THE ECONOMICS OF ECOSYSTEMS AND BIODIVERSITY

TEEB for National and International Policy Makers

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Ch1 The global biodiversity crisis and related policy challenge
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Part II: Measuring what we manage: information tools for decision-makers

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Chapter 8: Recognising the value of protected areas

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Chapter 8

Recognising the value of protected areas

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Key Messages of Chapter 8

There are already over 120,000 designated protected areas covering around 13.9% of the Earth's land surface. Marine protected areas still cover only 5.9% of territorial seas and 0.5% of the high seas (Coad et al. 2009) but are increasing rapidly in number and area. **The ecosystems within protected areas provide a multitude of benefits and the global benefits of protection can by far outweigh costs.** However, benefits from protection are often broadly disbursed, long term and non-market while the costs of protection and the earning potential from non-protection choices are often short-term and concentrated. Policy actions are needed to address the distribution of benefits and costs. Such policies are vital to make protected areas a socially and economically attractive choice and to maximise their contribution to human well-being at all scales.

Recommendations

In order to conserve biological diversity and maintain the wide range of ecosystem services of protected areas, complete the establishment of **comprehensive, representative and effectively managed systems of national and regional protected areas** and, as a matter of urgency, **establish marine protected areas**. When appropriately designed and managed, these can play an important role in supporting the maintenance and recovery of fish stocks as well as a wide range of other services.

Integrate protected areas into the broader land- and seascape and enhance/restore ecological connectivity among/between sites and their wider environment. This helps to increase ecosystem resilience, increasing their ability to mitigate environmental risks e.g. by supporting ecosystem-based adaptation to climate change.

With the help of economic valuation, establish effective policies and mechanisms for the **equitable sharing of costs and benefits** arising from the establishment of protected areas (e.g. Payment for Environment ervices, REDD+) and create appropriate incentives to overcome opportunity costs for affected stakeholders where this is justified by broader benefit.

Secure stable financial resources to implement and manage protected areas e.g. by designing appropriate and innovative funding instruments and ensuring adequate international funding, particularly to support the needs of developing countries. We need to understand better the scale and implications of the current protected areas financing gap.

Increase policy coherence to **create 'win-win' situations and establish an enabling environment** for effective establishment and management of protected areas. Important synergies with other policies include (i) recognising the opportunities of ecosystem-based adaption to climate change (e.g. the role of protected areas); (ii) further exploring how marine protected areas can help in recovery of fish stocks, increase food security and offer benefits to coastal protection; and (iii) reducing risks related to natural hazards (e.g. water scarcity) by investing in protected areas.

Worldwide, nearly 1.1 billion people – one sixth of the world's population – depend on protected areas for a significant percentage of their livelihoods (UN Millennium Project 2005). Therefore, it is important to **ensure the participation of local communities and support local livelihoods**, e.g. by using appropriate governance models for protected areas and ensuring that appropriately established and managed protected areas contribute to poverty reduction and local livelihoods.

8 Recognising the value of protected areas

"Protected areas promise a healthier future for the planet and its people. Safeguarding these precious areas means safeguarding our future."

Nelson R. Mandela and HM Queen Noor (2003)

Chapter 8 focuses on the role of protected areas in underpinning global human welfare and ways to improve their effectiveness. **8.1** provides an overview of their **current status** (definition, categories, coverage) and outlines the value and socio-economic potential of ecosystems preserved by protected areas. **8.2** analyses specific **benefits and costs associated with protected areas** and presents the results of comparisons at global, national and local levels. **8.3** and **8.4** provide insights on how **economic valuation of protected area costs and benefits** can provide useful tools to support their implementation, e.g. by building an attractive case for protection and helping to obtain sustainable and long-term financing. **8.5** addresses the broader context and the importance of **multi-level policy support and effective institutional frameworks** to secure lasting results. **8.6** draws together **key conclusions** and presents an enabling framework for protected areas in the future.

8.1 PROTECTING AREAS FOR BIODIVERSITY AND PEOPLE

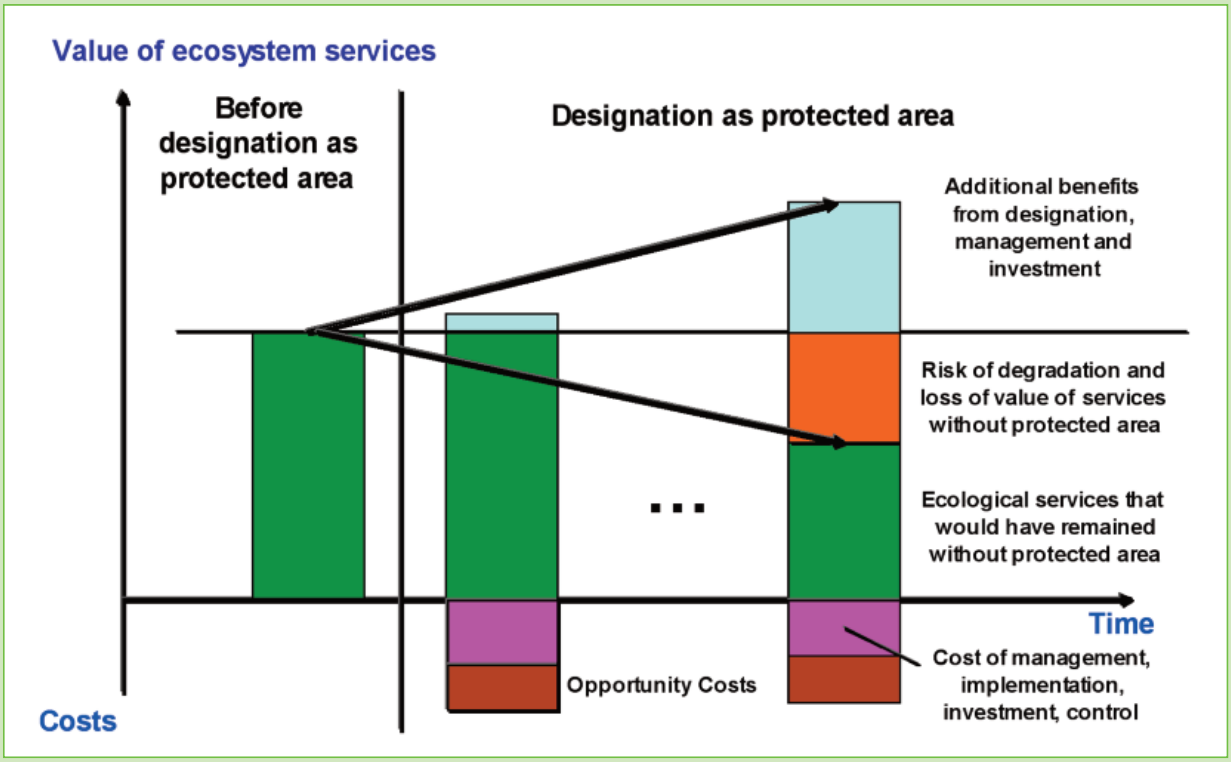
8.1.1 THE VALUE OF PROTECTED AREAS

Protected areas, often considered as the last safe havens for paradise lost, are central to global efforts to conserve biodiversity. Yet they not only safeguard our invaluable biodiversity capital but can also play a key role in maintaining our economic and social well-being (Kettunen et al. 2009; Mulongoy and Gidda 2008; Dudley et al. 2008; Balmford and Whitten 2003). Worldwide, nearly 1.1 billion people – one sixth of the world's population – depend on protected areas for a significant percentage of their livelihoods (UN Millennium Project 2005).

Ecosystems under effective protection help underpin global human welfare by e.g. maintaining food security, mitigating environmental risks and helping adaptation to climate change (see 8.2.1). Their establishment does not mean that an area loses its socio-economic significance - quite the opposite. Protected area designations contribute to preventing the degradation of ecosystems and their valuable services and can increase the value of services provided by sites.

Naturally, some ecosystem services provided by a site are likely to remain even without designation. The **total value of a protected area** can therefore be divided into two components: the added value of designation

Figure 8.1: Schematic for analysing the value of protected areas over time



Source: Patrick ten Brink, own representation

(symbolic value of protected area status; value of subsequent avoided degradation due to measures on and off site; increased value due to management and investment) and the value of services maintained without designation (see Figure 8.1).

In practice, it can be difficult to distinguish the added value of designation from the total value of a protected ecosystem, especially over time. This Chapter presents selected examples to present the marginal or additional protected area values: where only total values are available, this is made explicit.

8.1.2 THE DIVERSITY AND RANGE OF PROTECTED AREAS

There are already over 120,000 designated protected areas[1] covering around 13.9% of the Earth's land surface. Marine protected areas still cover only 5.9% of territorial seas and 0.5% of the high seas (Coad et al. 2009) but are increasing rapidly in number and area. Box 8.1 presents the two most widely-used definitions.

Protected areas are a flexible mechanism that can be designed to deliver multiple benefits for both biodiversity and people (see 8.2). Their six internationally recognised categories (see Figure 8.2 below) show just how diverse their management objectives and structures may be.

Although most people associate them mainly with nature conservation and tourism, well-managed protected areas can provide **vital ecosystem services**, such as water purification and retention, erosion control and reduced flooding and unnatural wild fires. They buffer human communities against different environmental risks and hazards (e.g. Dudley and Stolton 2003; Stolton et al. 2006; Mulongoy and Gidda 2008; Stolton et al. 2008a; see also Chapter 9 and TEEB D0, Chapter 7) and support food and health security by maintaining crop diversity and species with economic and/or subsistence value. They also play an important role in ecosystem-based approaches to climate change adaptation and contribute to mitigation by storing and sequestering carbon (see 8.1.3).

Box 8.1: Definitions of protected areas

There are two protected area definitions, from the Convention on Biological Diversity (CBD) and the IUCN World Commission on Protected Areas: both convey the same general message. These definitions encompass several other international classifications, such as natural World Heritage sites and biosphere reserves established by UNESCO.

CBD definition: "A geographically defined area which is designated or regulated and managed to achieve specific conservation objectives".

IUCN definition: "A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values" (Dudley 2008).

Protected areas are often an important part of **local cultural heritage and identity**, in addition to their recreation, education, health and tourism benefits to millions of people worldwide. Conferring protected area status gives formal recognition to these values and creates favourable conditions for their conservation and long-term management.

As many rural communities depend on protected forests, pastures, wetlands and marine areas for **subsistence and livelihoods**, protected areas contribute directly to the global agenda for sustainable development, poverty reduction and maintaining cultures (Dudley et al. 2008; Mulongoy and Gidda 2008). Many existing and proposed protected areas, particularly in developing countries, overlap with areas of high rural poverty (Redford et al 2008). They increasingly feature in national Poverty Reduction Programme Strategies as **potential sources of economic development** that can contribute to human well-being and poverty reduction (subsistence, cultural and spiritual, environmental services, political) (e.g. Blignaut and Moolman 2006). Protected areas have become important vehicles for supporting self-determination of many

indigenous peoples and local community movements, who have either self-declared or worked with governments to develop protected areas to secure traditional lands and protect biodiversity.

Depending on their category and design (see Figure 8.2), protected areas may allow for some controlled economic activities to take place within the designated area. Some, particularly private reserves and state national parks, may function as profit-making activities in their own right. Several protected area types, notably UNESCO biosphere reserves and protected landscapes, can act as models for sustainable development in rural areas. Not all protected areas are expected to generate income to help local communities, but where the opportunity exists they can make an important contribution to livelihoods (e.g. Mmopelwa and Blignaut 2006; Mmopelwa et al. 2009; see examples in 8.3).

Protected areas also impose costs on society, arising from restricted access to resources and foregone economic options (e.g. James et al. 2001; Colchester 2003; Chan et al. 2007; Dowie 2009). These costs must be recognised alongside the benefits (see 8.2 and 8.4 below).

8.1.3 CHALLENGES AND OPPORTUNITIES FOR POLICY MAKERS

Protected area agencies need to prove that the benefits from protected areas merit the costs, convince stakeholders of these benefits and ensure that costs are equitably distributed. The potential to deliver such benefits depends on the mechanisms for meeting the chosen objectives. Planning, design, the legal foundation, management, orientation, skills, capacity and funding are key.

Although the aim is usually to protect such areas from unsustainable human use, in practice they face many challenges and many perform at sub-optimal levels. Pressures come both from distant sources (e.g. long-range pollution, climate change) and from near or within the site (e.g. poaching, encroachment, unsympathetic tourism, abandonment of traditional management) (see Box 8.2). Economic valuation of benefits and costs, used in conjunction with an understanding of social and cultural issues, can provide information needed to overcome some of these challenges (see 8.3).

Many legally designated protected areas are so-called 'paper parks' i.e. they have no means of enforcing such protection. While designation can itself provide a measure of protection and is a valuable first step, areas without appropriate management are often at risk of degradation. Lack of capacity and resources, weak political support, poor understanding of social interactions, absence of community consultation and problems in empowering stakeholders can reduce their effectiveness, undermining the supply of ecosystem services as well as conservation.

Some pressures stem from the way that a protected area is set up. If local communities or indigenous peoples lose substantial rights to their territories and resources without agreement or compensation, they may have little choice but to continue 'illegal' activity in the newly protected area. Other pressures arise because natural resources like timber and bushmeat attract criminal activity. Weak management capacity often hinders adequate responses.

The type and level of threats varies enormously with national or regional socio-economic conditions: pressures from encroachment and collection of natural resources can be particularly high in areas of poverty. Building effective protected areas in a poor country is particularly challenging and needs different approaches to those possible in countries where most people are relatively wealthy. In developed countries, many protected areas are dominated by semi-natural or even highly human-influenced ecosystems (e.g. arable farmland): in such cases, maintaining traditional low-intensity land use practices is often the key requirement for biodiversity conservation. Because such land uses are threatened by intensification or in some cases by land abandonment (Stoate et al. 2001; Anon 2005; EEA 2006), funding is often required to maintain such practices.

We still have no comprehensive global picture of pressures on protected areas although a global study focusing on direct pressures is being undertaken to provide a fuller picture (see Box 8.2). In addition, the World Heritage Committee draws up the World Heritage in Danger list for UNESCO World Heritage sites at most risk.

Figure 8.2: Internationally-recognised system of protected area categories

The IUCN typology of protected area management types and governance approaches distinguishes six categories of management objective and four governance types (Dudley 2008).

