# the economics of wilderness

OVERCOMING CHALLENGES AND SEIZING OPPORTUNITIES

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Published by

PAN Parks Foundation, 2011

supported by

# contents



Recommended citation: Houdet, J., Kun, Z., 2011. The economics of wilderness: overcoming challenges and seizing opportunities. PAN Parks Foundation – Integrated Sustainability Services – Synergiz, research report, 33p.

# introduction

This study was initiated and commissioned by PAN Parks Foundation to Integrated Sustainability Services and Synergiz, as a joint publication of the three organisations. The study is mainly based on reviewing existing literatures and projects which are connected to ecosystem services of wilderness areas.



Why was the study initiated? The report of The Economics of Ecosystems and Biodiversity (TEEB) has successfully introduced several concepts, including the economic values of nature and the need for payments for ecosystem services to support sustainable land use. However, this has not yet penetrated into the practice of protected area management. PAN Parks Foundation felt it particularly important to highlight why and how this concept might be used in the context of wilderness protected areas in Europe.

Although covering only 1% of Europe, our wilderness is directly representative of the much larger, relatively pristine areas of habitat and natural processes that are a key focus of conservation elsewhere in the world. If we in Europe are seen to be protecting and restoring large areas of our own wild natural heritage, and doing so moreover for economic and social as well as conservation reasons, that sends a powerful signal to countries elsewhere in the world who are currently determining future land-use options for their own, often much larger and comparatively pristine, ecosystems.

But is wilderness a priceless heritage for future generations? Unfortunately we felt that Europeans are not valuing wilderness as much as they should. In addition to their intrinsic spiritual, landscape and biodiversity value, wilderness areas offer benefits for landholders, farmers, communities and society in general. These can be derived through traditional activities such as nature tourism, bringing income and employment. Environmental benefits can also be particularly valuable – notably in addressing the impact of climate change by storing carbon emissions or mitigating floods. Known as ecosystem services, such benefits often have a commercial value and can attract funding for local beneficiaries.

We need to present good examples of how wilderness areas benefit various stakeholders via their various ecosystem services. This study aims at discovering these values and how to translate them to conservation practitioners. The examples used are not necessarily European but we want to learn from best practice examples throughout the world and adopt them to our European situation. The end of the publication lists recommendations for how to take this issue further in the coming years.

# wilderness and wild areas – working definitions for europe

## DEFINITION OF WILDERNESS

Following up on the EC Presidency Conference on Wilderness and Large Natural Habitat Areas (Prague, May 2009), a special working group was formed in order to review the definition of wilderness and come up with a proposal adapted to the European situation. After two years of work, the working group has recently published its conclusions, including the need to differentiate wilderness areas from wild areas.

Wilderness areas are large, unmodified, or slightly modified, natural areas, without human intervention, infrastructure or permanent habitation. This allows for unconstrained ecosystems' dynamics, including evolutionary processes. They should be protected and managed so as to preserve their natural condition and to offer people the opportunity to experience the spiritual quality of nature.

Wilderness areas represent a vital element of Europe's natural and cultural heritage. In addition to their intrinsic value, they provide important economic, social and environmental benefits in many circumstances, including various ecosystem services for local communities, landholders and society at large.

The focus for wilderness conservation is on protection[1] and restoration[2] where needed. Opportunities for wilderness area enlargement should thus be considered wherever feasible: securing viable ecological networks at the landscape, watershed or bioregional scale, is essential for biodiversity and human adaptation in the face of climate change.



## DEFINITION OF WILD AREAS

Wild areas tend to be individually smaller and more fragmented than wilderness areas, although they often cover extensive tracts. The condition of their natural habitats, processes and associated species is often partially or substantially modified by human activities such as grazing by domestic livestock, forestry, sporting activities or infrastructures (roads, fences, water impoundments, excavations).

Yet, wild areas are often also of great value, and many should be considered for inclusion in the forthcoming European Wilderness Register. Where feasible, agreement should be reached to halt or at least mitigate human activity within a given timescale. Conservation emphasis here is on restoration, improving their wilderness value and embedding them in protected ecological corridors.

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1 Protection of wilderness areas involves safeguarding the naturalness of their ecosystem processes, habitats and associated species, by minimising unintended external influences – including water and air pollution. Conservation work within such areas should be undertaken using 'non-intervention management' principles which promote natural process and natural succession; hence focusing on overall ecological integrity rather than on individual species.

2 Restoration involves the reinstatement of natural habitats and processes, together with the reintroduction of species appropriate to the geography of an area at the present time. Wherever possible, it is implemented through natural regeneration followed by non-intervention. Yet, the process may initially involve human interventions, for instance where there is no local seed source, or where artificial drainage needs removal. A naturally functioning landscape that can sustain itself into the future without active human management is the ultimate goal: the aim should not be to try to turn back the clock to recreate any particular ecosystem from the past.

Although PAN Parks Foundation – as a member of the European Wilderness Working group – adopts the above definition for wilderness, the organisation also applies more specific terms for the Certified PAN Parks, which undergo an independent management effectiveness evaluation. These areas constitute a legally protected area with an ecologically unfragmented wilderness area of at least 10,000 hectares[3] where no extractive uses[4] are permitted and where the only management interventions are those aimed at maintaining or restoring natural ecological processes and ecological integrity. Such wilderness areas constitute core areas for nature, and may comprise virgin forests, rivers, marshlands, high mountains or caves, and seascapes.



The current network of certified PAN Parks includes 12 different areas from 10 European countries, and they represent unique best practice management examples of Europe's wilderness. For instance, in Peneda-Gerês National Park (NP), Portugal, the PAN Parks Wilderness area includes the last remnants of native forest in the country, while the PAN Parks Wilderness in Archipelago (Finland) provides an exceptional example of a no-fishing zone in the Baltic Sea.

3 The wilderness area can meet the size criterion even if part of it is under an ecosystem rehabilitation process which requires long-term active restoration management (due to the lack of critical segments of ecosystems dynamics, resulting, for instance, from extinction and/or replacement by semi-natural components). To fully meet this criterion, the management must have a clear goal with a defined rehabilitation or restoration schedule including deadlines.

4 The following human activities are not accepted in the wilderness area, even if they have been traditionally pursued there: hunting/culling; fishing: collection of animals, (parts of) plants and of rocks and minerals; mining; logging, livestock grazing; grass cutting. Fencing, road maintenance, road and building construction, motorised transportation and large-scale cultural and sporting events, are also prohibited. Immediate consumption is not considered as extractive use. Obsolete infrastructure should be removed.

# biodiversity, ecosystem services and wilderness areas

## WHAT IS BIODIVERSITY? WHAT ARE ECOSYSTEM SERVICES?

Biodiversity[5] refers to the three levels of organisation of living systems, namely genetic diversity, species diversity and ecosystem diversity. Their interactions provide the basis for human development and well-being (MA 2005). The Earth's diverse species and associated intraspecific genetic variability are crucial for the functioning and evolution of ecosystems, which in turn provide the opportunities for people, business and national economies to secure essential ecosystem services (ES).

Ecosystem services may be defined as the benefits humans, firms and nations derive actively or passively from ecosystems (Costanza et al. 1997; Daily 1997), such as provisioning services (wood, water, fish, medicinal compounds), cultural services (tourism, sports, research) and regulating services (climate stabilization, flood regulation, pollination, soil formation) (Table 1).

