, which captures many aspects of the institutional framework that is required for sustainability. Social resilience can be observed through proxy measures associated with property rights and access to resources, demographic changes and other measures. Present day equity considerations are also incorporated. The discussion focuses on coastal resources because they are perceived as the most resilient ecosystems due to their high functional diversity. It is also argued that they are socially and economically resilient because of the diversity of economic activities in coastal zones. The paper demonstrates the usefulness of the approach by exploring its implications in two studies. First, recent attempts to derive the economic value of ecosystem functions are presented with the limitations of this approach. Economic values in particular are often site- and culture-specific and their influence on resource use is fundamentally determined by the property rights governing entitlements to exchange and endowment. Even if equity is incorporated into resulting values, the relative importance of ecosystems differs according to their location. The second study is based on the conversion of mangrove forest in coastal northern Vietnam. It also shows the importance of equity considerations in the sustainability of resource use decisions and the impacts of such conversion on social resilience.

- contains examples or case studies from Vietnam
- focuses on key ecosystems or sectors: forests, marine and coastal

Bann, C. 1997. *The Economic Valuation of Mangroves: A Manual for Researchers.* International Development Research Centre: Ottawa.

This manual was developed to help researchers in South East Asia evaluate mangrove ecosystems. Its main components are an introduction to the values to mangroves and the threats they face, a theoretical introduction to environmental valuation, a methodology for the economic assessment of mangrove management options, a qualitative discussion of the possible impacts associated with common development options for mangrove ecosystems, and two case studies.

- contains examples or case studies from Cambodia and Vietnam
- focuses on key ecosystems or sectors: marine and coastal, wetlands, fisheries, forests

Bann, C. 1997. *An Economic Analysis of Alternative Mangrove Management Strategies in Koh Kong Province, Cambodia.* Research Report, EEPEA - Economy and Environment Program for South East Asia, International Development Research Centre: Ottawa.

The objective of this study was to provide information on the economic benefits and operational practices that might be employed in economically optimal management strategy for mangroves. A parallel objective was to train a team of Cambodians in survey techniques, data collection and analysis, and ultimately in the economic appraisal of natural resource use. The mangrove area in Koh Kong province covers an area of 63,700 hectares (ha) and has been described as ecologically and economically significant to Cambodia and the other countries located on the Gulf of Thailand. Furthermore, it is the only site in all of continental Southeast Asia that is considered to have potential as a coastal biosphere reserve. The mangrove forests and related environments of Koh Kong are therefore of vital international importance for nature conservation. As in other mangrove areas in Cambodia, the mangroves of Koh Kong, which support a number of households, are threatened by clearing for intensive shrimp farms and for commercial and domestic charcoal production. Charcoal production, which is illegal, has recently been stopped by the provincial government. This has left a number of families unable to support themselves, especially since fishing productivity has also declined. No other viable employment alternatives for local people have been identified. In order to make rational management decisions for the mangroves of Koh Kong, the full range of benefits and costs associated with the different uses of the mangrove ecosystem must be evaluated. This comprehensive approach can provide information to decision-makers on the environmental and social costs and benefits of various management options, and can therefore contribute to sustainable management. The study presents an economic evaluation of the two key uses of the Koh Kong mangrove resource: local community use and commercial shrimp farming. The mangroves of Koh Kong are central to the livelihood of coastal households, are of high ecological importance and, if carefully man-

aged, would provide a base for sustainable economic exploitation. The substantial benefits of the mangrove ecosystem would be foregone if the mangrove areas were compromised through uncontrolled resource use and inappropriate development.

- contains examples or case studies from Cambodia
- focuses on key ecosystems or sectors: marine and coastal, PAs, forests

Bann, C. 1997. *An Economic Analysis of Tropical Forest Land Use Options, Ratanakiri Province, Cambodia.* Research Report, EEPEA - Economy and Environment Program for South East Asia, International Development Research Centre: Ottawa.