IUCN category (primary management objective)	IUCN Governance type										
	A. Governance by governments			B. Shared governance			C. Private governance			D. Governance by indigenous peoples and local communities	
	Federal or national ministry or agency in charge	Local ministry or agency in charge	Management delegated by the government (e.g. To an NGO)	Transboundary protected area	Collaborative management (various pluralist influences)	Collaborative management (pluralist management board	Declared and run by private individual	Declared and run by non-profit organisations	Declared and run by for-profit individuals	Declared and run by indigenous peoples	Declared and run by local communities
I – Strict nature or wilderness protection											
II – Ecosystem protection and recreation		**A**		**G**							
III – Protection of natural monument or feature											
IV – Protection of habitats and species			**E**	**G**	**B**					**C**	
V – Protection of land-scapes or seascapes								**D**			
VI – Protection and sustainable resource use					**F**						

The examples below give a flavour of the diversity (letters are marked on the matrix above).

A. Girraween National Park, Queensland Australia. Owned and managed by the state government of Queensland to protect ecosystems and species unique to the area.

B. Dana Nature Reserve and Biosphere Reserve, Jordan. Managed by the state in cooperation with local communities to reduce grazing and restore desert species.

C. Alto Fragua Indiwasi National Park, Colombia. Proposed by the Ingano people on their traditional forest lands and managed according to shamanic rules.

D. Se ovlje Salina Natural Park, Slovenia. Important area of salt works and wetland, funded as a private reserve by Slovenia's largest mobile phone company. The park also forms part of the EU Natura 2000 network.

E. Sanjiangyuan Nature Reserve, China. Since 2006 part of the reserve has been managed by villagers from Cuochi, who may patrol and monitor an area of 2,440 km^2 in exchange for a commitment to help ensure that resource use is sustainable (Basanglamao and He Xin 2009).

F. Rio Macho Forest Reserve, Costa Rica. An extractive reserve under mixed ownership (70% government, 30% private) zoned for protection, tourism and sustainable use of forest products and agriculture.

G. Maloti-Drakensberg Transboundary Protected Area: including Natal-Drakensberg Park (Kwazulu Natal, South Africa, category II) and Maloti-Sehlabthebe National Park (Lesotho, category IV).

H. Iringal Village Community Conserved Area, India. Established voluntarily by villagers to protect nesting sites of Olive Ridley Turtle (not yet officially recognised as a protected area and thus not marked on the matrix).

Box 8.2: Main direct pressures posing risks to protected areas

A global meta-study coordinated by the University of Queensland examined over 7,000 assessments of protected area management effectiveness (Leverington et al. 2008) and identified the following key direct pressures on protected areas (in descending importance):

- hunting and fishing;
- logging, wood harvesting and collection of non-timber forest products;
- housing and settlement;
- recreation – mostly unregulated tourism;
- activities nearby, including urbanisation, agriculture and grazing;
- grazing and cropping;
- fire and fire suppression;
- pollution;
- invasive alien species; and
- mining and quarrying.

The study does not identify underlying causes e.g. hunting may be driven by poverty or inequality in land tenure. It also does not address the implications of climate change which will increase pressures on many protected areas and may eliminate viable habitat for some species or shift it outside current reserve boundaries (Hannah et al. 2007).

Most identified pressures stem from economic activity, demonstrating the value of resources found in protected areas. In some but not all cases, different management models might allow some exploitation of these resources within protected area management models.

Protected area systems are not yet necessarily representative of the biodiversity within a country: numerous gaps in species and ecosystem protection remain (Rodrigues et al. 2006). Many protected areas are located in areas with relatively low levels of biodiversity, such as ice caps, deserts, mountains, while some richer ecosystems and habitats remain largely unprotected e.g. only 2% of lake systems are in protected areas (Abell et al. 2007).

Despite increasing threats to the marine environment, progress in establishing marine protected areas (MPAs) has been very slow, particularly for the high seas (0,5% coverage; Coad et al. 2009). Yet research shows that **MPAs can be an effective conservation strategy for a range of species, particularly fish** (see examples in 8.2.1). It has been estimated that conserving 20-30% of global oceans in MPAs could create a million jobs, sustain fish catch worth US$ 70–80 billion/year and ecosystem services with a gross value of roughly US$ 4.5–6.7 trillion/year (Balmford et al. 2004). However, the extent to which MPAs can deliver benefits for biodiversity and fisheries obviously depends on careful design and effective management. Predicted recovery of fish populations may also take time so that benefits become visible only after a number of years.

For protected areas to function as ecological networks, a more systematic and spatially broader approach to their establishment and management is needed. The CBD Programme of Work on Protected Areas (see 8.5 below) recognises that this requires a more holistic way of viewing protected areas than in the past and highlights opportunities for protected area agencies and managers to work with other stakeholders to integrate protected areas into broader conservation strategies.

Well-managed protected area networks also offer critical opportunities to adapt to and mitigate climate change. Climate change will put new

pressures on biodiversity and increasingly modify ecosystems outside protected areas. This will add to the demands on protected area systems, probably including their natural resources, and increase their role in supporting the maintenance of resilient and viable populations, e.g. species of economic importance. In addition, some plants and animals will need to move their range, calling for more connectivity between protected areas than is currently available. Ways to achieve this connectivity include changing management in the wider landscape and seascape, restoring ecological connections between protected areas and expanding the protected area system itself (IUCN 2004; Huntley 2007; Taylor and Figgis 2007; Harley 2008; CBD AHTEG 2009).

Protected areas store and sequester carbon and can help counter climate change by retaining or expanding carbon-rich habitats (forests, peat, wetlands and marine ecosystems like mangroves, sea grass, kelp etc.) and soil humus. They also help people adapt to climate change by maintaining ecosystem services that reduce natural disaster impacts (coastal and river protection, control of desertification), stabilise soils and enhance resilience to changing conditions, Protected areas support human life by protecting fish nurseries and agricultural genetic material and providing cheap, clean drinking water from forests and food during drought or famine. All the above can create significant win-wins for biodiversity conservation and socio-economic resilience to climate change (Dudley and Stolton 2003; Stolton et al. 2006; Stolton et al. 2008a; Dudley et al. forthcoming; see also Chapter 9).

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8.2 WEIGHING THE BENEFITS AND COSTS OF PROTECTED AREAS

This section draws on state of the art research to examine two sets of questions fundamental to the impact of protected areas on human well-being:

- **Do benefits outweigh costs?** If so, in which contexts and at what scales? These questions address the rationale for investing in the effective management and potential global expansion of protected areas.

- **Who benefits and who bears the costs?** Over what timeframe are benefits and costs experienced? For which benefits do markets exist and where can they be created? These questions address equity concerns and can guide decisions on location and management of protected areas by governments and private actors on the ground.

We have chosen examples to illustrate benefits and costs for their clarity and methodological rigour in quantifying particular services or costs (see 8.2.1 and 8.2.2). The main focus is on examples that capture marginal rather than total benefits (i.e. they quantify the additional service flows from protection, rather than the total value of services). These examples are case-specific and do not indicate average levels of benefits or costs across all protected areas.

To understand how benefits and costs compare (8.2.3), we then rely on two other sources of information: (i) a smaller set of site and country level studies which evaluate the benefits and costs of protected areas together to enable them to be compared appropriately; and (ii) global evaluations of protection benefits/costs that provide average or summary values and thus make comparisons appropriate. Lastly, 8.2.4 describes additional factors that influence whether protection will be perceived as a good choice, independent of strictly economic considerations.

8.2.1. PROTECTED AREA BENEFITS

Section 8.1 provided an overview of the importance of protected areas for human livelihoods and well-being. The food, clean water, jobs, medicines, drought relief, and other services that ecosystems within protected areas provide are particularly important to the poor (WRI 2005, see Box 8.3 below). Broader benefits to society as a whole come from services such as carbon sequestration and storage, hazard mitigation and maintenance of genetic diversity.

This section gives concrete examples of some of the most important protected area functions, whilst noting that specific benefits from individual sites will vary depending on location, ecosystem and management strategy.

Supply clean water: Well-managed natural forests provide higher quality water with less sediment and fewer pollutants than water from other catchments. Protected areas are a key source of such water worldwide. One third of the world's hundred largest cities draw a substantial proportion of their drinking water from forest protected areas e.g. this service has saved (cumulatively) the city of New York at least US$ 6 billion in water treatment costs (Dudley and Stolton 2003). Venezuela's national protected area system prevents sedimentation that would reduce farm earnings by around US$ 3.5 million/year (Pabon-Zamora et al. 2009a[2]).

Reduce risk from unpredictable events and natural hazards: Protected areas can reduce risks such as landslides, floods, storms and fire by stabilising soil, providing space for floodwaters to disperse, blocking storm surges and limiting illegal activity in fire prone areas. In Vietnam, following typhoon Wukong in 2000, areas planted with mangroves remained relatively unharmed while neighbouring provinces suffered significant losses of life and property (Brown et al. 2006). In

Sri Lanka, flood attenuation provided by the 7,000 ha Muthurajawella Marsh near Colombo has been valued at over US$ 5 million/year (Schuyt and Brander 2004; for other examples see Chapter 9).

Maintain food security by increasing resource productivity and sustainability: Protected areas provide habitat and breeding grounds for pollinating insects and other species with economic and/or subsistence value such as game, fish, fruit, natural medicines, and biological control agents and can also support food and health security by maintaining genetic diversity of crops (Box 8.4). In the United States, the agricultural value of wild, native pollinators - those sustained by natural habitats adjacent to farmlands - is estimated at billions of dollars per year (adapted from Daily et al. 2009).

Well designed 'no take' zones in MPAs can function similarly (Gell and Roberts 2003). A review of 112 studies in 80 MPAs found that fish populations, size and biomass all dramatically increased inside reserves, allowing spillover to nearby fishing grounds (Halpern 2003). Eight years after designation of Kenya's Mombasa Marine National Park, fish catches around the park had reached three times the level of those further away (McClanahan and Mangi 2000). MPAs can also rebuild resilience in marine ecosystems and provide insurance against fish stock management failures (Pauly et al. 2002).

Support nature based tourism: Natural and cultural resources in protected areas (e.g. biodiversity, landscape and recreational values, scenic views and open spaces) are an important driver of tourism, the world's largest industry. Over 40% of European travellers surveyed in 2000 included a visit to a national park (Eagles and Hillel 2008). Such tourism can be an important source of local earnings and employment. In New Zealand, economic activity from conservation areas on the west coast of South Island led to an extra 1,814 jobs in 2004 (15% of total jobs), and extra spending in the region of US$ 221 million/year (10% of total spending), mainly from tourism (Butcher Partners 2005). In Bolivia, protected area tourism generates over 20,000 jobs, indirectly supporting over 100,000 people (Pabon-Zamora et al. 2009b).

Box 8.3: Protected areas support for local livelihoods

Lao PDR: Nam Et and Phou Loei National Parks. The 24,000 people who live in and around the parks use them for wild plants, fodder for animals, wild meat, construction materials and fuel. In 2002 these uses amounted to 40% of total production per family, with a total value of nearly US$ 2 million/year (Emerton et al. 2002).

Zambia: Lupande Game Management Area. In 2004 two hunting concessions earned the 50,000 residents revenues of US$ 230,000/year which was distributed in cash and to projects such as schools (Child and Dalyal-Clayton 2004).

Nepal: Royal Chitwan National Park. A Forest User Group in the buffer zone earned US$ 175,000 in ten years through wildlife viewing and used this to set up bio-gas plants. It operates a microcredit scheme providing loans at low interest rates (O'Gorman 2006).

Cambodia: Ream National Park. Fish breeding grounds and other subsistence goods from mangroves were worth an estimated US$ 600,000/year in 2002 with an additional US$ 300,000 in local ecosystem services such as storm protection and erosion control (Emerton et al. 2002b).

India: Buxa Tiger Reserve. 54% of families living in and around Buxa derive their income from non-timber forest products (NTFPs) harvested in the reserve (Das 2005).

Vietnam: Hon Mun Marine Protected Area. About 5,300 people depend on the reserve for aquaculture and near-shore fishing. Gross fisheries value is estimated at US$ 15,538 per km^2 (Pham et al. 2005).

Box 8.4: Maintaining food security: crop wild relatives and protected areas

Recognition of wider benefits can influence choices about location and management of protected areas. In situ conservation of crop wild relatives (CWR) helps to provide fresh crop breeding material and maintain food security (Stolton et al. 2008a: see examples on map). CWR are concentrated in relatively small regions often referred to as *centres of food crop diversity*. Habitat protection in 34 ecoregions containing such centres is significantly lower than average: 29 had less than 10% protection and 6 less than 1% protection (Stolton et al.2008b). Some are also undergoing rapid losses in natural habitat, thus putting CWR at risk.

Source: Conservation Magazine 2008 Vol. 9 (4)

Contribute to climate change mitigation and adaptation: 15% of global terrestrial carbon stock is contained in protected areas with a value understood to be in the trillions of dollars (Campbell et al. 2008). With deforestation accounting for an estimated 17% of global carbon emissions (IPCC 2007), maintenance of existing protected areas and strategic expansion of the global protected area system can play an important role in controlling land use related emissions. Intact ecosystems inside protected areas may also be more robust to climatic disturbances than converted systems.

Protect cultural and spiritual resources: These values are poorly accounted for by markets[3] but can nonetheless be immensely important to society. In Brazil's Sao Paolo municipality, residents have expressed willingness to pay more than US$ 2 million/year to preserve the 35,000 ha Morro do Diablo State Park, which protects a key fragment of Brazil's Atlantic forest (Adams et al. 2007). Visitors to South Korea's Chirisan National Park value the conservation of a single species – the Manchurian black bear – at more than US$ 3.5 million/year (Han and Lee 2008). Sacred sites are probably humanity's oldest form of habitat protection, representing a voluntary choice to forego other land uses in favour of larger spiritual benefits (Dudley et al. 2009). Indigenous groups and other traditional owners living in protected areas often have fundamental ties to traditional lands and resources (Beltran 2000).

Preserve future values: Protected areas are crucial if future generations are to enjoy the natural places that exist today. Equally important, the rate at which society is now recognising previously unappreciated ecosystem services suggests that nature's currently unknown option value may be immense. The contribution of standing forests to controlling climate change was little appreciated outside scientific circles just a decade ago - today, as noted above, we understand how colossal their carbon storage may be. When we include the potential for important new discoveries, e.g. in medicine, crop resilience, biomimicry and other areas, preservation of option values are a significant argument in their own right for creating and managing protected areas at a major scale.