However, biodiversity is currently disappearing at an alarming rate. Over the past 50 years ecosystems have been extensively modified to meet the rapidly growing demands for food, fresh water, timber, mineral resources, fibre and fuels, among other provisioning services. As a result, around 60% of ecosystem services are now degraded or being used unsustainably (MA 2005; TEEB 2010). Human-induced climate change, as well as continued economic expansion will further exacerbate ecosystem degradation and biodiversity loss. This is because development models are currently focused on the (Houdet et al. 2011):

- Appropriation of renewable (wood, fish) and non-renewable (minerals, fossil fuels) resources;
- Destruction and fragmentation of ecosystems through urbanisation and infrastructures;
- Homogenisation of living systems (e.g. monocultures, aquaculture);
- Management of damages, pollutions and waste, only when it is legally required, enforced and financially attractive to do so; a corrective - not preventive - approach to tackling environmental problems.

Few places in the world remain free of the cumulative impacts of these prevailing economic models, especially in Europe where the remaining wilderness and wild areas play critical roles for safeguarding intact ecosystems as well as some key components of biodiversity.

## THE BIODIVERSITY BENEFITS OF WILDERNESS AREAS

Wilderness areas have been protected for many ecological reasons worldwide (Kettunen et al. 2010). They may act as:

- Core areas for nature, including highly complex and diverse habitats (e.g. tropical forests, coral reefs) and unique ecosystems subject to extreme climatic conditions (e.g. Arctic and Antarctic wilderness areas, desert landscapes such as the Skeleton Coast and Namib Desert in Namibia);



5 Derived from the term 'biological diversity' which is defined by the Convention on Biological Diversity as "the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems".

**TABLE 1: THE COMMON INTERNATIONAL CLASSIFICATION OF ECOSYSTEM SERVICES** (CICES; HAINES-YOUNG ET AL., 2009)



| THEME | CLASS | GROUP |
|---|---|---|
| PROVISIONING | Nutrition | Terrestrial plant and animal foodstuffs |
| | | Freshwater plant and animal foodstuffs |
| | | Marine plant and animal foodstuffs |
| | | Potable water |
| | Materials | Abiotic materials |
| | | Biotic materials |
| | Energy | Renewable biofuels |
| | | Renewable abiotic energy sources |
| REGULATION AND MAINTENANCE | Regulation of wastes | Bioremediation |
| | | Dilution and sequestration |
| | Flow regulation (natural risks) | Air flow regulation |
| | | Water flow regulation |
| | | Mass flow regulation |
| | Regulation of physical environment | Atmospheric regulation |
| | | Water quality regulation |
| | | Pedogenesis and soil quality regulation |
| | Regulation of biotic environment | Lifecycle maintenance and habitat protection |
| | | Pest and disease control |
| | | Gene pool protection |
| CULTURAL | Intellectual and experiential | Recreation and community activities |
| | | Information and knowledge |
| | Symbolic | Aesthetic, heritage |
| | | Religious and spiritual |

- Refuges for many endangered species, especially for the megafauna (e.g. predators such as bears or wolves in the Tatra National Park, Slovakia; Borza & Vancura, 2009a);
- Home of many species that are still waiting to be discovered (Conservation International 2007);
- Places with highly adapted endemic fauna and flora, which would be lost forever if these areas disappeared (e.g. Cole & Yung, 2010; fynbos species in the mountain wilderness areas of the Cape Floral Kingdom, Lawler 2001);
- Reference laboratories where natural processes of evolution still continue; as well as essential components of ecological networks set up to ensure the viability and resilience of biodiversity in the face of climate change and land-use conversion (e.g. urbanisation, agriculture, dams). For instance, wilderness areas constitute an integral part of the European Natura 2000 Network (Borza & Vancura 2009b).

## THE ECOSYSTEM SERVICES OF WILDERNESS AREAS: WHAT POSSIBLE USES BY STAKEHOLDERS?

Wilderness areas can offer additional sustainable economic, social, cultural and environmental benefits – for local communities, landholders, some business activities, cities and society in general. Depending on their ecosystem characteristics and dynamics, as well as their spatial configuration in relation to human populations and economic activities, their benefits may include many regulation and cultural ecosystem services, including:

- Addressing climate change through carbon sinks / sequestration (e.g. Bond et al. 2009; Swingland 2002);
- Providing clean water, water purification and flood mitigation services (e.g. mountain wilderness areas in South Africa, Blignaut et al. 2011; Mander et al. 2007);
- Growing nature-based tourism and job opportunities in rural landscapes (e.g. Butler et al. 1998; Lane 1994; Page & Getz 1997; Warren & Taylor 1999; Wouters 2011);
- Providing opportunities for youth development, education and healthcare, and acting as places of inspiration, renewal or recreation far from the bustle and pressure of modern, stressful, urban lives (Boucher & Fontaine, 2010; Cordell et al. 2002, 2003; Hammond 1985; Rohde & Kendle, 1994).

However, the use and exploitation of certain ecosystem services from wilderness areas may be detrimental to wilderness values, such as harvesting timber, extracting minerals, using land for food production or vegetation for grazing livestock, and water resources for development opportunities. In PAN Parks certified wilderness areas in Europe, management authorities restrict access to and use of provisioning resources, as well as prohibit infrastructure development and certain recreational activities (Table 2). Legally protecting areas worthy of wilderness status is highly likely to impact certain stakeholder groups with pre-existing economic or social uses of ecosystem services (loss of benefits) or others which are looking for new development or use opportunities. In other words, stakeholders may depend and impact on different ecosystem services from wilderness areas, whether legally protected or worthy of legal protection (Table 3).

The protection and management of wilderness areas thus calls for efficient stakeholder engagement at local, regional and (sometimes) international levels. To that end, the economic valuation of ecosystem services is a very useful tool.

**TABLE 2: USE STATUS OF ECOSYSTEM SERVICES IN PAN PARKS CERTIFIED WILDERNESS AREAS**

| THEME | ECOSYSTEM SERVICES CLASS | USE STATUS |
|---|---|---|
| **PROVISIONING** | Nutrition | Use forbidden, apart from extensive livestock grazing in appropriate areas |
| | Materials | Use forbidden: e.g. no mining, no forest exploitation |
| | Energy | Biomass / minerals extraction and energy production forbidden |
| **REGULATION AND MAINTENANCE** | Regulation of wastes | Benefits to various stakeholders: e.g. assimilation of effluents in soils and plants |
| | Flow regulation (natural risks) | Benefits to various stakeholders: e.g. erosion control, wind breaks, flood control |
| | Regulation of physical environment | Benefits to various stakeholders: e.g. global and local climate regulation, water purification, air quality purification, soil structure and quality maintenance |
| | Regulation of biotic environment | Benefits to various stakeholders: e.g. maintenance of habitats and population sources for many species with positive impacts on economic activities, including pollination services (wild bees) and the regulation of pathogens |
| **CULTURAL** | Intellectual and experiential | Only wilderness recreation (hiking) and ecological research opportunities. No hunting and motorised access |
| | Symbolic | Spiritual and heritage benefits |