Ratanakiri is a richly forested province in remote Northeast Cambodia. Its forests are an extremely valuable natural resource that needs to be correctly managed if its benefits are to be maximised. Despite the lack of a land-use plan for the province, a number of commercial development activities are underway. Many of them will result in the destruction of pristine forest areas. Because local communities in Ratanakiri are totally dependent on the forest, and rapid deforestation is taking place, sustainable forest management options urgently need to be identified. An economic assessment of the costs and benefits (including environmental values and distributional concerns) of alternative uses of forest land can contribute to this process. The analysis can also show which option will bring the greatest economic and social returns to Cambodia over the long term. This study compares two key land uses: traditional use (e.g. harvesting of NTFPs) and commercial timber extraction. It is hoped that the results of this study will prove useful to policy-makers and other relevant parties involved in provincial land-use planning. The report's main recommendation is that all customary forest land in Ratanakiri be excluded from current and future timber concessions. As a first step, the recently formed local Forest Conservation Association in Poey Commune should be legally recognised. Further, the development of similar associations should be supported throughout the province. All current commercial activities affecting forest land in Ratanakiri should be immediately frozen until a more satisfactory and economically viable land-use plan can be recommended and implemented.

- contains examples or case studies from Cambodia
- focuses on key ecosystems or sectors: PAs, forests

Bien, N. N. 2001. *Forest Management systems in the Uplands of Vietnam: Social, Economic and Environmental Perspectives.* Research Report, EEPEA - Economy and Environment Program for South East Asia, International Development Research Centre: Ottawa.

The North Upland of Vietnam is characterised by biophysical, social and cultural diversity and by its important contribution to the national economy. The region also suffers from serious environmental problems, such as deforestation, soil degradation, loss of biodiversity and unsustainable livelihoods. These are attributed to ineffective institutional arrangements (such as inadequate property rights and enforcement), lack of local participation and empowerment, and misguided government policies. This research project aimed to determine better institutional structures for promoting sustainable forest management in the North Upland. It used a range of decision-making and participatory approaches, assessing and comparing various forest management regimes by means of socio-economic, environmental and institutional variables. Methods included Participatory Rural Appraisal (PRA), Criteria and Indicators (CandIs) Framework (CIFOR approach) and Multi-criteria Decision Analysis (MCDA). Three study sites were chosen, representing three human-ecological sub-regions of the North Upland, They are characterised by different types of forests. MCDA results showed that "household" was the most preferable option in all three sites, regardless of the different CandIs ratings. "Forest enterprise" was still an important component of forest management, particularly in protection forests, where forest enterprises were as important as households. Other options, such as contract-based, village-based and joint management were not preferred. It was noted that although the results of MCDA rank the different management systems, they do not tell why one system is preferred. The study makes a number of policy recommendations about government policy on food security for upland areas; the creation of markets for locally produced commodities; human resources development that involves the local population; and legalisation of land tenure for local people including customary land and areas already being managed by them. The report also recommends further research to develop separate sets of CandIs for specific forest categories, and steps to allow the dissemination of research results.

- contains examples or case studies from Vietnam
- focuses on key ecosystems or sectors: PAs, forests

Casellini, N., Foster, K., and Hien, B. T. T. 1999. *The "White Gold" of the Sea: A Case Study of Sustainable Harvesting of Swiftlet Nest in Coastal Vietnam.* IUCN - The World Conservation Union, Vietnam Country Office: Hanoi.

The sustainable exploitation of wild natural resources, such as swiftlet nests, has been achieved in Vietnam without external aid or expertise. This study examines economic aspects of this trade and argues that it is an importance

source of sustainable revenue for Vietnam. It also documents attempts by a private company to invest in scientific research and monitoring of harvesting, and their human and financial management procedures.

- contains examples or case studies from Vietnam
- focuses on key ecosystems or sectors: wildlife, marine and coastal

Chuenpagdee, R. 1998. *Damage Schedules for Thai Coastal Areas: An Alternative Approach to Assessing Environmental Values.* Research Report, EEPEA - Economy and Environment Program for South East Asia, International Development Research Centre: Ottawa.

Experience with valuation of natural resources has not provided reliable methods for measuring the economic value of most non-marketable environmental assets involved in damage claims and allocation decisions. This study, rather than relying on current valuation practices to guide resource allocation policies and determine compensation awards, proposes a "damage schedule approach." The damage schedules reflect community values, which should be considered in natural resource management and policy-making. Damage schedules are based on scales of relative importance calculated by measuring people's judgements about values of resource losses and the activities that cause those losses. People are asked to indicate their preferences and values without any reference to monetary values. They are simply asked to choose which item in a pair they consider more important. The resulting scales of relative importance are then examined for their usefulness in providing a basis for the damage schedules. The research was conducted using actual situations in the two coastal areas of Thailand: Ban Don Bay and Phangnga Bay. The two areas provided a good basis for testing the approach, as they differed in resource characteristics and in the resource's economic importance to the region.