8.2.2. PROTECTED AREA COSTS

Ensuring the provision of benefits from protected areas requires society to incur costs. These can include financial costs of management; social and economic costs of human wildlife conflict, restricted access to resources or displacement from traditional lands; and opportunity costs of foregone economic options. As with benefits, costs depend significantly on location, planning processes and management strategy (see sections 8.2.3 and 8.3). The main categories of cost are outlined below.

Management costs: Designation confers some protection on the site and the ecosystem services it provides (Bruner 2001 et al.; Adeney et al. 2009) but appropriate management is also necessary to ensure effective provision of benefits (WWF 2004; Leverington et al. 2008)[4]. Spending on protected area management is inadequate globally (James et al. 2001; Pearce 2007; Esteban 2005). In developing countries most costs are not covered, leaving many protected areas attempting to address complex contexts without basic equipment or staff (e.g. Galindo et al. 2005; Wilkie et al. 2001; Vreugdenhil 2003; see 8.4). In developed countries, funding is often required to maintain low-intensity land use practices via different payment schemes (see 8.1.3). Expansion and strategic integration of protected areas into the wider landscape to maintain key services would increase management needs further (Balmford et al. 2002; CBD AHTEG 2009).

Human wildlife conflict: Where wildlife is found in areas used for human activities, conflicts can be significant. Costs can range from frequent but low-level crop raiding by monkeys through loss of entire harvests and significant property damage by herds of elephants to actual loss of life (Distefano 2005). In Zimbabwe, livestock predation by carnivores from protected areas was estimated to generate losses of approximately 12% of household income (Butler 2000). The need to defend crops can trigger further costs in the form of foregone activities, ranging from farming to school attendance by children.

Loss of access to natural resources: Protected area creation and management can reduce or block access to economically and culturally important resources, bringing significant losses. In Cameroon, resource use

restrictions imposed on residents by the creation of Bénoué National Park led to the loss of about 30% of agricultural income and 20% of livestock-derived income (Weladji and Tchamba 2003; see also Harper 2002).

Displacement: A significant number of people have been directly displaced by protected areas. While there is debate about scope, it is clear both that such displacement has been a real problem in a number of cases, and also that its social and economic costs can be disastrous (Adams and Hutton 2007; Brockington and Igoe 2006; Agrawal and Redford 2007). This was the case in the Democratic Republic of Congo when the Bambuti Batwa people were evicted from their ancestral lands during the creation of the Kahuzi-Biega National Park (Nelson and Hossack 2003).

Opportunity costs: Choosing to create and manage protected areas requires foregoing alternative uses. For private actors, key opportunity costs include the potential profit from legitimate resource uses. For national governments, such costs come from foregone tax revenues and revenues from state-run extractive enterprises. Governments also have an obvious interest in the private opportunity costs borne by their citizens.

Even though protected areas tend to occupy land with lower agricultural potential (Gorenflo and Brandon 2005; Dudley et al. 2008), their opportunity costs often remain significant. The private opportunity cost for all strictly managed protected areas in developing countries has been estimated at US$ 5 billion/year (James et al. 2001). Protected area expansion to safeguard a range of services and adapt to climate change would also clearly imply significant opportunity costs, probably more than US$ 10 billion per year over at least the next 30 years (James et al. 2001; Shaffer et al. 2002).

8.2.3. DO PROTECTED AREA BENEFITS EXCEED COSTS?

Benefits and costs of protection vary significantly depending on geographic scale (Table 8.1, Figure 8.4). This section compares benefits to costs at three scales: to the global community from all protected areas worldwide; to countries from their national protected area systems (noting significant differences between developed and developing countries, already highlighted above); and to local actors living in and around individual sites. As mentioned, we base our analysis on two types of study suitable for evaluating net benefits: (i) studies that quantify both benefits and costs for the same site or region using comparable methodologies and (ii) studies that present global average or total values.

Table 8.1: Examples of protected area benefits and costs accruing at different scales

	Benefits	Costs
Global	- Dispersed ecosystem services (e.g. climate change mitigation/adaptation) - Nature-based tourism - Global cultural, existence and option values	- Protected area management* (global transfers to developing countries) - Alternative development programmes* (global transfers to developing countries)
National	- Dispersed ecosystem services (e.g., clean water for urban centres, agriculture or hydroelectric power) - Nature-based tourism - National cultural values	- Land purchase * - Protected area management (in national protected area systems) * - Compensation for foregone activities* - Opportunity costs of forgone tax revenue
Local	- Consumptive resource uses - Local ecosystem services (e.g. pollination, disease control, natural hazard mitigation) - Local cultural and spiritual values	- Restricted access to resources - Displacement - Protected area management (private land owners, municipal lands) - Opportunity costs of foregone economic activities - Human wildlife conflict

* These cost categories in effect transfer costs from the local to national level, or from the national or international level. Section 8.3 provides more information on these and related options.

GLOBAL BENEFITS VS. COSTS

Starting with a word of caution, global values necessarily rely on assumptions, generalisations and compilations of findings from valuation methodologies that are not perfectly comparable. Their conclusions should be regarded as indicative rather than precise. On the other hand, significant methodological progress has been made in addressing some major challenges (e.g. Balmford et al. 2002; Rayment et al. 2009). Furthermore, the scale of the difference between benefits and costs appears to be so large globally that even if analyses are incorrect an order of magnitude, the basic conclusions would be unchanged. Such a degree of inaccuracy is unlikely.

According to the most widely cited estimates, an expanded protected area network covering 15% of the land and 30% of the sea would cost approximately US$ 45 billion per year, including effective management, compensation for direct costs, and payment of opportunity costs for acquiring new land. The ecosystems within that network would deliver goods and services with a net annual value greater than US$ 4.4 trillion. This suggests that **investment in protected areas would help maintain global ecosystem service benefits worth 100 times more than the costs of designating and managing the network**. The operation, maintenance and investment in these natural assets makes economic sense (Balmford et al. 2002[5]; see also Chapter 9 on investing in natural capital).

A complementary perspective is available from the findings of the Stern Review on the Economics of Climate Change (Stern 2006) and other recent work which permit comparison of protected area benefits to costs in areas of active deforestation in developing countries:

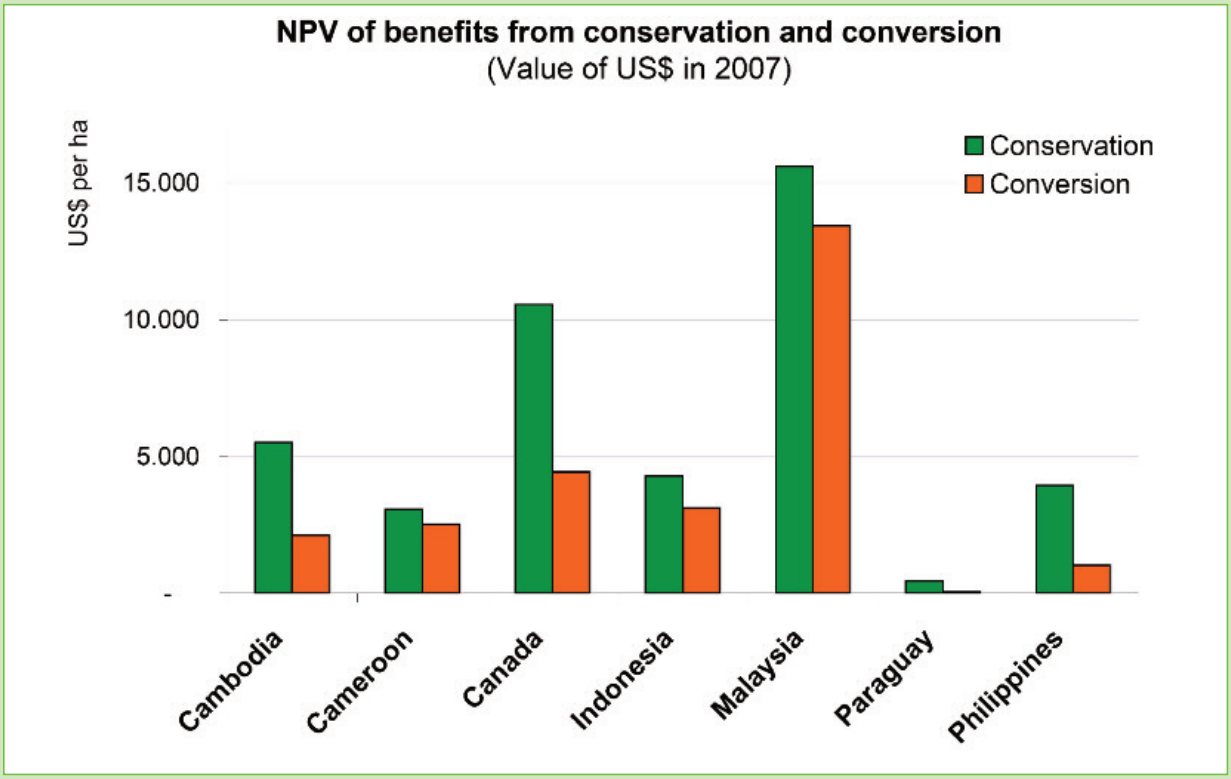
- Stern estimates that for areas being actively cleared, the average annual opportunity cost from foregone agricultural profits and one-off timber harvests is approximately US$ 95/ha;
- seven studies of human wildlife conflict reviewed by Distefano (2005) show average income losses of around 15%, suggesting additional direct costs of perhaps US$ 15/ha/year[6];
- average management costs are reported to be around US$ 3/ha/year (James et al. 1999), yielding an estimate of total annual costs of perhaps US$ 115/ha/year;
- on the other hand, average total benefits per hectare/year from a wide range of ecosystem services provided by tropical forests are estimated at around US$ 2,800/ha/year[7] (Rayment et al. 2009)[8].

Taken together, these studies suggest that even in areas of active deforestation, global protected area benefits will most often greatly outweigh costs[9].

It is also useful to compare total benefits delivered by protected ecosystems with those from converting natural ecosystems to agriculture, aquaculture or other primary production. Balmford et al. (2002), Papageorgiou (2008) and Trivedi et al. (2008) synthesise findings from eight studies that compare the benefits delivered by intact ecosystems with benefits from such conversion (Figure 8.3). All studies include market goods and ecosystem services provided by both conservation and conversion, to ensure that production landscapes are not unfairly disadvantaged by the incorrect assumption that they provide no ecosystem services. This comparative analysis again suggests that protection is an excellent investment globally. **Including major market and non-market values, the global benefits from protection appear to be on average 250% greater than benefits from conversion[10].**

Source: NASA Earth Observatory. URL: http://earthobservatory.nasa.gov/images/imagerecords/1000/1053/tierras_baja_pie.jpg

Figure 8.3: Total benefits of conservation compared to benefits from conversion for seven case study sites in different countries.



Sources: Bann (1997), Yaron (2001), van Vuuren and Roy (1993), van Beukering et al. (2003), Kumari (1994), Naidoo and Ricketts (2006), and White et al. (2000), as reviewed by Balmford et al. (2002), Papageorgiou (2008) and Trivedi et al. (2008). A case from Thailand (Sathirathai (1998) is excluded from the graph for purposes of scale. 'Conservation' includes sustainable production of market goods and services including timber, fish, non-timber forest products, and tourism. 'Conversion' refers to replacement of the natural ecosystem with a system dedicated to agriculture, aquaculture, or timber production. Both scenarios include ecosystem services.

NATIONAL BENEFITS VS. COSTS

Some key benefits from protection accrue largely to the global community (e.g. carbon sequestration, existence or option values, see Balmford and Whitten 2003) or to companies and individuals from other countries (nature-based tourism, see Walpole and Thouless 2005). In contrast, protected area costs are mostly national or local.

Even if carbon sequestration, existence values and tourism values are assumed to accrue only to the global community and are completely removed from the comparisons in the eight studies reviewed above (Figure 8.3), remaining national benefits still average more than 50 times total costs. This suggests that **at the national scale, ecosystem service benefits continue to greatly outweigh the cost of protecting them**, making national investment in protected areas on balance a sound economic choice. A substantial body of case evidence also supports this conclusion. For instance:

- in Brazil's Amazon, ecosystem services from protected areas provide national and local benefits worth over 50% more than the return to smallholder farming (Portela and Rademacher 2001) and draw three times more money into the state economy than would extensive cattle ranching, the most likely alternative use for park lands (Amend et al. 2007);

- in Madagascar, investment in managing the national protected area system and providing compensation to local farmers for the opportunity costs of foregone farm expansion would pay for itself and generate an additional return of 50% from tourism revenues, watershed protection, and international

transfers to support biodiversity (Carret and Loyer 2003);

- in Scotland, the ecosystems protected by Natura 2000 sites provide benefits to the Scottish public worth more than three times than associated costs, including direct management and opportunity costs (Jacobs 2004).

On the other hand, it may not be in the national best interest to protect some globally valuable areas in the absence of markets or other transfers to support provision of key services. In Paraguay's Mbaracayu Biosphere Reserve, for instance, 85% of benefits are generated by carbon sequestration. Although the Reserve is of net benefit globally, the value of ecosystem services that accrue nationally[11] is significantly lower than potential income from foregone agricultural conversion (Naidoo and Ricketts 2006), making the reserve a net cost to the country.

LOCAL BENEFITS VS. COSTS

Many key services from protected areas benefit local actors most, from sustainable resource use to disease control to local cultural or spiritual values. Values like watershed protection are of benefit locally, but often also at a larger scale. Although management costs are mainly paid at national or international level (Balmford and Whitten 2003), costs of lost access to resources and wildlife conflict are often extremely localised (Naughton-Treves 1997; Shrestha et al. 2006). The opportunity cost of conversion to non-natural systems tends to be borne in part locally (e.g. where protected areas prevent local actors from clearing land) and in part by commercial, typically non-local actors who clear land for shrimp farms, large scale ranching and similar uses (see Figure 8.4).

As with the larger scale comparisons, there is evidence that local benefits provided by ecosystems within protected areas can outweigh costs. In Costa Rica, communities affected by protected areas have less poverty, better houses and better access to drinking water than communities living farther away (Andam et al. 2008). However, there are also cases where local costs clearly outweigh benefits, particularly where groups are displaced or lose access to key resources (e.g. Harper 2002; Colchester 2003).

Particularly at the local scale, whether or not protected areas are a net benefit or a net cost depends significantly on their design, management and on policies to share costs and benefits, as well as the service provision of the site and on the local socio-economic context and opportunity costs (see section 8.3 below). The following general points on local benefits and costs therefore include reference to different management choices:

Ecosystem services can underpin local economies: Clean water, pollination and disease control are often fundamental to local well being. In Indonesia, people living near intact forests protected by Ruteng Park have fewer illnesses from malaria and dysentery, children miss less school due to sickness and there is less hunger associated with crop failure (Pattanayak and Wendland 2007; Pattanayak et al. 2005).