**TABLE 3: POTENTIAL DEPENDENCIES AND IMPACTS ON ECOSYSTEM SERVICES FROM WILDERNESS AREAS LEGALLY PROTECTED AND WORTHY OF PROTECTION STATUS BY DIFFERENT STAKEHOLDER GROUPS**

| | EXISTING PAN PARKS CERTIFIED WILDERNESS AREAS | | WILDERNESS AREAS WARRANTING LEGAL PROTECTION | |
|---|---|---|---|---|
| **STAKEHOLDER GROUP** | **POTENTIAL DEPENDENCIES** | **POTENTIAL IMPACTS** | **POTENTIAL DEPENDENCIES** | **POTENTIAL IMPACTS** |
| **ADJACENT LANDOWNERS / FARMERS** | Some regulation and maintenance services (e.g. water quality and delivery timing, flood and erosion control, pollination services) potentially impacted by high densities of some species - i.e. human / wildlife conflicts | Illegal use of provisioning (e.g. wood, mushrooms) and recreation (e.g. hunting) services | Many provisioning, regulation and cultural services | Decreasing stocks of some provisioning services, changes in delivery quality / timing of some regulating and cultural services |
| **ADJACENT HUMAN COMMUNITIES /CITIES** | Mostly regulation and maintenance services (e.g. local climate regulation, water quality and delivery timing, flood and erosion control), some recreation services (wilderness hiking) | Illegal use of provisioning services (water abstraction projects, wood exploitation) | Many provisioning, regulation and cultural services | Decreasing stocks of some provisioning services, changes in delivery quality / timing of some regulating and cultural services |
| **LOCAL AUTHORITIES** | Mostly regulation and maintenance services (e.g. local climate regulation, water quality and delivery timing, flood and erosion control) | Lobbying for access to / use of provisioning services and the development of further recreation opportunities (motorised access, infrastructures) | Many provisioning, regulation and cultural services | Decreasing stocks of some provisioning services, changes in delivery quality / timing of some regulating and cultural services |
| **NATIONAL / REGIONAL GOVERNMENT** | Global climate regulation (carbon stocks), contribution to biodiversity conservation targets (lifecycle maintenance and habitat protection, biodiversity as a public good and cultural services) | Lobbying for access to / use of provisioning services and the development of further recreation opportunities (motorised access, infrastructures) | Many provisioning, regulation and cultural services | Decreasing stocks of some provisioning services, changes in delivery quality / timing of some regulating and cultural services |

| | EXISTING PAN PARKS CERTIFIED WILDERNESS AREAS | | WILDERNESS AREAS WARRANTING LEGAL PROTECTION | |
|---|---|---|---|---|
| **STAKEHOLDER GROUP** | **POTENTIAL DEPENDENCIES** | **POTENTIAL IMPACTS** | **POTENTIAL DEPENDENCIES** | **POTENTIAL IMPACTS** |
| **LOCAL BUSINESS COMMUNITY** | Only some regulation and maintenance (e.g. water quality, cultural services (wilderness recreation, rural tourism) | Lobbying for access to / use of provisioning services and the development of further recreation opportunities (motorised access, infrastructures) | Many provisioning, regulation and cultural services | Decreasing stocks of some provisioning services, changes in delivery quality / timing of some regulating and cultural services |
| **POTENTIAL INVESTORS** | Almost none (potentially indirect global climate regulation - carbon stocks) | Lobbying for access to / use of provisioning services and the development of further recreation opportunities (motorised access, infrastructures) | Many provisioning and cultural services (investment opportunities) | Scoping for investment opportunities which may impact on many ecosystem services |
| **SOCIETY AT LARGE** | Symbolic services (wilderness heritage values, biodiversity conservation as a public good) | – | Symbolic services (wilderness heritage values, biodiversity conservation as a public good) | – |

# the benefits and costs of wilderness areas

## THE KEY PRINCIPLES AND TOOLS OF ECONOMIC VALUATION

The economic valuation of biodiversity and ecosystem services falls within the scope of cost-benefit analysis (CBA) of project alternatives, including the designation of protected areas. This requires the pricing of their economic value(s) and, more precisely, capturing their marginal economic value for trade-offs purposes (Braat & ten Brink, 2008). As argued by Ruhl et al. (2007), "*failure to refine our understanding of their value, and the consequent inability to account for those values in regulatory and market settings and, more important, in the public mind, is unlikely to promote their conservation*". In other words, coupling CBA with the valuation of biodiversity and ecosystem services would allow stakeholders of wilderness areas to better understand the trade-offs – at local, national and international levels – between the benefits of legitimate (authorised) consumptive and non-consumptive use of their ecosystem services, and the associated management and opportunity costs.

To that end, the total economic value of biodiversity, inclusive of that of ecosystem services (Kettunen et al., 2009b), is traditionally divided into its use values (direct use value, indirect use value, option value) and non-use values (existence value and bequest value), with a gradient of decreasing tangibility as one moves from direct use values to existence values. Several monetary ecosystem valuation methods may be used to assess the economic values of ecosystem services (Table 4):

1. The Market Price Method estimates economic values for ecosystem products or services that are bought and sold in commercial markets.

2. The Damage Cost Avoided, Replacement Cost, and Substitute Cost Methods estimate economic values based on costs of avoided damages resulting from lost ecosystem services, costs of replacing ecosystem services, or costs of providing substitute services.

3. The Production Function Method estimates economic values for ecosystem products or services that contribute to the production of commercially marketed goods.

4. The Hedonic Pricing Method estimates economic values for ecosystem or environmental services that directly affect market prices of some other goods. This is most commonly applied to variations in housing prices that reflect the value of local environmental attributes.

5. The Travel Cost Method estimates economic values associated with ecosystems or sites that are used for recreation. It assumes that the value of a site is reflected in how much people are willing to pay to travel to visit the site.

6. The Contingent Valuation Method estimates economic values for virtually any ecosystem or environmental service by asking people to directly state their willingness to pay for specific environmental services, based on a hypothetical scenario. This is the most widely used method for estimating non-use, or 'passive-use' values.

7. The Choice Experiments Method estimates economic values for virtually any ecosystem or environmental service by asking people to make trade-offs among sets of ecosystem or environmental services or characteristics. It does not directly ask for willingness to pay (i.e. this is inferred from trade-offs that include cost as an attribute).

8. The Benefit Transfer Method estimates economic values by transferring existing benefit estimates from studies already completed for another location or issue.

Within the context of wilderness areas, the key challenge lies in undertaking comprehensive assessments of all ecosystem services involved, using the appropriate combination of valuation techniques in a transparent way, so as to meaningfully engage stakeholders and build the case for their efficient protection and management.