- contains examples or case studies from Thailand
- focuses on key ecosystems or sectors: marine and coastal, PAs

De Lopez, T., Vibol, K., Proeung, S., Dareth, P., Thea, S., Sarina, C., Song, S., Chantha, V., Vandy, N., Bunly, L., and Sinoeun, C. 2001. *Policy Options for Cambodia's Ream National Park: A Stakeholder and Economic Analysis.* Research Report, EEPEA - Economy and Environment Program for South East Asia, International Development Research Centre: Ottawa.

Preah Sihanouk (Ream) National Park is located in southwestern Cambodia, in the province of Kompong Som. The park covers 21,000 ha of terrestrial and marine habitats. Approximately 26,600 people live within the park's boundaries. Important stakeholders include local communities, commercial loggers and fishermen, park authorities, the Cambodian Ministry of Environment and tourists. The report has two objectives: to determine how the establishment or destruction of the park distributes benefits and costs among different stakeholders; and to formulate strategies for the management of these stakeholders in order to achieve conservation goals. Five surveys were undertaken in the field to provide social, economic and ecological data for cost-benefit and stakeholder analyses. They included a survey of 15 per cent of households in local communities, three different contingent valuation surveys of tourists in Kompong Som and park visitors, and a forest inventory of the park's mangroves.

- contains examples or case studies from Cambodia
- focuses on key ecosystems or sectors: marine and coastal, wetlands, PAs, forests

Dixon, J., and Hufschmidt, M. M. (eds.). 1990. *Economic Valuation Techniques for the Environment: A Case Study Workbook.* John Hopkins University Press: Baltimore and London.

Environmental impact is one of the most significant considerations in the evaluation of economic development projects, but it is extremely difficult to measure. This book presents detailed case studies, from various parts of Asia, of the economic evaluation of the environmental impacts of development projects. Three introductory chapters examine general aspects of environmental valuation techniques, including the identification, quantification and analysis of environmental effects. A hypothetical case study illustrates important differences between financial and economic evaluations, and between market and shadow prices.

- contains examples or case studies from Thailand
- focuses on key ecosystems or sectors: agriculture, fisheries; infrastructure, marine and coastal, urban settlements, PAs, forests, wildlife; water

Dixon, J. A., Carpenter, R. A., Fallon, L. A., Sherman, P. B., and Manipomoke, S. 1986. *Economic Analysis of the Environmental Impacts of Development Projects.* Earthscan Publications Ltd: London.

Although it has always been thought that some degree of pollution and waste is unavoidable in development projects, no one has made much effort to quantify and assess the extent of this damage. This book proposes a means of constructing useful economic evaluations of the impacts on the environment of development projects. It calls for the systematic evaluation of all intentional and unintentional consequences of development initiatives before

they are approved. Various case studies from Asia illustrate valuation methods and environmental impacts of development projects.

- contains examples or case studies from Thailand
- focuses on key ecosystems or sectors: agriculture, infrastructure, fisheries; industry

Dixon, J. A., and Sherman, P. B. 1990. *Economics of Protected Areas: A New Look at Benefits and Costs.* Earthscan Publications Ltd: London.

The true economic value of protected areas — including national parks, scientific reserves, wildlife sanctuaries, natural monuments and landmarks — is often difficult to measure. These areas may be the repository of unique or very valuable natural assets, yet the short-term gains from exploiting their natural resources can often appear more attractive than the long-term benefits of conservation. This book helps government and non-governmental agencies assess the costs and benefits associated with maintaining protected areas. It also provides methodologies for valuing these benefits and costs in monetary terms. Case studies are presented of the valuation of protected areas from Asia, Africa, Latin America and the Caribbean.

- contains examples or case studies from Thailand
- focuses on key ecosystems or sectors: PAs, wildlife, forests; water, tourism

Grandstaff, S. and J. Dixon. 1986. Evaluation of Lumpinee Park in Bangkok, Thailand. In Dixon, J. and M. Hufschmidt (eds.). *Economic Valuation Techniques for the Environment: A Case Study Workbook.* Baltimore: John Hopkins University Press.

Sometimes an environmental resource, such as a public park, provides many benefits to users but no direct expression of its value is apparent because no admission fee is charged. Lumpinee Park in Bangkok is an example. The case study examines several techniques that can be used to estimate the monetary value of the benefits received by park users and other individuals. The Lumpinee Park chapter presents two approaches to valuing park benefits: travel cost and contingent valuation methods. The results of these valuation exercises provide information about benefits from park use and park existence.