Protected areas can support sustainable local use: In Cambodia's Ream National Park, estimated benefits from sustainable resource use, recreation and research are worth 20% more than benefits from current destructive use. The distribution of costs and benefits favours local villagers, who would earn three times more under a scenario of effective protection than under a scenario without management (De Lopez 2003).

Sustainability frequently brings short-term local costs: St Lucia's Sufriere MPA has significantly increased fish stocks since its creation, providing a sustainable local benefit. However, this required 35% of fishing grounds to be placed off limits, imposing a short term cost on local fishermen in the form of reduced catch (Lutchman 2005).

Locally-created protected areas can protect values defined by local people: Community protected areas can conserve resources and services locally defined as worth more than the opportunity cost of their protection. Local people and governments can also collaborate to create protected areas to maintain key values at both levels. In Indonesia, the 100,000 ha Batang Gadis National Park was created by local initiative in response to flash flooding caused by upland deforestation (Mulongoy and Gidda 2008).

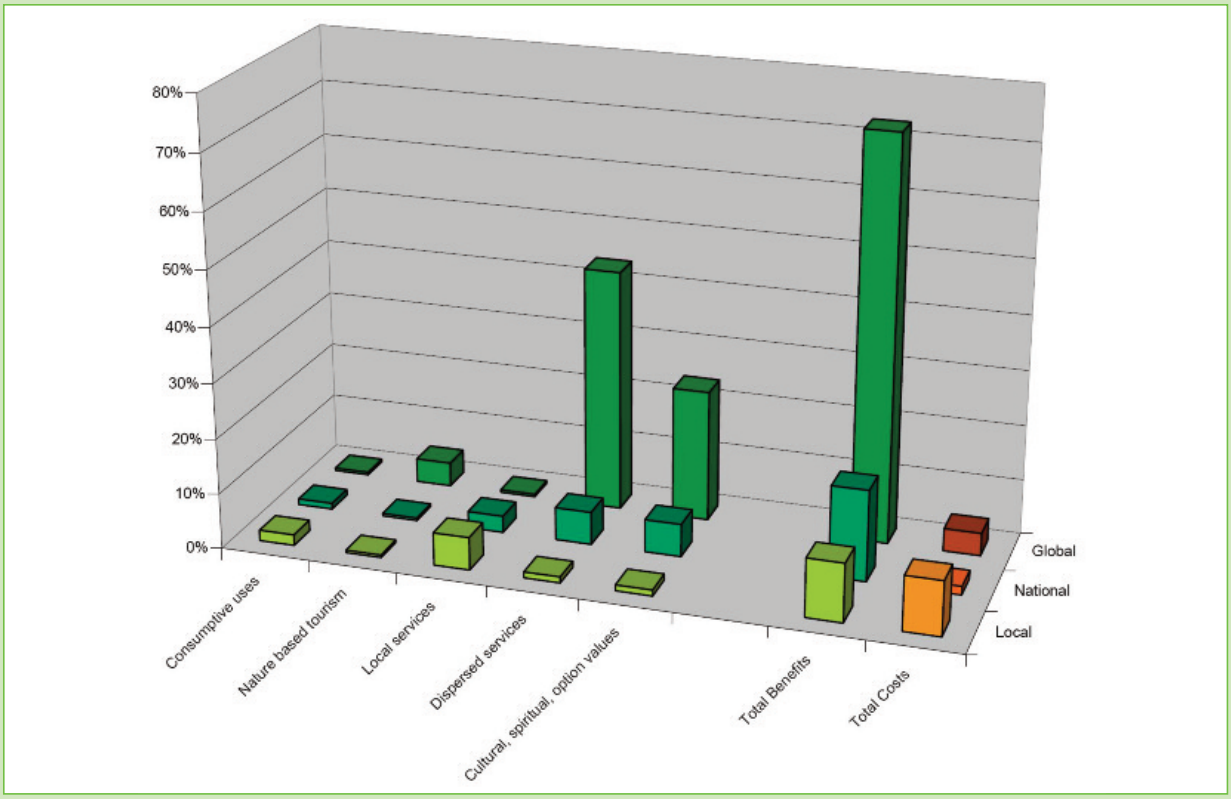
Failure to recognise local rights and uses can result in major costs: Evicting people to make way for protected areas can be devastating. Lost access to natural resources can also have serious negative impacts. Conversely, real participation in protected area planning and management can help ensure local rights are respected, benefits are maintained or enhanced and effective conservation is achieved (Potvin et al. 2002). Such involvement has not been systematically sought but there is growing evidence of its importance. In Fiji, for instance, the participatory creation and management of Navakavu Locally Managed Marine Area led to higher sustainable fish consumption by local families and more community cooperation in resource management (Leisher et al. 2007).

8.2.4. WHY ARE COSTS OFTEN PERCEIVED AS GREATER THAN BENEFITS?

If protected areas can provide such important benefits to society at all levels, why are they under threat of degradation and why are they often perceived mainly in terms of costs? Key reasons include the following:

Costs are more palpable than benefits: Resource degradation typically offers clear and immediate returns in the form of marketable products, tax revenues, or subsistence goods. Crop raiding or livestock predation can also cause sudden, palpable losses. In contrast, many benefits from conservation have no market value, are less

Figure 8.4: A schematic illustration: the distribution of benefits and costs of protected areas



This graph illustrates that the distribution of costs and benefits is spread accross and varies between different geographic scales (adapted from Balmford and Whitten 2003). The magnitudes (%) are illustrative and not based on actual monetary data. Balmford and Whitten emphasize that at global scale, benefits in general far outweigh the costs. We underline here that at site level the situation is more ambiguous: sometimes benefits outweigh costs and vice versa. Thus, even though the overall return on investment in protected areas is high, a close look at the distribution of the costs and benefits is required. The magnitude of global benefits suggests that if we had cost sharing mechanisms in all protected areas to ensure that local benefits exceeded local costs - it would still leave the global community with a large net benefit. Please see section 8.4 below for more information on these aspects.

well understood and therefore poorly appreciated, and deliver benefits to a wider and more dispersed group of beneficiaries and over a longer time period.

Private benefits from production often make protection unattractive for on-the-ground decision-makers: For private actors, converting natural areas to production frequently offers net benefits even if such conversion represents a net local cost (Chan et al. 2007). In Thailand, for instance, the total private return from converting mangroves to shrimp farms has been estimated at US$ 17,000/ha: such returns make deforestation attractive to individual decision-makers despite losses to local society of more than US$ 60,000/ha in decreased fisheries productivity, reduced storm protection, and the elimination of a key source of timber, fuel and other forest products (Sathirathai 1998). While the benefit-cost comparison depends on the specific ecosystem, socio-economic context, market prices, subsidy levels and other factors, similar results are found in a range of contexts (see also Sathirathai and Barbier 2001; Barbier 2007; Hanley and Barbier 2009 as well as Chapters 1 and 10).

Source: Getty Images – PhotoDisc®

Beneficiaries do not adequately share costs: Globally, protected areas have not yet taken full advantage of fee charging mechanisms to help cover costs (Emerton et al. 2006; see Chapter 7). More significantly, most of the benefits they provide are classic public goods, from which people benefit independent of their individual actions and which receive little support from society in the absence of policy or related interventions. At national level, the most common solution – government support for protected areas using tax revenue – is often hampered by an inadequate appreciation of benefits. At international level, there is an even poorer appreciation of the imperative to share costs even though distribution analysis of benefits suggests that global cost sharing is economically rational. Mechanisms to facilitate such cost sharing at a major scale are also lacking.

8.3 IMPROVING EFFECTIVENESS THROUGH ECONOMIC EVALUATION

As outlined in 8.1, **a key challenge for protected areas is to ensure that they can actually meet their objectives**. Hundreds of new areas have been designated over recent decades but many fail to provide effective conservation and lack functioning management structures to secure support from administrators and neighbouring communities. External pressures, local conflicts, lack of financial resources and poor capacity are frequent obstacles. Inappropriate institutional structures and unclear land rights often exacerbate the problem.

At the national level, policy makers can promote an enabling framework for effective protected areas in several ways:

- shape funding priorities for conservation and funding mechanisms for protected areas to ensure that existing models provide the right incentives and sufficient financial stability for effective management;
- influence the legal framework, operational goals and administrative structure of national protected area systems to enable locally adapted management arrangements and more flexible resource use regimes to reduce the risk of conflicts;
- raise their political profile to influence public perceptions and encourage business involvement in conservation;
- share information and best practices internationally and facilitate coordination and cooperation between government agencies and other stakeholders.

An economic perspective on ecosystem services can make this task easier for policy makers as regards advocacy, decision support and handling social impacts (see below).

Results of economic valuation need to be appropriately interpreted and embedded in sound management processes. Valuation studies are always based on a number of underlying assumptions (see 8.3.2 below) which must be clearly understood to use and correctly interpret valuation results. This is particularly important where the results are employed for decision support e.g. determining the framework and tools for protected area management. Whilst monetary values can help to translate ecological concerns into economic arguments, the latter should always be considered within the bigger picture of sound protected area governance and management (e.g. participation of local communities and engagement of broader public) which requires political support.

8.3.1 VALUING ECOSYSTEM SERVICES FOR ADVOCACY

Ecosystem service valuations can be a powerful tool to communicate protection as an attractive choice central to sustainable development strategies.

Globally, it has been estimated that ecosystems within protected areas deliver US$ 100 worth of services for every US$ 1 invested in management to maintain provision and increase delivery of ecosystem services i.e. the annual ratio of the flow of services to operation, maintenance and investment costs is 100:1 (adapted from Balmford et al. 2002). More precise estimates can be developed at national level (see also Chapter 9).

Demonstrating the importance of ecosystem services that sustain economic growth is particularly important. Where rapid industrial development based on exploitation of natural resources is a high national priority, valuations can illustrate that functioning ecosystems are critical to this long-term growth. Conversely, degrading ecosystems and vital services jeopardises economic development by raising costs

and customer concerns. In Ethiopia, the remaining mountain rainforests host the last wild relatives of coffea arabica plants: the high economic value of their genetic diversity is a strong argument for strengthening conservation efforts in these landscapes undergoing rapid transformation (Hein and Gatzweiler 2006). Similar evidence is available from the Leuser National Park, Indonesia (see Box 8.5).

8.3.2. VALUING ECOSYSTEM SERVICES FOR DECISION SUPPORT

Valuing ecosystem services can support sound decision-making by helping to assess the costs and benefits of different options e.g. where a protected area should be located, comparison between different resource use regimes. It can also provide useful answers to broader questions such as: what are the cost-effective choices for enlarging our national networks? What sectoral policies, use regimes and general regulations do we need for landscapes surrounding protected areas and for resource use inside their borders? What priorities should national conservation strategies focus on? Answers to these and similar questions can benefit from even partial/selective valuation (Box 8.6).

Valuations can inform the debate amongst those responsible for a protected area and those affected by it, making visible the real trade-offs and economic consequences involved in the various options under consideration. They support transparent estimates of the consequences of different conservation strategies in terms both of costs incurred and ecosystem services secured. Valuations can at least partly translate ecological considerations into more widely understood, less technical arguments and substantially contribute to a more informed public debate about conservation priorities.

Valuation studies do not provide ready solutions to difficult questions. They should inform, not replace, critical debate that draws on a broader range of ecological and political information based on research and on experience. Where trade-offs imply strong conflicts among key actors, these cannot be resolved by valuation studies.

Box 8.5: Using economic arguments to support conservation in Indonesia

The Aceh Province (north Sumatra) has one of the largest continuous forest ecosystems remaining in south-east Asia. The forest sustains local community livelihoods by retaining water in the rainy season, providing continuous water supply throughout the dry season, mitigating floods and erosion and providing timber and non-timber products. Since 1980, the Leuser National Park has sought to protect this rich natural heritage. However, the national army, present in conflict-ridden Aceh during the 1990s, was itself involved in logging and commercial resource exploitation to generate revenues for its operations. Appeals to government officials to respect the park's unique biodiversity were not effective.

Faced with the Park's rapid degradation, its Scientific Director commissioned a valuation study of the impact of biodiversity loss on the province's potential for economic development (van Beukering et al. 2003). This analysed the benefit of the Park's ecosystems for water supply, fisheries, flood and drought prevention, agriculture and plantations, hydro-electricity, tourism, biodiversity, carbon sequestration, fire prevention, non-timber forest products and timber as well as their allocation among stakeholders and their regional distribution.

The study found that conserving the forest and its biodiversity would provide the highest long-term economic return for the Province (US$ 9.5 billion at 4% discount rate) as well as benefits for all stakeholders, particularly local communities. Continued deforestation would cause ecosystem service degradation and generate lower economic return for the Province (US$ 7 billion). There would be short term benefits mainly for the logging and plantation industry but long term negative impacts for most other stakeholders.