## TABLE 4: VALUATION TECHNIQUES FOR ECOSYSTEM SERVICES (TEEB 2010)

| | METHODS | ECOSYSTEM SERVICES WHICH CAN BE VALUED |
|---|---|---|
| DIRECT MARKET PRICES | Market prices | Provisioning services |
| MARKET ALTERNATIVE | Replacement costs | Pollination, water purification |
| | Damage cost avoided | Damage mitigation, carbon sequestration |
| | Production function | Water purification, freshwater availability, provisioning services |
| SURROGATE MARKETS | Hedonic price method | Use values only, recreation and leisure, air quality |
| | Travel cost method | Use values only, recreation and leisure |
| STATED PREFERENCE | Contingent valuation method | All services |
| | Choice experiments | All services |
| PARTICIPATORY | Participatory environmental valuation | All services |
| BENEFIT TRANSFER | E.g. mean value, adjusted mean value, benefit function | Whatever services were valued in the original study |

## THE ECONOMIC BENEFITS AND COSTS OF EUROPEAN WILDERNESS AREAS: OVERCOMING OUR GENERAL LACK OF UNDERSTANDING

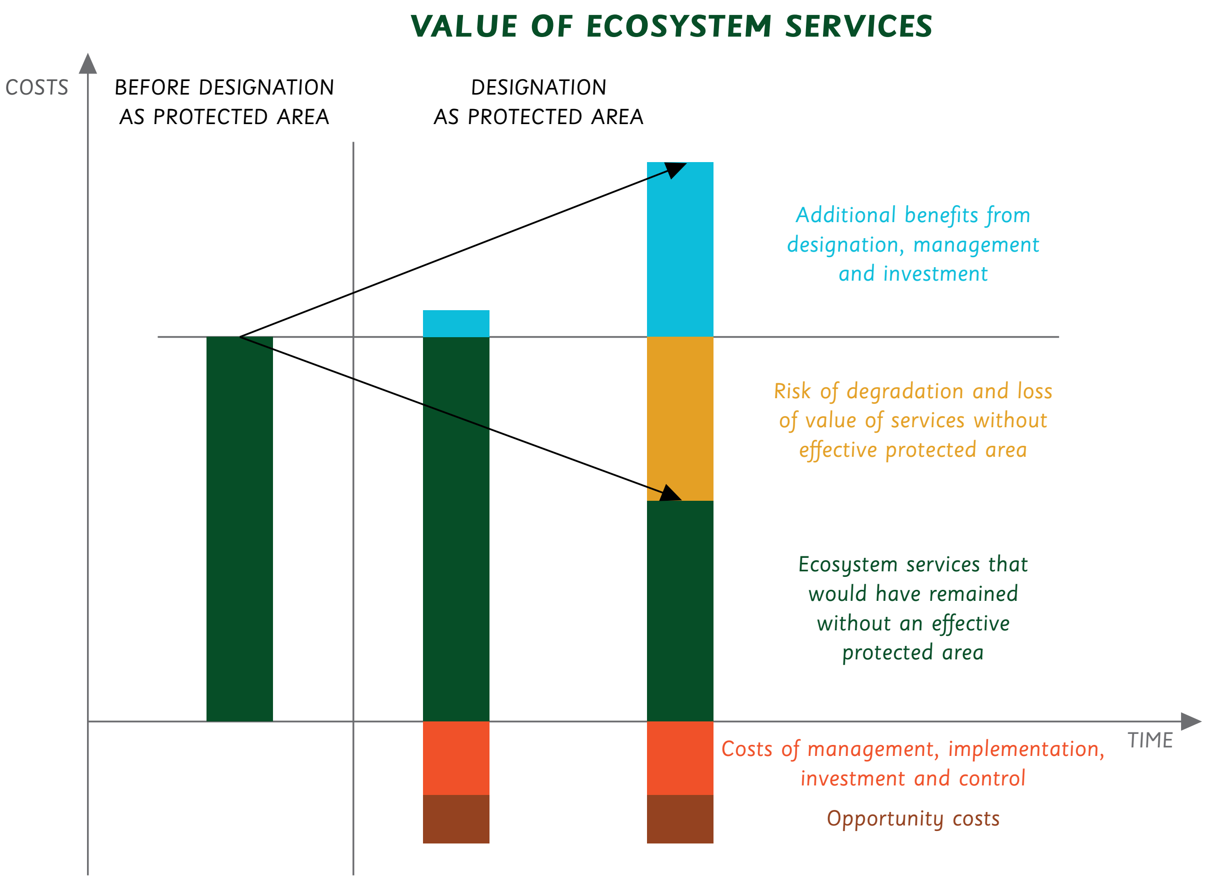
Ecosystem services analysis and valuation has become important for protected area management, promotion and expansion worldwide (Hein 2011; Kettunen et al. 2009).

Firstly, because the socio-economic benefits of protected areas are often not quantified, they may be underestimated in policy making and land-use planning (e.g. Balmford & Whitten 2003; Dearden et al. 2005; Carpenter et al. 2006; Emerton et al. 2006; Tallis et al. 2009). This is critical given the current economic crisis which is leading to further pressures on government budgets, and hence on the budget available to maintain existing protected areas and create new ones (e.g. major budget cuts considered in The Netherlands; Planbureau voor de Leefomgeving 2010).

Secondly, integrated ecosystem management has become an integral part of protected area management. It requires the provision of different types of ecosystem services simultaneously to satisfy the needs and aspirations of different stakeholder groups (Gaston et al. 2008; Palomo et al. 2011). As previously argued, many protected areas provide additional benefits to their primary goal of biodiversity conservation (e.g. Balmford et al. 2002) so that the total value of their ecosystem services can be divided into two components: *the added value of designation* (e.g. 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* (Figure 1).



**FIGURE 1: BEFORE AND AFTER DESIGNATION** (TEN BRINK, IN KETTUNEN ET AL. 2009)



However, despite the progress recently made in understanding the values of ecosystem services in a range of contexts (MA 2005), there are relatively few studies providing a comprehensive analysis of the bundle of ecosystem services generated by European protected areas (e.g. Gaston et al. 2008, Jongeneel et al. 2008) or the associated management and opportunity[6] costs (Kettunen et al. 2009) (Figure 1). For instance, studies on European forest ecosystem services are rare (Elsasser 2007; EUSTAFOR & Patterson, 2011).

The situation seems even worse for European wilderness areas, which are a subset of the larger network of protected areas, thus resulting in a general lack of understanding of the actual and potential economic benefits and costs *associated with their specific management frameworks and rules.* Unlike some protected areas which may allow for some controlled economic activities to take place within their borders (e.g. hunting, harvesting of wild food and medicinal products, motorised recreation access), legally protected wilderness areas provide more limited income opportunities for stakeholders, especially local communities. They may also generate additional management and opportunity costs (Table 5).

In other words, choosing to create and manage protected wilderness areas often requires forgoing alternative uses (Kettunen et al., 2009). For private actors, key opportunity costs include the potential profit from the potential exploitation of provisioning services (e.g. mining for oil in Yasuni NP in Ecuador[7] or for various mineral resources in Antarctica). For national governments, such costs come from forgone 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 & Brandon 2005; Dudley et al. 2008), their opportunity costs often remain significant. For instance, the private opportunity cost for all strictly managed protected areas in developing countries has been estimated at US$ 5 billion per year (James et al. 2001) while protected area expansion to safeguard a range of ecosystem 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).

As argued by Kettunen et al. (2009), "*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… 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).*" In other words, when making the case for the effective protection and management of wilderness areas towards securing both their ecological and financial viability, their costs must be recognised alongside their benefits.

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6 Opportunity cost is the cost of any activity measured in terms of the value of the best alternative that is not chosen (that is foregone). It is the sacrifice related to the second best choice available to someone, or to a group, who has picked it among several mutually exclusive choices. The opportunity cost is also the cost of the forgone products after making a choice. Opportunity costs are not restricted to monetary or financial costs: the real cost of output forgone, lost time, pleasure or any other benefit that provides utility should also be considered opportunity costs.