- contains examples or case studies from Thailand
- focuses on key ecosystems or sectors: wildlife, PAs

Isangkura, A. 1998. *Environmental Valuation: An Entrance Fee System for National Parks in Thailand.* Research Report, EEPEA - Economy and Environment Program for South East Asia, International Development Research Centre: Ottawa.

Many national parks in Thailand are threatened by activities such as encroachment by local villagers, forest fires, soil erosion, human settlement or pollution. This cumulative negative impact can in part be attributed to insufficient funding for park management. The objectives of this study are to measure the recreational values of three recreational areas in northern Thailand; and to use these recreational values to determine entrance fees. The study focuses on three public recreational areas, Doi Inthanon National Park, Doi Suthep and Mae Sa Waterfall, which are part of two national parks in Chiang Mai province. The study explores the concept of a multi-park system which will explore consumer preferences for recreational attributes and ways in which consumers substitute one recreational area for another. Information on consumer preference ordering will be used to calculate the appropriate entrance fee for each of the three areas. The results will be useful in the preparation of the master plans, currently being drafted, for Doi Inthanon National Park and Suthep-Pui National Park. The master plans will address many issues, including the management of human settlement inside the park, forest degradation, conservation of park ecosystems, land use planning, and recreation and tourism. Appropriate pricing can be an important component of the master plans, as it would demonstrate how proposed recreational activities could be financed.

- contains examples or case studies from Thailand
- focuses on key ecosystems or sectors: PAs, forests

James, R. F. 1991. *Wetland Valuation: Guidelines and Techniques.* PHPA/AWB Sumatra Wetland Project Report No 31, Asian Wetland Bureau - Indonesia: Bogor.

This document briefly discusses a number of key issues of concern when valuing natural areas, and provides detailed guidelines on the application of a number of specific valuation techniques. The document focuses mainly on practical issues and methodologies.

- contains examples or case studies from Thailand
- focuses on key ecosystems or sectors: wetlands, marine and coastal

Kumar, R., and Young, C. 1996. *Economic Policies for Sustainable Water Use in Thailand.* CREED Working Paper No 4, International Institute for Environment and Development: London.

This paper has been prepared as part of the ongoing CREED project on Macro Economic Policies and the Environment in Thailand. The objective of the paper is to illustrate how the Social Accounting Matrix of Thailand may be extended to incorporate water resources and give examples of what the supply and demand functions for water would look like. The framework is based upon an integrated approach to demand and supply management of water resources and its implications for water pricing policies. The discussion concentrates on modifications and extensions of the social accounting matrix and on demand and supply equations for water that reflect the true scarcity of water for different uses and from different sources. There is an attempt, at the conceptual level, to introduce the user cost of water in the accounting matrix, thereby providing a link between Computable General Equilibrium (CGE) models and user costs. Incorporating the modified social accounting matrix and demand and supply equations for different water resources into the general equilibrium model would be a follow-up of this exercise, to be undertaken at a later stage.

- contains examples or case studies from Thailand
- focuses on key ecosystems or sectors: water, wetlands, agriculture, watersheds, industry, infrastructure, urban settlements

Sathirathai, S. 1998. *Economic Valuation of Mangroves and the Roles of Local Communities in the Conservation of Natural Resources: Case Study of Surat Thani, South of Thailand.* Research Report, EEPEA - Economy and Environment Program for South East Asia, International Development Research Centre: Ottawa.

Mangrove ecosystems are a very important type of wetland. They shelter coastlines and estuaries and, especially in the tropics, are rich in flora and fauna. Their major environmental services include storm protection, shore stabilization, and control of soil erosion and flooding. They are also a biomass export and a nursery ground for marine life. In Thailand, however, mangroves disappear at the alarming rate of approximately 6,225 ha per year. One of the major causes of this is the conversion of mangrove areas into intensive shrimp farms. These have become a very popular business venture, especially in the south of Thailand. The destruction of mangrove areas is also attributed to policy failure; excessive clearance results from ill-defined property rights. In fact, shrimp farming by itself need not pose any environmental threat, provided that wastewater is well treated before being released into public water systems. Problems occur when shrimp farming competes for the areas in the mangrove ecosystems. Since shrimp farming has a high market value compared to mangroves, government policy tends to favour it. The total economic value of shrimp farming is overestimated, however, ignoring social costs. It also underestimates the total economic value of mangroves, and fails to consider non-market components, such as benefits from its environmental services. Consequently, before policy can be appropriately designed, it is necessary to correctly assess the foregone benefits of mangroves and compare them with the actual returns from shrimp farming. The study follows the case of Ban Tha Po Moo 2, where 400 ha of mangroves is protected by villagers. The benefits of mangroves to the villagers will also be assessed.