Source: van Beukering et al. 2003; Jakarta Post 2004

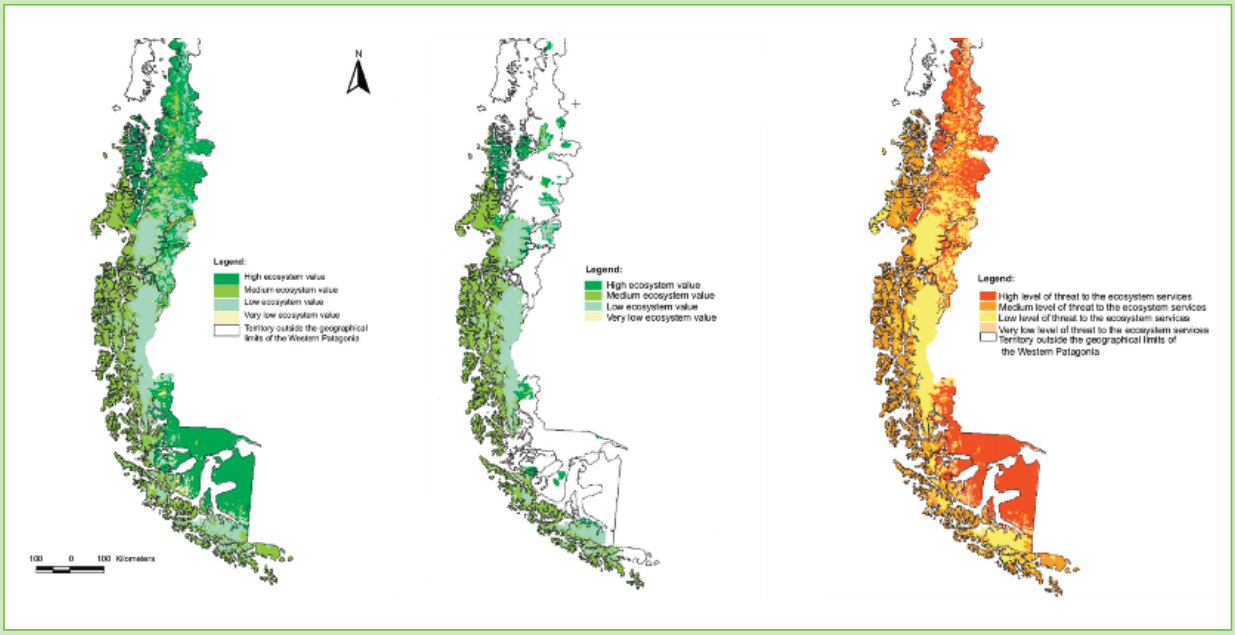
The scope and design of valuation studies affects their outcomes. Valuation can only ever assess a subset of benefits associated with protected areas. This is a point of concern: by focusing on what we can easily measure, we may neglect what we cannot assess e.g. cultural and spiritual values. Valuations require several choices to be made about e.g. the ecosystem services we focus on, the number of years we consider and the assumptions we make concerning the future state of the ecosystem. Such choices imply that we can have two different study designs producing different results, without one being wrong and the other one right.

Box 8.6: Valuation for decision support: regional conservation planning in Chile

In Western Patagonia, 47% of the territory is under legal protection – raising the question of whether such areas are in the right place to protect the region's biodiversity and natural heritage. Chilean researchers assessed the capacity of territorial units to provide a broad range of ecosystem services and generated an ecosystem value per unit (Map 1). They overlaid this map with the current boundaries of Patagonia's protected areas (Map 2) and also analysed factors threatening the provision of ecosystem services, drawing on multi-criteria evaluation and expert judgement, constructing a spatially explicit analysis of threat intensity (Map 3). These threats ranged from global issues (e.g. reduction of the ozone layer) to impacts of local salmon farming.

The comparison of all three maps indicated that (i) despite their vast extent, existing protected areas covered only a very limited percentage of territory with high ecosystem value; (ii) the highest threat level was found in areas with high ecosystem value outside protected areas.

The study enables regional conservation planners to examine the assumptions which underlie the composite variables of ecosystem value and threat intensity. If they agree with the authors' approach, they can draw on these insights to complement and/or correct their approach e.g. to re-allocate conservation funds and prioritise management actions appropriately at regional level.



1) Ecosystem values

2) Ecosystem values inside protected areas

3) Threats to ecosystem services

Sources: Adapted from Martinez-Harms and Gajardo 2008

Valuations imply value judgments, so policy makers need to agree on the design of a study and be aware of its implications when considering its possible use for decision support. To overcome such challenges, some agencies – such as the New Zealand Department of Conservation – have chosen to focus on ecological measurements as a surrogate for measuring ecosystem services. This alternative method is based on the assumption that works to maintain and restore ecosystems, based on ecological criteria, will lead to maintained and restored ecosystem services. There is evidence that this method works for at least some ecosystem services (McAlpine and Wotton 2009; see also Chapter 3.2 of this report which shows how a combination of qualitative, quantitative and monetary values can most usefully present the value of a given site).

8.3.3. VALUING ECOSYSTEM SERVICES TO ADDRESS SOCIAL IMPACTS

Valuation helps to analyse the social impacts of conservation by enabling us to track the distribution of costs and benefits associated with provision of ecosystem services and maintenance of ecosystem functions. Studies can make visible the situations where benefits are partly global but costs (maintenance effort, use restrictions) are borne by the local population and thus highlight the equity implications of a protected area (see Box 8.7). Such studies, scaled up to national system level, can help policy makers orient conservation efforts according to social impacts and set different objectives for different areas. This enhanced transparency and comparative analysis can improve negotiation efforts and compensation schemes, even if dedicated anthropological studies are better suited to describe the complex social dimension of conservation efforts and their impacts on people's livelihoods.

Making local costs visible stimulates efforts to harness benefits at local level. Many protected areas have considerable scope to enhance local benefits and minimise local costs. Local losses can be greatly reduced through growing awareness of new and traditional techniques for discouraging crop/livestock raiding e.g. physical enclosures to protect livestock at night, use of guard dogs and planting of repellent crops (Distefano 2005). Finding alternative sources of local income to compensate for use restrictions is more challenging but essential for the long-term success of any protected area. These may include conservation easements, payments for ecosystem services (see Chapter 5) and tourism. These funding sources not only need significant start up funds but also – and perhaps more importantly – strong political leadership and high-level support.

Valuations support the use of cost-efficient compensation mechanisms. Where local costs of protected areas cannot be met by alternative sources of income, well-designed compensation programmes can fill the gap (Box 8.7). Identifying costs, benefits and their distribution at a finer scale reduces the risk of compensating either too little (questionable conservation outcomes) or too much (wasting scarce resources). All such mechanisms need functioning governance structures and simple procedures to limit both the risk of fraud and administrative costs.

Box 8.7: Compensation through insurance against elephant damage in Sri Lanka

Rapid population growth and several decades of violent conflict have increased poverty and exacerbated one of Sri Lanka's major rural problems – the Human-Elephant-Conflict (HEC). With elephants consuming 150kg of food every day, crop raiding is a serious problem. In densely inhabited areas, defence strategies, such as watch towers and firecrackers have not led to acceptable long-term solutions.

To explore management alternatives, scientists conducted a survey of HEC impacts in 480 local households and used contingent valuation to estimate willingness to accept compensation. A second survey of Colombo residents revealed that their willingness to pay (WTP) for elephant conservation exceeded the level of funding needed to compensate damage in rural areas.

In addition to several concrete policy recommendations, the study led to the first insurance scheme covering elephant damage in Sri Lanka. In 2007, Ceylinco Insurance presented a scheme that is partly corporate social responsibility and partly profit-driven. Ceylinco charges a small addition to the premium payments of existing life/vehicle policy holders. This money is paid into a trust which funds compensation payments. This effectively transfers the financial burden of conservation to urban, city-dwelling people who do not have to risk their lives and livelihood living in areas with large numbers of elephants.

Farmers also have to pay a nominal fee to participate in the scheme. The payments are Rs 300,000 (around US$ 6000*) for death, Rs 200,000 (around US$ 4000) for death of spouse, Rs 50,000 (around US$ 1000) for property and Rs 25,000 (around US$ 500) for crop loss. There are other benefits like built-in child policies and educational cover for farmers' children. The most progressive element is that land ownership is not a consideration for qualification. Many farmers suffering elephant damage are slash-and-burn (shifting) cultivators who encroach on government lands. This is likely to encourage the government to reconsider the problems of rural landless peasantry.

Valuing conservation costs in terms of affected rural livelihoods has made visible the social implications of protecting elephants. Valuing willingness to pay for elephant conservation has shown the potential for financing the insurance scheme.

Source: PREM 2006; Indian Environment Portal 2007

* exchange rate 1 Rs = 0.02 US$ (2006 rates)

8.4 SECURING SUSTAINABLE FINANCING FOR PROTECTED AREAS

This section focuses on financing protected areas and the role of ecosystem service valuation in fundraising. In most countries, information on financial needs and the funds available for planning, design, establishment and effective management of protected areas is fragmentary. **However, it is generally accepted that creation and management costs can be substantial and that there is a considerable shortfall between the needs and financial resources allocated to protected areas** (see 8.2 above). This is particularly true for developing countries where most biodiversity is concentrated and conservation demands are high.

Economics and valuation can play a very important role in improving protected area financing. Better awareness of financial gaps can help mobilise resources through existing and new mechanisms to improve and expand the coverage of protected area systems and stabilise future funding.

8.4.1. IS THERE A FINANCING GAP FOR PROTECTED AREAS?

Cost estimations for global protected areas vary significantly between different studies. They depend on assumptions used (e.g. elements included in the total costs, type of management required – strict reserves managed mainly for science and wilderness areas may require less investment than national parks or habitat/species management areas[12]), size and location of protected areas (terrestrial/marine, developed/developing country due to differences in labour, opportunity costs and land acquisition costs etc.) and whether resources are needed to manage existing protected areas or to expand the network.

Cost estimates identified in the literature range from **US$ 1.2 billion/year** for a fully efficient (existing) protected area network in developing countries only (James et al. 1999) to **US$ 45 billion/year** for a global marine and terrestrial network that covers 30% of marine area and 15% of terrestrial area (Balmford et al. 2004, see below). Values within the above range have been calculated from other researchers (Vreugdenhil 2003; Bruner et al. 2004; European Commission 2004) under various scenarios of protected area expansion and for different regions. For example, the European Commission report focuses on the costs of Natura 2000, the EU network of areas managed for specific conservation objectives, which are estimated to € 6.1 billion for the EU-25 countries only (excluding Bulgaria and Romania).

The current protected area system is far from adequate but the studies show that further expansion will entail significant costs. Bruner et al. (2004) suggest that a system covering some of the highest global priority land sites in developing countries could increase annual management costs in these countries to US$ 4 billion/year and incur land acquisition costs of up to US$ 9 billion/year over a 10 year period, depending on the level of ambition and acquisition opportunities. UNEP-WCMC surveys (1993 and 1995) put the global cost of protecting 15% of the world's land area (of which 10% would be strictly protected) at up to US$ 25 billion/year. Estimated overall costs rise significantly if MPAs are included. Coverage of 30% of marine ecosystems, mainly in the tropics, as well as 15% of terrestrial areas could cost the above noted figure of US$ 45 billion/year over 30 years, including management and opportunity costs (Balmford et al. 2004): for projected benefits of this expansion, see 8.2.3).

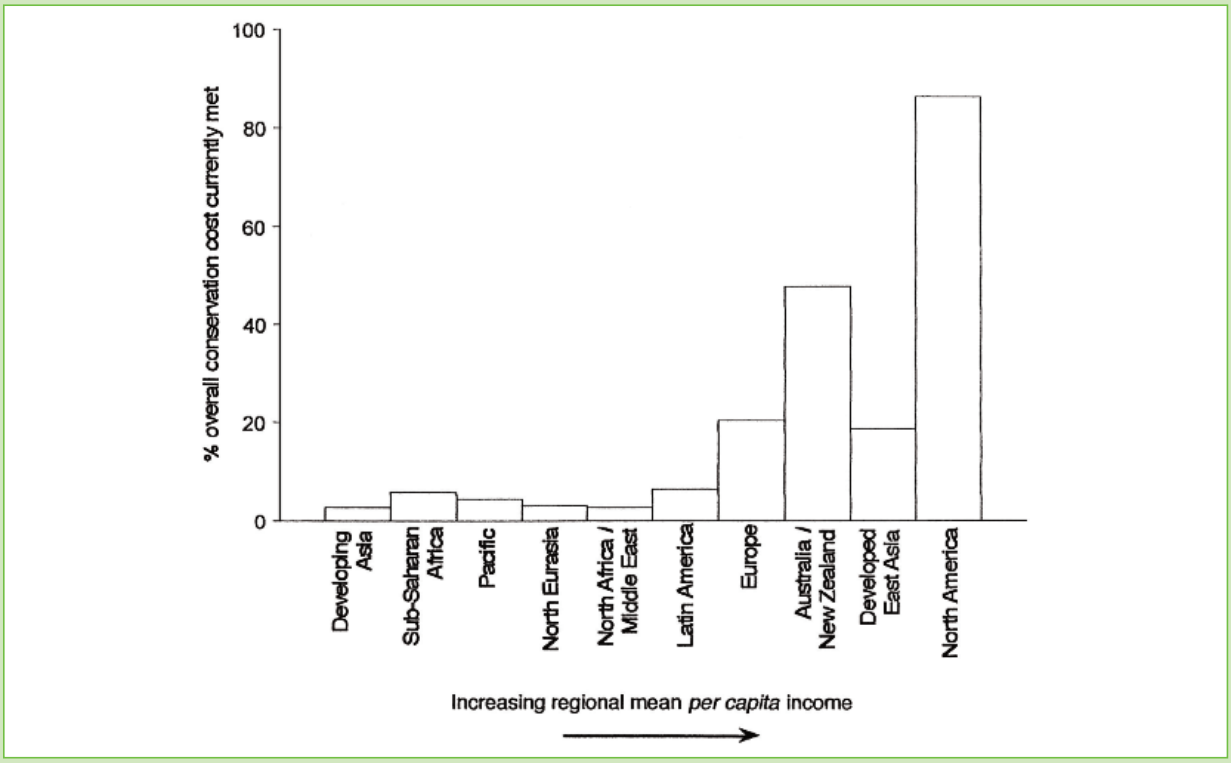
Turning to actual expenditure, an estimated US$ 6.5-10 billion/year is currently spent on supporting the global protected area system (Gutman and Davidson 2007[13]). This breaks down into US$ 1.3-2.6 billion (public expenditure by developing countries for

biodiversity protection), US$ 1.2-2.5 billion (Official Development Assistance from developed countries for protected areas in developing countries, NGO contributions and business spending) and US$ 4-5 billion allocated by developed countries to support their own protected areas networks.

Country-specific examples highlight the scale of the financing gap for existing protected areas. In Ghana, Ecuador and Peru, current spending has been estimated to account for between 35 and 50% of funding needs (Ankudey et al. 2003; Galindo et al. 2005; Ruiz 2005). In Bolivia, the budget covers 70% of needs (Molina et al. 2003) whereas in Cameroon and across the Congo Basin, budgets cover only 20% of needs (Culverwell 1997; Wilkie et al. 2001). Data provided by governments in 2006 indicates that the estimated annual gap in six South American countries (Brazil, Bolivia, Colombia, Chile, Ecuador (Galapagos) and Peru) totalled US$ 261 million and that in Indonesia, the gap is around US$ 100 million/year (Watkins et al. 2008).