7 http://www.banktrack.org/show/dodgydeals/block_31_yasuni_national_park

**TABLE 5: EXAMPLES OF PROTECTED AREA BENEFITS AND COSTS ACCRUING AT DIFFERENT SCALES** (KETTUNEN ET AL. 2009)

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

## BEYOND THE LIMITATIONS OF ECONOMIC VALUATION: ACCOUNTING FOR THE COSTS OF INACTION

There are various limitations associated with the use of non-market valuation techniques. For instance, concerns with contingent valuation relate to the reproduction of protocols and the comparative analysis of results across time and space (e.g. Kumar & Kumar, 2008). Biases are also associated with benefit transfer techniques applied to the results of studies based on one or more valuation techniques (e.g. Costanza et al. 1997; Wilson & Hoehn, 2006). As argued by Nelson et al. (2009), benefit transfer approaches often incorrectly assume that "*every hectare of a given habitat type is of equal value – regardless of its quality, rarity, spatial configuration, size, proximity to population centres, or the prevailing social practices and values.*"



Beyond methodological limitations, the economic valuation of BES is an anthropocentric approach grounded on weak sustainability: i.e. the substitutability between different forms of capital (Pearce et al., 1990; Godard 1995). Depending on the aims and context of the study (e.g. questions asked to interviewees) and the methodological assumptions of the model used (e.g. chosen discount rate), the marginal economic value of an additional ecosystem services unit would vary considerably, and in some circumstances be particularly low (e.g. Simpson et al., 1996[8]). This would hold even truer within the context of most CBA of highly lucrative industrial projects (e.g. mines, dams), so that many stakeholders argue that the total economic value of biodiversity, though useful for expressing previously ignored values of non-marketed ecosystem attributes within collective or public decision-making processes, is not sufficient in itself for arbitrage. Indeed, the social acceptability or legitimacy of any project is contingent to stakeholders' perceptions of the interactions between the (proposed) activity and specific ecosystem services, in reference to a wide variety of value systems and social needs (Gobert 2008). This is why Chevassus-au-Louis et al. (2009) argue that monetary values should be subordinate to others within debates pertaining to biodiversity conservation, and hence wilderness conservation.

For all these reasons, wilderness managers and promoters should put emphasis, within the scope of full CBA, on accounting for the costs of inaction, i.e. *the costs of not protecting the ecological assets and ecosystem services underpinning wilderness values.* This would imply:

1. Accounting for the non-monetary values of all key ecosystem attributes (assets, functions, processes and services) contributing to wilderness areas' status (e.g. naturalness assessment methods, Winter et al. 2010);

2. The mainstreaming of the biodiversity no-net-loss / enhancement principles for the effective management and restoration of wilderness ecosystem attributes; principles borrowed from research on the impact mitigation hierarchy, biodiversity offsets and ecological equivalency accounting (e.g. BBOP 2009, 2011; Germaneau et al., in press; Quétier & Lavorel, 2010) (Figure 2);

3. As appropriate given the local circumstances, accounting for the costs:

- Of the potential loss (or degradation) of key ecosystem attributes if various development opportunities (e.g. hunting, wood harvesting, dam construction) had not been forgone (i.e. no effective legal protection for the wilderness area). This would amount to assessing the added value of wilderness area designation, as avoided damage costs to wilderness values (Figure 1).

8 The high substitutability between genetic resources underpinning this study has been criticized by Sarr et al. 2008.

This would be instrumental for comparative analysis with the opportunity costs of wilderness area protection.

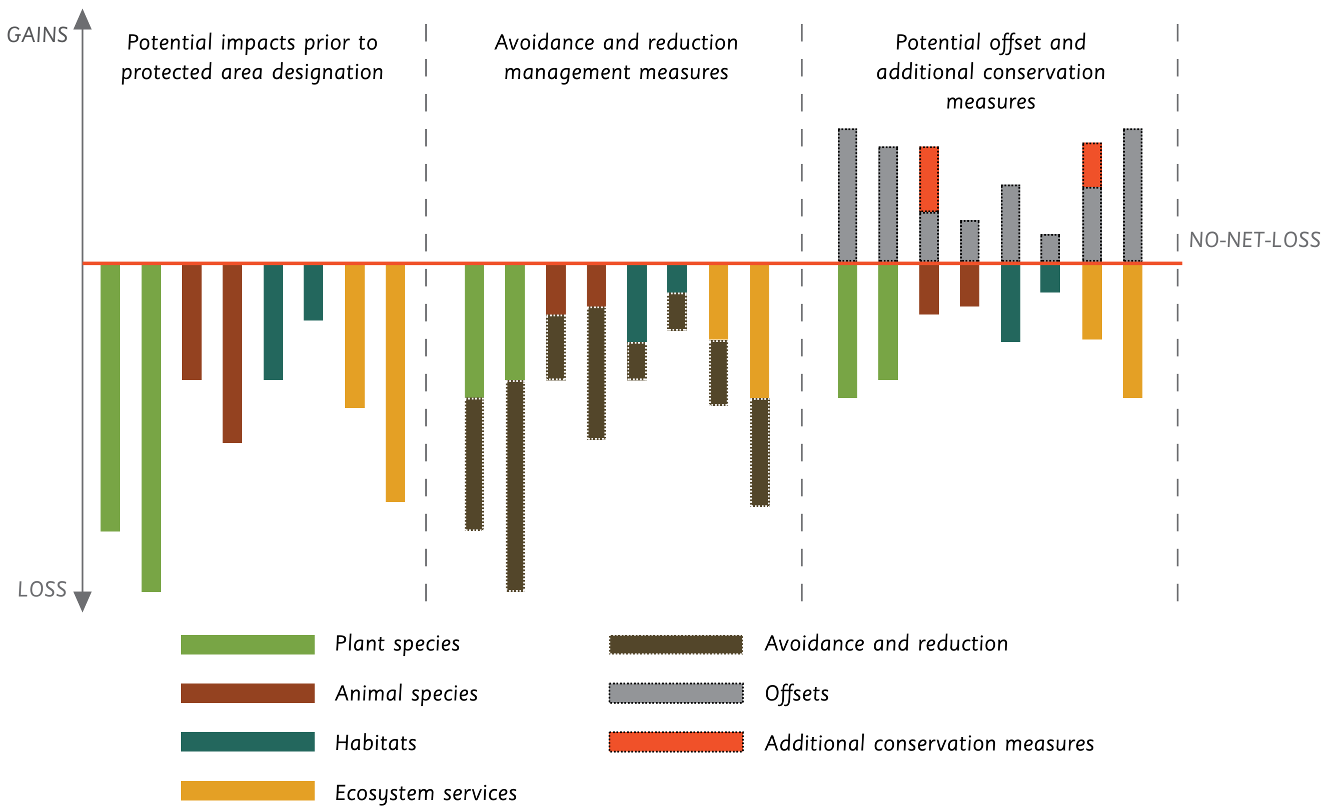
- Of restoring lost wilderness values: i.e. costs of future increases in ecological values due to management and investment (Figures 1 & 3).

The resulting coupled non-monetary and monetary information could then be used as tools for engaging with stakeholders – from national / state treasury for budgetary negotiations, to local communities for co-management purposes.