- contains examples or case studies from Thailand
- focuses on key ecosystems or sectors: marine and coastal, wetlands

Tapvong, C., and Kruavan, J. 1999. *Water Quality Improvements: A Contingent Valuation Study of The Chao Phraya River.* Research Report, EEPEA - Economy and Environment Program for South East Asia, International Development Research Centre: Ottawa.

Water pollution is one of the most serious environmental problems facing Thailand. The Chao Phraya — “the King’s River” — is the most contaminated river in the country. Recently, the Pollution Control Department (1997) reported that levels of dissolved oxygen in the lower reaches of the Chao Phraya River have been close to zero since 1990, and that by the year 2000, it might well be “dead”, i.e. aquatic life would find it impossible to survive. Water, once a “free good”, is becoming increasingly scarce and therefore, valuable. But because water is still regarded and used as a free good, there are distortions in the pricing of environmental quality: so-called “market failures.” The general failure to accurately price water and maintenance of water quality has led to widespread water pollution in the Chao Phraya River. The specific research objectives are to estimate the willingness of Bangkok residents to pay for improved water quality by conducting a contingent valuation survey, and to suggest economic instruments to encourage this willingness to pay, such as user fees, property taxes, and other measures.

- contains examples or case studies from Thailand
- focuses on key ecosystems or sectors: water, wetlands

Tingsabadh, C. 1996. Valuation of Natural Resources in Economic and Conservation Terms: A Case Study of South Thailand. In J. A. McNeely, and S. Somchevita (eds.). *Biodiversity in Asia: Challenges and Opportunities for the*

Scientific Community. Office of Environmental Policy and Planning, Ministry of Science, Technology and Environment: Bangkok.

In Thailand, the conservation of natural areas, primarily terrestrial forests but also marine areas, is a long-established policy. In spite of this, natural ecosystems have been declining, which has substantial impacts on the local communities who make use of their natural resources. This has led to conflicts over land and resource use. Valuation can help to identify and address such problems. It is also useful for justifying conservation budgets and clarifying the issues so as to allow rational land and resource use decisions. For these reasons, the Thai government initiated this study on the valuation of natural resources. The study aimed to assess the value of biodiversity to the country, measure the economic costs and benefits of conservation, propose guidelines for the sustainable management of biological resources, identify economic incentive measures for conservation, and propose guidelines for planning. Valuation was carried out for important ecosystems (such as lowland forests, wetlands, mangroves, marine zones and protected areas) in five provinces in southern Thailand. The paper outlines the methodology and results of the valuation exercise, and identifies some of the underlying economic causes of biodiversity loss, such as market failures and weak enforcement of conservation rules.

- contains examples or case studies from Thailand
- focuses on key ecosystems or sectors: PAs, marine and coastal, forests, wetlands, wildlife, tourism

Tri, N. H., Adger, W. N., Kelly, M., Granich, S., and Ninh, N. H. 1996. *The Role of Natural Resource Management in Mitigating Climate Impacts: Mangrove Restoration in Vietnam.* Working Paper GEC 96-06, Centre for Social and Economic Research on the Global Environment: London.

The risk that tropical storm occurrence may alter as a result of global warming presents coastal managers with a serious challenge. This paper examines a strategy to protect coastal populations and resources, based on the rehabilitation of a natural ecosystem, the mangrove. It quantifies the economic benefits of mangrove rehabilitation undertaken to enhance sea defence systems in three coastal districts of northern Vietnam. The results show that mangrove rehabilitation can be desirable from an economic perspective just in terms of the direct use benefits to local communities. Such activities have even higher benefit-cost ratios if indirect benefits are included. These benefits result from the avoidance of maintenance costs for the sea dike systems, which the mangroves protect from coastal storm surges

- contains examples or case studies from Vietnam
- focuses on key ecosystems or sectors: marine and coastal, wetlands

Winpenny, J. T. 1991. *Values for the Environment: A Guide to Economic Appraisal.* HMSO Press: London.

This practical guide to the economic treatment of environment in project appraisal uses cost-benefit analysis as basis for decisions. It discusses the main environmental impacts of projects and the methods available for determining their economic values. It illustrates the feasibility of environmental valuation for a range of sectors, ecosystems and countries. The guide concludes with a review of relevant policy issues.

- contains examples of case studies from Thailand

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