If we consider the medium-range cost estimate for the efficient functioning of the existing global network of US$ 14 billion/year (James et al. 1999 and 2001) and compare them with current levels of available global funding for biodiversity (Gutman and Davidson 2007), it could be said that **the world community is investing between 50 and 75% of what would be needed to effectively manage the existing network of protected areas**. However, this general statement is no longer valid if we break down the assessment by the world's regions (Figure 8.5). The figures then show that protected area systems in more developed regions (North America, Australia/New Zealand) receive far more support compared with the gaps experienced in poorer and less developed regions (developing Asia, Africa). The percentage would be even lower if the need to fund an expanded global protected area system to cover representative ecosystems were taken into account. Note that, while this is the most recent estimate available, the numbers will have changed since publication, particularly in Europe as the Natura 2000 network has been established.

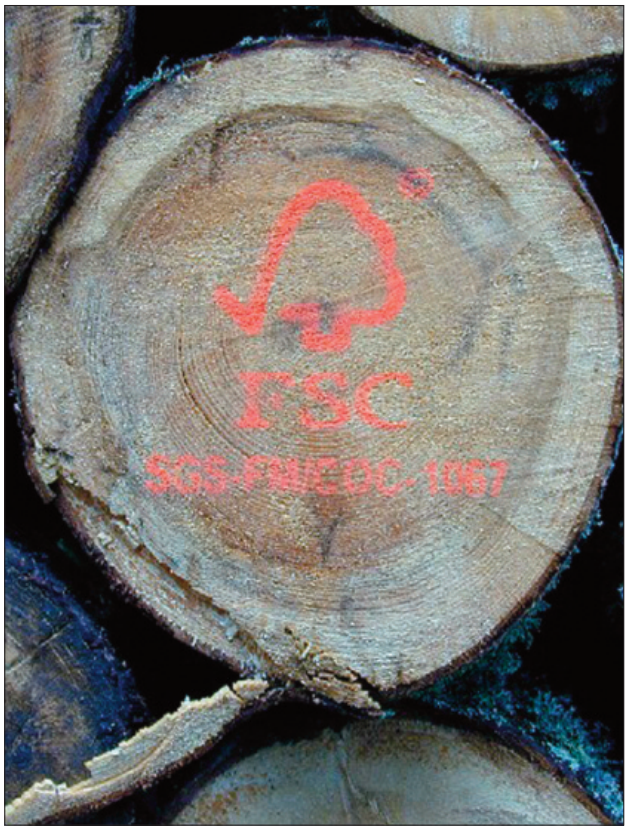
Figure 8.5: Financing gaps by region for existing protected areas



Source: Balmford et al. 2003

8.4.2. MOBILISING FUNDS: EXISTING SOURCES AND INNOVATIVE MECHANISMS

Biodiversity financing from different international sources and funds is estimated to be around US$ 4 to 5 billion a year, with some 30-50% going to finance protected areas (Gutman and Davidson 2007). Official Development Assistance (ODA) from high-income countries provides up to US$ 2 billion/year: this is mostly in the form of country-to-country bilateral aid, with the rest in the form of multilateral aid managed by the Global Environment Facility (GEF), other UN agencies, the International Development Agency and multilateral development banks. The percentage spent on biodiversity conservation has remained consistently low over the past 15 years (2.4-2.8% of total bilateral ODA: UNEP/CBD/WG-PA/1/3 and OECD/DAC) despite awareness-raising efforts within the CBD and through IUCN-World Conservation Union. The severe competition for available funds with other aid demands (e.g. poverty alleviation, rural infrastructure, water provision projects, education and health) is obviously a constraint for increasing expenditure on biodiversity-related activities.



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Funding by non-profit organisations (mainly channelled through international conservation NGOs, private and businesses-related foundations) **probably contributes more than US$ 1 billion/year to international biodiversity protection** but relevant information and data are fragmentary (Gutman and Davidson 2007). Information on NGO spending suggests that funds allocated to protected areas and biodiversity may be even higher. **As with ODA, non-profit funding for biodiversity conservation has grown sluggishly during the past decade:** constraints include levels of public awareness, choices between different environmental priorities and the state of the economy. Competition with other international priorities, such as climate change that have gained higher political and business support, creates the impression that biodiversity is losing ground.

Market-based sources of protected area income could contribute between US$ 1-2 billion annually (Gutman and Davidson 2007). These include international tourism, in particular ecotourism; markets for environment-friendly products such as organic, certified and fair trade product (see Chapter 5). These funding sources have grown quickly in the last twenty years and raised high expectations, but their direct contribution to protected areas needs to be determined.

The three categories of funding listed above can come from public and private sources, be generated within or outside the protected area (Emerton et al. 2006) and be targeted at actions that will take place at the local, national, regional or global level.

Financing for protected areas can also be obtained via new innovative mechanisms and instruments. These additional sources could be based on licensing and concessions, establishment of trust funds, benefits transfer through the creation and deployment of a Green Development Mechanism, payments for ecosystem services and creating international markets for biodiversity and ecosystem services through offsetting schemes or trading (see further Chapter 5, and also 7). Transnational and international PES for global public goods (e.g. carbon sequestration through the proposed REDD scheme under UNFCCC) are amongst the most prominent

recently proposed financing schemes: others include environmental taxes and public-private partnerships that link businesses, NGOs, public bodies and communities.

Table 8.2 lists the main existing funding mechanisms for protected areas, both traditional and innovative, with an assessment of their strengths and weaknesses. Most of the funds available today come from traditional methods of income generation such as entry and use fees, tourism charges or funds from NGOs, foundations, private and business sources, ODA or trust funds. Between 1991 and 2006, donor countries invested more than US$ 1.6 billion via the GEF in 1,600 protected areas around the world, spanning 360 million hectares (an area equivalent to Mongolia and Greenland together). This investment leveraged an additional US$ 4.2 billion in co-financing. As a result, very few countries lack protected area systems at the national level. However, some of the traditional mechanisms (e.g. debt-for-nature swaps) have proved cumbersome and require specific operational conditions. In the last 15 years, the total generated by commercial debt-for-nature swaps was only US$ 112 million according to figures compiled by the WWF's Center for Conservation Finance.

Despite increased resources, such mechanisms have failed to provide the funds required to establish the comprehensive and ecologically representative protected area system needed to fulfil the CBD objectives (see 8.5 below). On the occasion of the ninth meeting of the CBD Conference of the Parties in May 2008, the world community reiterated concerns that insufficient resources continued to be one of the main obstacles to the planning, design, establishment and effective management of protected areas, particularly by developing countries and countries with economies in transition. It recognised the urgency of mobilising adequate financial resources for protected areas at a time when the conservation agenda in general, and the Millennium Development Goal target of reducing significantly the rate of biodiversity loss, were being integrated in sustainable development programmes.

CBD COP Decision IX/18 also notes that innovative mechanisms, including market-based approaches, can complement but not replace public funding and development assistance (see also UNEP/CBD/COP/8/INF/21 on public private partnerships). Table 8.2 lists several innovative mechanisms (bio-prospecting fees and contracts, green lotteries) which are still being tested and will need capacity building for their design and use. Mechanisms such as PES and REDD have begun to gather significant support due to their flexibility in design, attracting political attention for their further development. Other ideas are still contentious, like the reform of the financing system and international environmental taxation. Some consider that this kind of taxation could help to improve accountability in the use of natural resources and stimulate transnational companies/corporations subject to such taxes to internalise the costs of business-related impacts on biodiversity (Verweij and de Man 2005).

8.4.3. A FRAMEWORK FOR SUCCESSFUL FINANCING

Traditionally, financial planning for protected areas has focused on the priorities of international donors and lacked an enabling regulatory framework or incentives for behavioural change. Plans have rarely been supported by accurate assessments of financial needs and gaps, cost reduction strategies, assessment and diversification of income sources, business plans or a framework to prioritise revenue allocation. As a result, only a few countries have completed financial plans that incorporate the above indicated elements at system level: these include Ecuador, Costa Rica, Peru, Brazil, Colombia, Grenada and the EU (European Commission 2004).

This section outlines four steps to secure more successful financing for protected areas.

CREATE MARKETS AND PROMOTE MARKET-BASED TOOLS

Economic incentives that bridge the gap between private and public values of biodiversity can provide some solutions to the problem of the global commons and improve the rationale for engaging in biodiversity protection actions. Building on the discussion in Chapter 5, creating markets for goods or services derived

Table 8.2: Existing funding mechanisms for protected areas, including lessons learned concerning their effectiveness

		Geographic area			Available Instruments	Weaknesses/needs for improved performance
Source of funds	**Available Instruments**	**L/R**	**Nat**	**Int**		
Privat	Protected areas entrance and use fees	●			Core component of protected area funding	Better calculation of prices, introduce ecological sustainability when extractive/harvesting uses
Privat	Tourism-related incomes	●	●	●	Can recover resource costs, can capture WTP from the visitors, diversification of tourism markets, rural/ local development, can be used to manage demand	Investments to improve facilities, expertise to provide and market these services, calculation of prices and charges
Privat	Markets for sustainable rural/local products	●	●		Can promote and communicate the value of the resource; assist in branding of a protected area; work in combination with local/rural development; moneys are distributed to local communities; certification is a top-up	Investment needed for certification, developing markets/ marketing
Privat	Innovative goodwill fundraising instruments (Internet based, etc)	●	●	●	Very innovative source of funds that seek to reach global 'small' contributors; additionality is key	Need for making it policy specific and targeting, mainstream the instruments in policy, need for new creative ideas and marketing
Privat	Green lotteries	●	●	●	New tool to mobilise funds; to appeal to consumers and wider public; works better when associated with biodiversity of high value	Need for publicity and marketing
Privat	Public Private Partnerships (PPP) & business-public-NGO partnerships	●	●	●	Can evolve in the context of business CSR, measure included in the menu of many international financing efforts (Climate Change, poverty, etc), experiences exist, flexibility and adaptability can be applied	Tendency to 'move on', local/regional implementation can be more stable
Privat	Business voluntary standards		●	●	Can be developed for protected area and sustainable practices; although not really bringing actual money into the protected area system they can contribute to sustainable management of protected area and local development	Not all business can follow, as standards are costly even for those who introduce/are leaders
Privat	Businesses' goodwill investments (like Corporate Social Responsibility - CSR)	●	●	●	Potential for increasing corporate support/sponsoring to PAs	Need to sustain and increase interest in PAs, increase interaction with private sector, develop new approaches and marketing of PAs
Privat	Venture capital and portfolio (green) investments		●	●	Potential for mobilising corporate funds in a sustainable way; sponsoring protected areas and species; can support environmental business from SMEs near the protected area	High administrative costs; may generate low returns and loose support from capital/investors; Providing for corporate tax relief associated with these mechanisms may further support their uptake
Privat / Public	Non-profit organisation (NGOs, foundations, trusts and charities) funding	●	●	●	Important source of funds overall, provided at protected area level or species level, can help in mobilising actors to donate	Need to sustain and increase donor and public interest in protected areas, increase interaction with donors/public, develop new approaches and marketing of protected areas
Privat / Public	(International) Markets for all type of ecosystem services (PES) and green markets		●	●	Use has increased recently, opportunity to generate revenues for services and not only extractive use, can provide compensation to landowners to adhere to protected area management	Need for developing design guidelines, supportive policy and legislative frameworks, improved methodologies for establishing the biophysical links, set prices, monitor delivery of services

Privat / Public	Bio-prospecting		●	●	Immediate link with protected area, can develop significant potential and mobilise additional funds	R&D and administrative costs; need for highly specialised knowledge, need to work together with access and benefit sharing (ABS)
Public / Privat	Biodiversity cap-and-trade schemes and market-based instruments (MBI) (e.g. off-sets, habitat banking)			●	Instrument that can help in but mostly around protected area; can mobilise significant funds; can create markets for biodiversity and their services	Costs for administration; implementation at global level and registration/monitoring; further work on equivalency methods and their application may be needed
Public / Privat	Carbon emission permits (use part of the auctions)		●	●	Can provide complementary funds for protected areas; some synergies can strengthen between climate change adaptation and ecosystem financing needs	Competition for the distribution of the resources coming from actions/permits between different environmental purposes
Public	Government budgetary allocations	●	●	●	Core component of protected area funding, but are not enough on their own	Some evidence of protected area funding decline; resources often driven to/compete with other priorities, strengthening policy integration and mainstreaming protected area is needed
Public	Earmarking public revenues		●	●	Can potentially provide sufficient resources that will go to protected area and biodiversity conservation	Quite difficult to achieve: if resources earmarked for environmental purposes there is competition between different environmental goals/policies
Public	Environment-related taxes (national or international)		●	●	Taxing (or increase taxation) to international trade; some products are related to nature (timber, etc); others (aviation, shipping) are of environmental nature but already can be accepted.	Competition about the distribution of revenues between different environmental causes
Public	Environmental tax reform		●	●	Reforming taxation of international currency transactions can bring important resources for environmental purposes (climate and biodiversity)	Political will is needed for environmental tax reform; internationally this require more efforts
Public	Reforming subsidies (rural production, fisheries, etc)		●	●	Can help provide subsidies for land owners and users of protected area that will allow sustainable use of the resource, or even will allow to implement protected area management	Better calculation of prices/subsidies, design of subsidies to be more green (agri-environmental measures), but quite difficult to achieve consensus and harmonised approach at global level
Public	Benefit-sharing and revenue-sharing	●	●		Integral component of protected area funding; potential to offset local opportunity costs; increase availability of local funds; tapping into development sources; improving benefit sharing	Need for design and communication with local/national authorities; monitoring of its implementation to demonstrate benefits
Public	Reforms in the international monetary system			●	Reforming taxation of international currency transactions can bring important resources for environmental purposes (climate and biodiversity)	Political will is needed for agreeing the introduction of such taxes internationally
Public	Bilateral and/or multilateral aid (and GEF)			●	Core component of protected area funding; source of direct budgetary support to protected area	Some evidence of funding decline; Major reorientation to poverty reduction and sustainable development may drive resources to other priorities; strengthening integration and mainstreaming of protected area is needed

Public	Debt-for-nature swaps		●	●	Can provide large and secure amounts for protected area or specific sites; funding protected area through SD and poverty reduction	Instrument in decline, due to difficulties in persuading donors/government to release large amounts of funds; difficulties in persuading protected area agencies to invest large amounts for the future
Public	Development banks and agencies		●	●	Big number of agencies, lots of funds, but no increase there	Biodiversity priorities mixed with other environmental objectives/MDG; bureaucracy; increased spending on start-up but not so much on reoccurring costs
Public	Long-term ODA commitments through a Green Development Mechanism	●	●	●	Help transfers from developed/developing countries to less developed countries, GDM can Implement MDG and assist local needs too	Need for developing guidelines, legislative frameworks at global level, improved methodologies for establishing the biophysical links, set prices, monitor delivery of services, evaluate the efficiency of transfers

Abbreviations: Private (Pri), Public (Pub), Local (L), Regional (R), National; (Nat), International (Int), Small and medium sized businesses (SME).