Indeed, exclusively relying on economic valuation of ecosystem services may not always constitute the most efficient approach to make the case for promoting the expansion and ensuring the ecological, social and financial viability of wilderness areas. Two major risks may occur. First, it is easy to spend large amounts of money on economic studies that attempt, against all odds, to assign monetary values to changes in ecosystem services. Second, it is easy for wilderness or protected area managers to misuse the results of these studies in ways that can undermine support for their programmes. Sometimes, it is more useful or practical to make decisions based on ranking or prioritising the expected benefits of ecological investments. These can be used to set priorities by determining the greatest benefits per Euro spent, without resorting to monetary valuation of biodiversity. While monetary measures of ecosystem benefits may be necessary to justify spending on wilderness protection or restoration, non-monetary indicators of expected benefits are more useful for managing spending to achieve the greatest environmental and economic payoff. In the end, the goal is to articulate the appropriate set of monetary and non-monetary values to various stakeholder groups in different contexts (Farrell 2007).



**FIGURE 2: APPLYING THE BIODIVERSITY NO-NET-LOSS / ENHANCEMENT PRINCIPLES TO ECOSYSTEM RESTORATION** (ADAPTED FROM GERMANEAU ET AL., IN PRESS)



# what future for european wilderness areas?

## MAKING WILDERNESS AREAS ECOLOGICALLY VIABLE: RESTORING DEGRADED AND FRAGMENTED ECOSYSTEMS

In Europe, making wilderness areas ecologically viable in the face of rapid ecosystem changes (e.g. climate change, land conversion) involves both their effective protection and significant expansion. From the former perspective, fragmentation is one of the most serious threats to European wilderness. Although there are several PAN Parks certified protected areas with unfragmented wilderness, reducing and avoiding fragmentation is a major goal of the PAN Parks network. For instance, in Fulufjället NP (Sweden), a snowmobile trail was redirected to avoid fragmentation of a newly designated PAN Park.



Because the conservation of European wilderness areas is one of the most effective tools in protecting natural habitat types and species of European Community interest, many wilderness areas already constitute an integral part of the Natura 2000 network[9]. The key requirement of Natura 2000 is to maintain a favourable conservation status, which is often challenging given the dynamic nature of ecosystems. While it is more than evident that non-intervention management is not a suitable tool for all Natura 2000 sites, its use may yield great results in sites where the objective is to protect ecosystem dynamics (Borza & Vancura, 2009b). Provided management and restoration objectives are clearly defined, the framework of Natura 2000 provides enough flexibility to implement non-intervention management techniques and hence secures wilderness areas in the long-term.

Expanding European wilderness areas implies investing in restoration of degraded and fragmented areas as suggested in the 3rd Global Biodiversity Outlook report (SCBD 2010). This report estimated that approximately 200,000km2 of farm land could be abandoned by 2050, which offers huge opportunities for restoring wilderness attributes. This occurs both naturally and with human assistance throughout Europe. Examples of the former include wolves crossing from Poland into Germany, with at least 30 of them inhabiting Saxony now. The implementation of passive and active restoration measures are the other available approaches. Depending on the history of the protected area, intervention may be needed only for a limited time in order to undo past damages, as in the case of some old-growth forests where the elimination of pressure due to logging and grazing will suffice (passive restoration). However, active restoration may be needed in certain circumstances, especially where more profound changes have taken place, resulting in the loss of various ecological components. Such active restoration measures may involve the re-introduction of extinct species, the control or removal of non-native and invasive species (Table 6), prescribed burning, replanting to hasten forest regeneration, or seedling selection.

9 Natura 2000 is an EU-wide network of nature protection areas established with the aim of protecting the most seriously threatened habitats and species across Europe.

**TABLE 6: THE HIGH COST OF CONTROLLING AND ERADICATING ALIEN SPECIES IN EUROPE** (NESSHÖVER ET AL. 2009; ADAPTED FROM VILA ET AL. 2009)

| SPECIES | BIOME / TAXA | COUNTRY | EXTENT | COST ITEM | PERIOD | COST (MILLION € YEAR-1) |
|---|---|---|---|---|---|---|
| Carpobrotu spp. | Terrestrial plant | Spain | Localities | Control / eradication | 2002-2007 | 0,58 |
| Anoplophra chinensis | Terrestrial invertebrate | Italy | Country | Control | 2004-2008 | 0,53 |
| Cervus nippon | Terrestrial vertebrate | Scotland | Localities | Control | | 0,82 |
| Myocastor coypus | Terrestrial vertebrate | Italy | Localities | Control / damages | 1995-2000 | 2,85 |
| Sciurus carolinensis | Terrestrial vertebrate | UK | Country | Control | 1994-1995 | 0,46 |
| Azolla filiculoides | Freshwater plant | Spain | Protected area | Control / eradication | 2003 | 1,00 |
| Eichhornia crassipes | Freshwater plant | Spain | River basin | Control / eradication | 2005-2007 | 3,35 |
| Oxyura jamaicensis | Freshwater vertebrate | UK | Country | Eradication | 2007-2010 | 0,75 |
| Chrysochromulina polylepis | Marine algae | Norway | Country | Toxic bloom | | 8,18 |
| Rhopilema nomadica | Marine invertebrate | Israel | Coast | Infrastructure damage | 2001 | 0,04 |

Though many restoration processes take considerable time, they can often have rapid effects with respect to at least partial recovery of some key functions (Table 7); which provides support to strategies based on avoiding damages and maintaining ecosystem functions and services. However, given the scale of current ecosystem damages, cost-efficient[10] ecological restoration should be understood to play an important role in wilderness area expansion in Europe. This crucial role is further illustrated by the fact that billions of dollars are currently being spent on restoration around the world (Enserink 1999; Doyle & Drew 2007; Stone 2009) (Figure 3).

For instance, the US Congress enacted the Comprehensive Everglades Restoration Plan (CERP) in 2000 so as to improve the quality and secure the supply of drinking water for South Florida and to protect dwindling habitats for about 69 species of endangered plants and animals (e.g. the emblematic Florida panther of which only 120 individuals survive in the wild). The total cost of the 226 projects to restore the ecosystem's natural hydrological functions is estimated at close to US$ 20 billion, mostly financed via federal and state funding (Polasky 2008). The return on this investment, which is lower than the costs, relates to different tangible benefits such as agricultural and urban water supply, flood control, recreation, commercial and recreational fishing and habitat protection (Milon & Hodges, 2000). However, Milon & Scroggins (2002) have shown that including positive externalities (i.e. many non-use benefits, such as the cultural value of the intact ecosystem) in the CBA generate overall benefits which are in a similar range to the costs of restoration, depending on the discount rate used.

The CERP is a unique restoration project, in both scope and scale: there is yet to be an equivalent restoration program in Europe. Given recent considerations of budget cuts in various EU countries, how can we finance cost-effective European wilderness conservation and ecosystem restoration in the long term? This calls for the development of new financing mechanisms.

## MAKING WILDERNESS AREAS FINANCIALLY VIABLE: SEIZING OPPORTUNITIES OF EMERGING MARKETS FOR ECOSYSTEM SERVICES

The emergence of payments for ecosystem services (PES) seems highly appealing for the sustainable financing of European wilderness areas. Combining[11] strategies for mitigating BES loss (Polluter or Impacter Pays Principle - OECD 1975; SLWRMC 1999) and remunerating BES supply (Beneficiary Pays Principle - Aretino et al. 2001; Hackl et al. 2007; linked to some extent to the Victim Pays Principle - Siebert 1992) opens the door to new forms of arbitrage with respect to land-use planning, including the expansion of wilderness areas. This approach sees ecosystem services provision becoming an integral part of

10 Selecting the most cost-effective techniques is critical to the success of any restoration project (Naidoo et al. 2006; Yoe 2001). The two primary economic approaches for evaluating projects are cost-benefit analysis and cost-effectiveness analysis. Cost-benefit analysis is used to evaluate whether a project should be undertaken, by ensuring that its benefits are commensurate with its costs. Cost-effectiveness analysis is used to compare two or more alternatives that achieve the same objective and can also be used to evaluate whether benefits are commensurate with costs.

11 Iftikhar et al. (2007) provide some preliminary thoughts on inter-linkages among and between Compensation and Rewards for Ecosystem Services (CRES) and human well-being, with a special focus on its implications for poor communities.

**TABLE 7: FEASIBILITY AND TIME-SCALES OF RESTORATION - EXAMPLES FROM EUROPE** (NESSHÖVER ET AL. 2009; ADAPTED FROM MORRIS & BARHAM, 2007)

| ECOSYSTEM TYPE | TIME-SCALE | NOTES |
|---|---|---|
| Temporary pools | 1-5 years | Even when rehabilitated, may never support all pre-existing organisms. |
| Eutrophic ponds | 1-5 years | Rehabilitation possible, provided adequate water supply. Readily colonised by water beetles and dragonflies but fauna restricted to those with limited specialisations. |
| Mudflats | 1-10 years | Restoration dependent upon position in tidal frame and sediment supply. Ecosystem services: flood regulation, sedimentation. |
| Eutrophic grasslands | 1-20 years | Dependent upon availability of propagules. Ecosystem services: carbon sequestration, erosion regulation and grazing for domestic livestock and other animals. |
| Reed beds | 10-100 years | Will readily develop under appropriate hydrological conditions. Ecosystem services: stabilisation of sedimentation, hydrological processes. |
| Salt marshes | 10-100 years | Dependent upon availability of propagules, position in tidal frame and sediment supply. Ecosystem services: coastal protection, flood control. |
| Oligotrophic grasslands | 20-100 years + | Dependent upon availability of propagules and limitation of nutrient input. Ecosystem services: carbon sequestration, erosion regulation. |
| Chalk grasslands | 50-100 years + | Dependent upon availability of propagules and limitation of nutrient input. Ecosystem services: carbon sequestration, erosion regulation. |
| Yellow dunes | 50-100 years + | Dependent upon sediment supply and availability of propagules. More likely to be restored than recreated. Main ecosystem service: coastal protection. |
| Heathlands | 50-100 years + | Dependent upon nutrient loading, soil structure and availability of propagules. No certainty that vertebrate and invertebrate assemblages will arrive without assistance. More likely to be restored than recreated. Main ecosystem services: carbon sequestration, recreation. |
| Grey dunes and dune slacks | 100-500 years + | Potentially restorable in long time frames depending on intensity of disturbance, main ecosystem service, coastal protection and water purification. |
| Ancient woodlands | 500-2000 years | No certainty of success if ecosystem function is sought – dependent upon soil chemistry and mycology plus availability of propagules. Restoration is possibility for plant assemblages and ecosystem services (water regulation, carbon sequestration, erosion control) but questionable for rarer invertebrates. |
| Blanket/ Raised bogs | 1 000-5000 years | Probably impossible to restore quickly but will gradually reform themselves over millennia if given the chance. Main ecosystem service: carbon sequestration. |
| Limestone pavements | 10,000 years | Impossible to restore quickly but will reform over many millennia if a glaciation occurs. |

interactions between economic agents (Houdet et al. 2011; Table 8), first as a strategic core variable among others for decision-making and management and, perhaps more importantly, as a source of new assets and liabilities (trading rights and/or contractual agreements), new skills or competencies as well as technological (e.g. using living systems as ecosystem engineers for restoration; Byers et al., 2006; Hastings et al., 2006) and organisational innovations.

However, for economic agents to fully embrace markets for biodiversity and ecosystem services (Table 8), numerous uncertainties will need to be resolved. For an efficient sharing of their advantages (Perrings et al. 2009; Pascual et al., 2009), we would need:

- To clarify the level of excludability and rivalry regarding beneficiaries and providers of various ES;



**FIGURE 3: SUMMARY OF COST RANGES OF RESTORATION EFFORTS** (NESSHÖVER ET AL. 2009)**, WITH BARS REPRESENTING THE RANGE OF OBSERVED COSTS IN A SET OF 96 STUDIES**