Source: Compilation of information within Emerton et al. (2005); UNEP/CBD/WP-PA/1/3 (2005); Bräuer et al.(2006)

from protected areas calls for removal of trade-related barriers and enhanced public knowledge of their importance and special characteristics. An important precondition is the establishment and assignment of well-defined and stable property and/or use rights and the creation of information instruments for the products and services that protected areas provide.

Market creation is based on the premise that holders of rights derived from a resource (landowners, people with use permits, etc.) will maximise the value of their resources over long time horizons, thus optimising biodiversity use, conservation and restoration (OECD 2008). Translated into simple terms, this means that there needs to be;

- an understanding that a protected area produces ecosystem services and benefits valuable to the public (whether local communities or a global constituency);
- a clear understanding of the property rights involved;
- a commitment to efficient management to reduce pressure on the protected area so that it will continue to provide the services;
- identification of global and local beneficiaries and communication of the value of the services they gain; and
- last but not least, an efficient mechanism to collect the fees/support from global and local beneficiaries and allocate them to efficient management of the resource.

ADDRESS FUNDING INSTABILITY AND CREATE A DIVERSE INCOME PORTFOLIO

Even if funding is obtained and appropriate mechanisms make the transfers from the beneficiary to the resource, there is not always a guarantee of long-term success. Often projects kick off well and raise expectations but are then discontinued for various reasons. A common scenario is where donors only finance initial phases of the protected area management plan and then move on to other areas, or else enabling conditions change significantly and finance stagnates. In other cases, the upward trend in the financial flow collapses; when this is totally unexpected, there can be big consequences for the stability of any conservation project.

Box 8.8: Options for financing a new network of protected areas in Sierra Leone

The Sierra Leone Government applied for GEF funding to create a national network of protected areas. The issue of sustainable financing sources for this network is of paramount importance. A study prepared by RSPB, the National Commission for the Environment of Sierra Leone and the Conservation Society of Sierra Leona demonstrated that although there are several potential mechanisms to generate income for the protected areas (debt swaps, a hypothecated airport departure tax, sale of carbon credits, donations from the mining industry, GEF, support from NGOs), the creation of a trust fund would be the optimum solution for establishing sustainable financial security. This trust fund would help to bring together various possible income streams to ensure they are sufficiently co-ordinated. The reason behind this proposal was the serious constraints on generating dependable on-going revenue in Sierra Leone and the vulnerability associated with dependence on a series of one-off injections of funds.

Source: RSPB et al. 2006

In other cases, government backing or any public authority support may not be strong enough to provide funds needed over time. **This reinforces the need to develop a diverse portfolio of sources of income for protected areas to the extent possible.** This requires committed management efforts and good relations with the range of possible donors and sectors that may wish to operate in the area. Keeping up with all potential funding sources can at times involve a high risk of conflicts between actors with different interests in the protected area.

Bringing different finance sources together under a common umbrella is not always easy, but can be a solution when there is increased risk that independent efforts and mechanisms will fail to deliver, mainly due to institutional conditions in the country concerned. For these reasons, the possibility of establishing trust funds to manage the income generated directly by the protected area and other support flows from international donors may be a better solution in many cases (see Box 8.8).

It is likely that any individual funding source and mechanism may experience changes over time (e.g. limitations to available resources and changes in funding priorities). A diverse portfolio of funding sources, including public and private mechanisms, can therefore increase the long-term sustainability of protected area financing and management.

ADDRESS POSSIBLE SOCIAL IMPACTS OF PROTECTED AREA FINANCING

Ecotourism is widely promoted as a conservation tool and actively practised in protected areas worldwide. Theoretically, support for conservation from the various types of stakeholder inside and outside protected areas is maximised if they benefit in proportion to the opportunity costs they bear. Conversely, unbalanced distribution of benefits between stakeholders can erode their support for or lead to the failure of ecotourism and conservation (see Box 8.9).

Box 8.9: Inequalities in benefit distribution in China's Wolong Nature Reserve

Research on the distribution of benefits derived from ecotourism in the Wolong Nature Reserve for Giant Pandas revealed two types of uneven distribution of economic benefits among four major groups of stakeholder. These created conflicts and subsequently failure in reaching the Reserve's conservation objectives.

Significant inequalities exist between local rural residents and other stakeholders. The former, with farmers, bear most of the cost of conservation but most economic benefits (investment, employment and goods/services) in three key ecotourism sectors (infrastructure construction, hotels/restaurants and souvenir sales) go to other stakeholders outside the Reserve. The distribution of benefits is also unequal even among Reserve residents. Most rural households that benefit from ecotourism are located near the main road and have less negative impacts on panda habitat than households located and exercising activities far from the road and closer to panda habitats. This distribution gap is likely to discourage conservation support from the second group of households, yet their activities are the main forces degrading panda habitats. This unequal distribution of benefits can be lessened by enhancing local participation, increasing the use of local goods and encouraging the relocation of rural households closer to ecotourism facilities.

Source: He et al. 2008

MAKING AVAILABLE FUNDS WORK BETTER

Securing adequate financial resources does not of itself guarantee effective management of protected areas. Enforcement of laws is critical - pressure on valuable and scarce resources will always be present and must be addressed through enforcement of existing restrictions on protected area use (see Chapter 7).

To strengthen appropriate management of protected areas, good monitoring mechanisms are needed to report on site-specific pressures, measure progress towards set objectives, assess efficiency of finance used and identify what else needs to be done (see Chapter 3). Many researchers and practitioners have long identified the lack of monitoring as a key reason for conservation failures in protected areas; along with inadequate community/public participation in decision-making (see Box 8.10). Building capacities within the park and in local or regional administrations can help make implementation more efficient and put meaningful protection in place.

Box 8.10: The importance of monitoring in forest protected areas, Panama

Protected areas are cornerstones in forest conservation and may play a significant role in reducing deforestation rates. Research in nine protected areas in Panama illustrates that coupling monitoring measures with greater funding and strong governance is paramount to reducing deforestation. On their own, however, these factors are insufficient for forest protection. Conservation approaches that complement effective monitoring with community participation and equitable benefit sharing can best address wider issues of leakage and permanence under potential REDD implementation.

Source: Oestreicher et al. 2009

8.5 STRENGTHENING POLICY AND INSTITUTIONAL SUPPORT

Successful establishment and effective management of protected areas, and the delivery of associated benefits, requires multi-level policy support and effective institutional frameworks. This section broadens the analysis in sections 8.1 to 8.4 to discuss the broader policy, institutional and stakeholder context needed to ensure that protected areas achieve their goals and provide societal benefits.

8.5.1. MAJOR POLICY INITIATIVES ON PROTECTED AREAS

Many international and regional agreements, conventions, treaties and global programmes highlight the establishment, management, funding and/or importance of protected areas. Similarly, organisations like IUCN, with its regular global conferences and World Commission on Protected Areas, help create a global consensus on key protected area issues. In the EU, the Natura 2000 Network forms a policy cornerstone for the conservation of Europe's most valuable species and habitats.

In February 2004, the 188 CBD Parties agreed the most comprehensive and specific protected area commitments ever made by the international community by adopting the CBD Programme of Work on Protected Areas (PoWPA) (see Box 8.11). This builds on resolutions from the Vth World Parks Congress (the Durban Accord) and enshrines the development of comprehensive protected area systems that are sustainably financed and supported by society. The PoWPA, by emphasising equitable sharing of costs and benefits, recognising different governance types and giving prominence to management effectiveness and multiple benefits, is the most comprehensive global plan of action for implementation. **It can be considered as a defining framework or 'blueprint' for protected areas for decades to come** (Stolton et al. 2008c; Chape et al. 2008).

8.5.2. INSTITUTIONAL REQUIREMENTS FOR PROTECTED AREAS

Successful institutional structures for protected areas typically include a commitment to the following aspects:

- a common set of goals across a portfolio of diverse protected areas;
- a culture of learning, capacity building and adaptive management;
- collaboration between and among key protected area actors and stakeholders;
- full recognition of the ecological, economic, social, cultural values and benefits of protected areas; and
- the ability to adequately monitor and adapt to ecological and social conditions (Slocombe 2008).

Such institutions also need the authority, ability and willingness to promote sustainable use of resources, facilitate equitable distribution of costs and benefits and support different governance types (Barrett et al. 2001).

Successful establishment and management of protected areas require mechanisms for coordination and collaboration between different institutional levels (e.g. different sectors, stakeholders and government agencies). This contributes to well-informed management planning and significantly improves the efficiency and effectiveness of conservation spending. Communication and exchange of information is an important part of this process (e.g. stakeholder forum, inter-agency groups etc.).

Improved monitoring is a key component of institutional transparency (see 8.4.3). Monitoring needs to be based on clear objectives and measurable targets, agreed with stakeholders that address pressures to protected areas and aim to improve the state of biodiversity and ecosystem services. Efficient monitoring also helps to demonstrate that protected

Box 8.11: The CBD Programme of Work on Protected Areas (PoWPA)

The Programme of Work on Protected Areas, adopted by 188 Parties in 2004, is one of the most ambitious environmental strategies in history. Its aim was to establish a comprehensive, effectively managed and ecologically representative national and regional systems of protected areas by 2010 (terrestrial) and 2012 (marine), The Programme is generally judged to have been a success, even though these goals will not be completed by the target dates (see phased timetable below). It is likely that the CBD Tenth Conference of Parties in late 2010 will propose a new timetable and minor modifications to the actions. A process to develop these proposals is underway.

PHASES OF THE PROGRAMME OF WORK

PHASES	POTENTIAL MAIN OUTCOMES OF EACH PHASE
PHASE I (2004 – 2006)	• **"Master plan" for protected areas.** Completing, in effect, a "master plan" for the system of protected areas (key elements include, for example: plans for filling ecological gaps; securing financial resources; building capacity; promoting governance arrangements; and addressing policy, legislative and institutional barriers). • **Studies and assessments,** for input into "master plans", covering, for example, socio-economic contributions of protected areas, ecological gaps in protected area systems, and types of governance arrangements. • **New protected areas.** Establishment of new protected areas where urgent action is required.
PHASE II (2007 – 2008)	• **Threats.** Mechanisms in place to address key threats. • **Financial resources.** Sufficient financial resources secured. • **Indigenous and local communities.** Policies and mechanisms to support indigenous and local community participation and equitable sharing of costs and benefits. • **Standards.** Standards adopted for all major aspects of protected areas.
PHASE III (2009 – 2015)	• **Effective systems of protected areas.** Comprehensive, ecologically representative, and effectively managed systems of protected areas. • **Integration** of protected areas into wider land and seascapes.

Source: Dudley et al. 2005

areas do indeed provide benefits to biodiversity and people – and therefore are worth the investment.

8.5.3 KEY ELEMENTS FOR SUCCESSFUL MANAGEMENT

Six elements have been identified as critical to focus concerted efforts and combine the strengths of all sectors of society (policy makers, civil society, indigenous and local communities and business). These can be thought of as **'the Six Cs'** and should be embedded in policy and institutional structures for protected areas at local, national, regional and global levels and **translated into practical actions on the ground**.

Box 8.12 shows how these elements can be incorporated for effective implementation of protected areas,

using the example of Micronesia. The Annex further illustrates how certain decisions under the CBD, Ramsar Convention on Wetlands, World Heritage Convention and UN Convention to Combat Desertification (UNCCD) touch on these key elements.

Box 8.12: Micronesia Challenge commitment to protected area implementation

"In the Federated States of Micronesia, more than half of our citizens' and residents' livelihoods depend on a subsistence lifestyle; hence managing our natural resources is a matter we take very seriously. In Micronesia, we do not see conservation and development as opposing forces, but rather as complimentary to each other."

The Honorable Joseph Urusemal
President of the Federated States of Micronesia (2006)

The Micronesia Challenge is a commitment by the Chief Executives of the Federated States of Micronesia, the Republic of the Marshall Islands, the Republic of Palau, the U.S. Territory of Guam and the U.S. Commonwealth of the Northern Mariana Islands to effectively conserve at least 30% of the near shore marine resources and 20% of the terrestrial resources across Micronesia by 2020.

Capacity: A regional technical support team includes a wide range of partners, supported by a technical measures working group which helps to ensure that there is adequate capacity among all member countries.

Capital: The Nature Conservancy and Conservation International have jointly pledged US$ 6 million to leverage an additional US$ 12 million for the first phase of the Challenge. The leaders and their partners are working to secure matching funds for this pledge and additional funding to support the long-term expansion and effective management of protected area networks for each of the Micronesia Challenge jurisdictions. GEF has pledged a US$ 6 million match as part of a new Pacific Alliance for Sustainability initiative. These developments have coincided with the establishment of a Micronesia Conservation Trust Fund.

Coordination: The Micronesia Challenge steering committee and partners have developed a comprehensive strategic plan that helped ensure coordination by clearly defining roles and responsibilities of each of the partners.

Cooperation: There is a high level of cooperation among all partners, including participating governments, NGOs, and local communities.

Commitment: There is a strong and publicly-declared commitment of each of the governments as well as clear commitment among stakeholders at sub-national levels, including local communities and locally managed marine areas.

Communication: The communications working group has developed a regional communications strategy, local communication plans and a regional inventory of outreach materials to gain publicity at a global level.

The Micronesia Challenge serves as a model for conservation initiated by a coalition of regional governments, endorsed at an international level and implemented on the ground with local communities.

Source: http://micronesiachallenge.org/index.php

8.5.4. PROMOTING COHERENCE AND SYNERGIES: THE EXAMPLE OF CLIMATE CHANGE

Policy makers need to align protected areas with other policies to ensure broad policy coherence and build on opportunities for synergies. One example of this is making explicit linkages between protected areas and climate change adaptation. **Better managed, better connected, better governed and better financed protected areas are recognised as key to both mitigation and adaptation responses to climate change.**

Protected areas are critical to preventing further carbon emissions from degradation and development and can make an important contribution to an overall strategy for climate change mitigation. A total of 312 Gt of terrestrial carbon is currently stored in the existing protected area network: if lost to the atmosphere, this would be equivalent to approximately 23 times the total global anthropogenic carbon emissions for 2004 (Kapos et al. 2008). Their contribution will certainly increase as governments continue to designate new protected areas in the Arctic, tropical rainforests and boreal forests.

However, protected areas are generally not considered in current REDD discussions and strategies, given the impression that carbon in protected areas is safe and that such areas would not offer additional carbon sequestration. Yet protected areas remain vulnerable to degradation: a significant number of the world's protected areas are poorly or inadequately managed (Leverington et al. 2008). A comprehensive network of effectively designed and managed protected areas would ensure that carbon is protected into the foreseeable future and should therefore be considered as a primary REDD strategy. Links to REDD would needs to respect the need for additionality – ie ensure real, measurable and long-term emission reductions.

The UNFCCC recognises the value of ecosystem resilience in Article 2 of its Convention, and introduced the term 'ecosystem-based adaptation' at COP14. However, it **does not yet explicitly recognise the contribution of protected areas to ecosystem resilience and ecosystem-based adaptation**. Climate adaptation on the ground cannot and should not be addressed exclusively by human-made infrastructure (e.g. CBD AHTEG 2009; Campbell et al. 2009): climate-resilient development needs to include ecosystem-based adaptation where appropriate. Well-designed coherent networks of appropriately managed and ecologically connected protected areas are one of the most cogent responses to climate change and should be an explicit component of an ecosystem-based adaptation strategy (e.g. Kettunen et al. 2007).

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8.6 CREATING A WORKABLE FUTURE FOR PROTECTED AREAS

Increased support for protected areas is in society's best interest, with their global benefits (i.e. total benefits provided by ecosystems within protected areas) generally far outweighing costs. The scale of the difference between benefits and costs globally appears to be so significant, even allowing for inevitable imprecision in global analyses, that these basic conclusions would be unchanged even if analyses were incorrect by more than an order of magnitude, Even at the local level, benefits can be greater than the costs even without any national or international payments for broader ecosystem service benefits – although the ratio is very site specific. Payments for the provision of services from these sites can increase the economic attractiveness of protected areas and help them be an engine of local development.

Support can take the form of new designations where this would benefit ecosystems of particular value in terms of species and habitats – there is still a large untapped potential for new marine protected areas which currently cover only 5.9% of territorial seas and 0.5% of the high seas (see 8.1 above). Support can also include increased investment in or payment for management of existing protected areas to address the funding gap and help them fulfil their potential to protect biodiversity and deliver important ecosystem services locally, nationally and internationally.

Policy actions for more equitable distribution of benefits and costs are fundamental. Benefits from protection are often broadly disbursed, long term and non-market, whereas the costs of protection are more immediate and the earning potential from not choosing protection are often short-term and concentrated. At the local and sometimes national levels, the question of whether protected areas represent net benefits or net costs therefore depends on recognising local rights, ensuring meaningful local participation, managing to maximise benefits and minimise costs, and creating mechanisms to enable beneficiaries at all scales to pay for protection or invest in maintaining the delivery of ecosystem services. Such policies increase the perceived fairness of protected areas and help ensure their contribution to human well-being at all scales.

Policy makers can strengthen the effectiveness of protected areas through an enabling framework for the national system (e.g. clear legislative basis, policy consistency, cooperation between stakeholders) and by ensuring that funding models provide the right incentives and sufficient financial stability for effective management. They play a key role in raising the profile of protected areas in both national and international fora and in encouraging positive stakeholder engagement.

Valuation of benefits and costs provided by ecosystems within protected areas can deliver multiple benefits for biodiversity and people. It can support decision-making and fundraising (e.g. by showing that biodiversity conservation can often be a socio-economically attractive choice) but its results need to be appropriately interpreted and embedded in sound management processes. Monetary values can help to translate ecological concerns into economic arguments, but these arguments must always be considered within the bigger picture of protected area governance. It should also be noted that sustainable use and broader use of compensation programmes will not make protection attractive for everyone. Enforcement of regulations to ensure respect for jointly agreed protected area rules is therefore vital.

Current expenditure on protected areas does not match funding needs. There is a clear need for an integrated multilevel policy response and a long-term vision for financing protected areas in order to bridge the current funding gap. Steps towards this goal

include better communication of benefits and costs to increase public understanding of the positive returns available from funding protected areas and to support the design and implementation of new innovative mechanisms and instruments.

Although practitioners are still refining the figures on financing needs of protected areas, the CBD and the conservation community should consider setting a fundraising target for global biodiversity conservation and mobilise all relevant actors. The CBD's Ninth Conference of the Parties (Bonn, 2008) called for establishing national financial targets to support implementation of the CBD Programme of Work on Protected Wreas (Decision IX/18). This decision should pave the way for consolidated action.

To achieve future funding targets, the financing problem needs to be addressed in a strategic way. Efforts to increase protected area funding have already shown considerable success: the global network continues to expand and dedicated programmes for protected areas now exist in nearly all countries. In 2008, CBD Parties adopted a general strategy to mobilise resources to implement the Convention's objectives, including improving financing for protected areas (Decision IX/11). This strategy addresses key obstacles to achieving adequate biodiversity funding but requires concerted efforts to translate it into practical actions for individual stakeholders.

Stronger cooperation, both North-South and South-South, is essential to increase the funding base for protected areas. The establishment of a dedicated global fund or financial mechanism could help mobilise and focus resources in an effective manner. Reducing existing demands on public financing through the reform of harmful subsidies could help to generate additional resources for protected areas (see Chapter 6). Identified financial needs of protected areas could be further integrated into existing and emerging financial instruments for the environment e.g. the REDD discussions highlight potential synergies between climate change and biodiversity objectives (see Chapter 5). Market-based instruments can significantly contribute to generating additional funds for protected areas, e.g. from consumers and the business sector (see Chapter 7).

There is clear international policy commitment and institutional support for protected areas – this should now be translated into concrete actions on the ground in a coherent and mutually supporting manner. The current global financial crisis may provide an opportunity to devise a new economic system connected to earth's natural systems in the place of a system that is disconnected and runs down natural capital. A suite of long-term economic measures is needed that fully accounts for the true benefits and costs of ecosystem protection. Investment in the network of global protected areas is one such measure.

Chapter 8 has **shown the range of social and economic benefits** that ecosystems within **protected areas** can provide and presented evidence of the generally favourable benefit-cost ratio for their creation and management at global and often national and local levels. Robust policy action to **improve management** of existing areas, **expand the global protected area network** – particularly for marine protected areas – and secure more **equitable distribution of their costs and benefits** is critically important to achieve the full potential of such areas and improve human well-being over the long term.

Chapter 9 focuses on another area of **investment in natural capital** – that of **ecological infrastructure and restoration**. Whilst acknowledging that it is generally economically preferable to avoid the need for restoration, the Chapter explores the economic benefits of restoration where damage has occurred. It demonstrates that while restoration costs can be high, there are many documented cases of very significant social returns on investment, creating important private and particularly public goods.

Endnotes

[1] As listed by the World Database on Protected Areas (WDPA)

[2] Throughout this section, we annualize findings given in Net Present Value assuming a time horizon of 30 years and a discount rate of 10%.

[3] An important exception is visitation to well known culturally important sites such as Machu Picchu in Peru or Angkor Wat in Cambodia.

[4] Management costs can usefully be divided into recurrent costs (e.g. staff salaries, fuel, maintenance of equipment, community engagement/participation, monitoring and evaluation, site level administration), up-front establishment costs (e.g., stakeholder consultations, scientific study, boundary demarcation, land/equipment purchase, construction) and subsequent investment (to upgrade management and also upgrade the protected area itself (e.g., via infrastructure, restoration, or other improvements). It is appropriate to note that key establishment activities have not been carried out in many existing protected areas.

[5] The valuations of ecosystem goods and services underlying these estimates have been criticized, e.g. see Toman (1998) and Daily et al. (2000). On the other hand, the study makes an important methodological advance in calculating marginal rather than total benefit of protection, by comparing the goods and services provided by intact versus converted forms of each biome.

[6] Countries included were Zimbabwe, Kenya, Zanzibar, Uganda, India, Mongolia, and China.

[7] While an average is given for illustrative purposes, in reality there values will vary significantly site to site, depending on the state of ecosystem, the services it provides, the spatial relation with the beneficiaries and the socio-economic status of these beneficiaries (See Chapters 1 and 4 for further discussion).

[8] Not all ecosystem services are covered given limits to what valuation studies have covered. In addition, the average has excluded some high outliers to avoid undue influence on the illustrative average. These values are arguably conservative.

[9] The difference in the ratio of benefits to costs here compared to Balmford et al. (2002) might reasonably be expected given that protected areas have on balance been created on less agriculturally valuable lands and farther from transportation infrastructure, implying significantly lower opportunity costs than those found in areas of active deforestation (Gorenflo and Brandon 2005; Dudley 2008).

[10] This perspective (net benefits from competing scenarios) is not directly comparable to the two previous assessments (benefit/cost of conservation) and would be expected to yield a much lower ratio. In addition, the studies reviewed in this section include a smaller set of ecosystem goods and services than do the benefit/cost assessments, suggesting that benefits of conservation are estimated conservatively.

[11] Existence and carbon sequestration are assumed to be purely global values.

[12] See IUCN management categories. Categories I-IV (strictly protected areas and National Parks) require between US$ 60-240/ha/year in land and over US$ 1,000/ha/year in small marine parks.

[13] Based on their own estimates and those in Molinar et al. (2004), James et al. (2001) and Pearce (2005 and 2007)

[14] Full text of the paragraphs can be accessed at http://www.cbd.int/decision/cop/?id=11661.

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ANNEX: KEY ELEMENTS FOR SUCCESSFUL IMPLEMENTATION AND RELEVANT POLICY PROVISIONS

Key elements for successful implementation of protected areas	Relevant paragraphs of CBD COP Decision IX/18 on Protected Areas[14], some Ramsar resolutions, World Heritage Convention and UN Convention to Combat Desertification decisions
Capacity	• Establish or strengthen regional/sub-regional forum (para.A.6f) • Establishing regional technical support networks (para.A.12) • Strengthen capacity of national protected area professionals (para.A13) • Convene regional capacity building workshops (para.A.15) • Further develop and make available a range of implementation tools (para.A.16) • Develop a user friendly and comprehensive central website (para.A.17) • IUCN to further contribute to capacity building for implementation • Provide developing countries with assistance, including capacity building, in order to help reverse the factors leading to consideration of deletion or restriction of a Ramsar site: Ramsar Resolution IX.6, 12 • Promote the training of personnel in the fields of wetland research, management and wardening: Ramsar Article 4, 5 • Identify the training needs of institutions and individuals concerned with wetland conservation and wise use, and implement appropriate responses: Ramsar Strategic Plan 2003-2008, Operational Objective 20.1 • Include risk preparedness as an element in World Heritage Site Management plans and training strategies: WHC Decision 28 COM 10B, 4 • Promote gender-sensitive capacity-building to enable stakeholders to carry out specific participatory and synergistic programmes as part of their National Action Programmes to combat land degradation and mitigate the effects of drought, protect biodiversity, facilitate the regeneration of degraded forests, while promoting sustainable livelihoods at local level: UNCCD Decision 1/COP.6, 17
Capital	• Recognised the urgency for mobilising adequate financial resources (preamble para.B.4) • Urged the developed countries and others to provide adequate, predictable and timely financial support (para.B.1) • Parties to develop and implement sustainable financing plans based upon needs assessment and diversified portfolio (para.B3 a, b and d) • Urged donor countries to enhance financial resources and technical support for implementation of the programme of work and ensure better alignment of PA funding with aid delivery mechanisms in the Paris Declaration on Aid Effectiveness (para.B4.d) • Invited GEF to continue to provide adequate funding including supporting protected areas under Climate change (para.B.9 a and b) • Explore funding opportunities for protected areas in the context of climate change (para.B3h) • Provide developing countries with assistance in order to help reverse the factors leading to consideration of deletion or restriction of a Ramsar site: Ramsar Resolution IX.6, 12 • Increase support to States Parties for the identification of cultural, natural and mixed properties of potential outstanding universal value, as well as in the preparation of nomination dossiers: WHC Decision 28 COM 13.1, 11 (a) • Strengthen support for reforestation and forest conservation to combat desertification caused by drought, deforestation due to population increase, overgrazing, logging or fires; building on self-help efforts by developing countries: UNCCD Decision 21/COP.4, 2 and Decision 21/COP.4, Annex
Coordination	• Establishment of multisectoral advisory committees (para.A.5b) • Designate a national focal point for PoWPA for coordinated development and implementation (para.A.21) • Parties, relevant inter-governmental organisations, ILCs, NGOs, donors research institutions to establish regional support networks and enhancing partnership (para.A.12) • Mainstream and integrate protected areas with development agendas (para.B.3e) • Promote international coordination of measures to further public awareness of wetland values in reserves: Ramsar Recommendation 5.8 • Collaborate with IUCN and provide support to the strategic implementation of the Global Framework Programme for Capacity Building on Natural Heritage: WHC Decision 29 COM 10, 6

Key elements for successful implementation of protected areas	Relevant paragraphs of CBD COP Decision IX/18 on Protected Areas[14], some Ramsar resolutions, World Heritage Convention and UN Convention to Combat Desertification decisions
Commitment	• Parties to finalise the ecological gap analysis not later than 2009 and give special attention to the implementation of programme element 2 and improving management effectiveness including monitoring (para. A3, 4b and c) • Parties to improve, diversify and strengthen protected area governance types and recognize co-managed areas and community conserved areas through acknowledgement in national legislation. • Develop national and regional mechanisms to ensure consultation with local and indigenous people in management planning for Ramsar sites Ramsar Recommendation 6.3, 15 • Involve local communities and indigenous peoples in restoring and maintaining wetlands Ramsar Resolution VIII.16, 19 • Continue implementing the Regional Programme and the Action Plans adopted in Abu Dhabi to be developed into operational national work plans, and establish a fund raising strategy to provide the necessary financial and human resources: WHC Decision 30 COM 11C.1
Communication	• Recognised limited availability of information on implementation (para.A.1) • Increase public awareness on protected area benefits in poverty eradication and achieving sustainable development (para.A.22) • Review and report national implementation (para.A.25 a) • Promote valuation of protected area goods and services including socio- economic costs and benefits of protected areas (para.B3d) • Develop facilities for promoting public awareness of wetland values at wetland reserves: Ramsar Recommendation 5.8 • Strengthen appreciation and respect for cultural and natural heritage, particularly by educational and information programmes: WHC Article 27, 1 • Develop initiatives at all levels to promote dialogue that will increase national and regional understanding for the protection of World Heritage: WHC Decision 27 COM 20B.6, 9