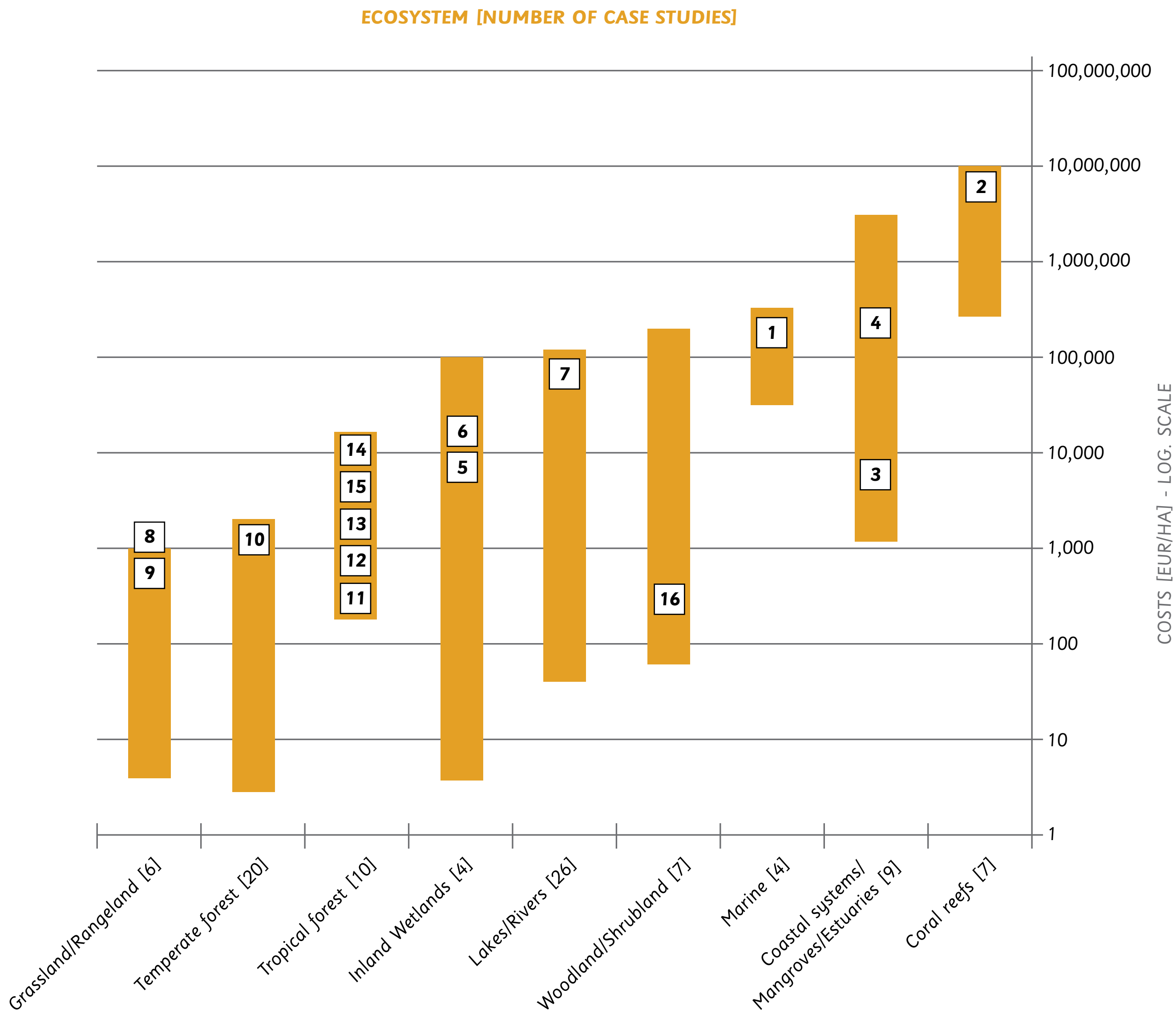


**TABLE 8: MARKET MECHANISM OPTIONS FOR BIODIVERSITY AND ECOSYSTEM SERVICES** (HOUDET ET AL. 2011; ADAPTED FROM PARKER & CRANFORD 2010)

| | **BENEFICIARIES PAY** | **POLLUTERS PAY** |
|---|---|---|
| **Ecosystem services** | **Direct PES**<br><br>Beneficiary pays for ES that flow to them. ES are not wholly public, but can be captured to some degree by paying beneficiaries (bilateral arrangements - e.g. payments for watershed services)<br><br>**Indirect PES**<br><br>Consumers of final goods and services pay a premium for the sustainable ecosystem management practices up in the supply chains (e.g. organic food) | **ES Markets**<br><br>Polluter pays for damage they have done by buying an offset/credit. The beneficiaries are the population that receive the ES and are usually different from the population that is paying (bilateral/market arrangement - e.g. water quality trading, forest carbon storage) |
| **Biodiversity** | **User Fees**<br><br>Beneficiary pays for access to/use of in situ biodiversity. Direct use biodiversity benefits accrue to those who pay for access (single payments - e.g. Eco-tourism, hunting licenses) | **Impact mitigation markets**<br><br>Developer pays for damages they have done to biodiversity (habitats, species) by buying an offset / credit (bilateral/ market arrangement e.g. biodiversity offsets/banks, tradable fisheries quotas) |

- To make sure there would be sufficient demand or willingness to pay for such services by beneficiaries or polluters;
- To delineate and enforce clear regimes of rights surrounding land use and ecosystem services;
- To invest in social capital so as to foster collective action and cohesion between the providers and beneficiaries of ecosystem services (e.g. to reduce transaction costs and free-riding behaviour).

To those challenges we may add those relating to defining ecosystem boundaries including spatial and temporal relationships across different scales between economic agents with regards to dependencies and impacts on ecosystem services (Table 3): several ecosystems may exist within a larger one and their boundaries may expand and contract over time in response to various drivers of change, including anthropogenic influences. What's more, the precise tracing of ES from their source(s) to their ultimate user(s) is likely to be required in many circumstances, and may further necessitate identifying service provision timing, delivery channels, distance delivery, and delivery timing (Ruhl et al. 2007).

Towards achieving the sustainable financing of the conservation and expansion of European wilderness areas, the diversification of income sources should be the principal goal. Beyond public subsidies, payments for various ecosystem services could be sought, including (but not limited to):

- Payments for certified wilderness recreation services (user fees by direct beneficiaries). For instance, the PAN Parks Foundation started a tourism model in 2009. By building up a network of tour operators, it seeks to develop high quality nature tourism experiences for its member parks. The tourism model thus aims to mobilise sustainable tourism development in order to strengthen wilderness conservation.

- Payments for water-related and natural-risk regulation services (direct payment by beneficiaries): e.g. project undertaken in the Drakensberg catchment areas in South Africa to improve water quantity, quality and delivery (flood control) timing (Blignault et al. 2011; Mander et al. 2008). Key challenges include finding willing buyers and cost-efficient means of monitoring changes in management practices; hence the expected improvements in ecosystem services delivery.

- Payments for carbon-related services (payments by polluters): various ecosystems (e.g. forests, grasslands, wetlands) provide carbon sequestration benefits which could potentially be sold on the voluntary carbon market. However, transaction costs for certifying such carbon projects (e.g. Verified Carbon Standards or VCS - http://www.v-c-s.org/) may be particularly high, while greenhouse gas measurement protocols are unlikely to be available for all types of habitats.

- Voluntary payments for biodiversity conservation: i.e. payments by organisations seeking to improve its brand or image. In that context, the Green Development Initiative (GDI - http://gdi.earthmind.net/) supports the management of geographically defined areas in accordance with the objectives and guidance of the Convention on Biological Diversity (CBD). The GDI is establishing an international standard and certification system for verifying land management plans that deliver conservation and development outcomes in accordance with CBD. In so doing, GDI certification facilitates recognition of and support for biodiversity conservation and its sustainable and equitable use on the ground. Several PAN Parks certified wilderness areas are taking part in the pilot-testing phase of the GDI.

- Offset measures (mitigation credits) for residual development impacts (Polluters pay – regulated impact mitigation markets): such measures would fall within the scope of the Habitat and Bird Directives and may include restoring degraded / fragmented ecosystems or purchasing unprotected areas worthy of wilderness status.

Combining these payments is also called stacking PES, which can be contrasted with bundling ecosystem services for a single payment: e.g. a carbon offset project, with both VCS and Climate Community Biodiversity Standard (http://www.climate-standards.org/) certification, which makes available for sale carbon credits with social and biodiversity co-benefits. PES may be stacked in different ways: (a) multiple payments for different ecosystem services; (b) one or more PES with one offset measure; and (c) multiple offsets or mitigation credits. Furthermore, stacking PES may occur in several ways (Cooley & Olander 2011): (1) horizontal stacking, which means selling credits from distinct, non-spatially overlapping parts of a single property; (2) vertical stacking, which involves multiple payments for a single management activity on spatially overlapping areas (i.e. in the same hectare: e.g. planting a forested riparian buffer to receive both water quality credits and carbon credits); and (3) temporal stacking which implies one main management activity, but payments separated in time (e.g. restoring habitat to receive endangered species credits, and then later receiving carbon offset credits - or vice versa).

However, great care should be taken by wilderness area managers or promoters to avoid the potential pitfalls of stacking PES. Indeed, where offset and mitigation programs are part of the stack, there is potential for negative overall ecosystem service outcomes: this is because these offset credits allow others to impact the environment. For instance, Cooley & Olander (2011) have identified several possible problems, including:

- Overlapping credit types, which lead to problems of "double dipping": i.e. the same action is sold twice to offset two separate impacts;
- The incomplete coverage of impacts, or slippage of impacts, that are not covered by other programs and are therefore not accounted for;
- The lack of additionality of projects financed by stacked payments: this relates to projects that would have occurred without an additional payment. In such cases, there is no demonstration of an additional ecosystem benefit to offset an additional impact. For instance, if a water quality programme provides sufficient payment for the plantation of a riparian buffer to move forward on its own, the project does not need an additional payment for the carbon to be stored by the growing trees. The carbon payment would not generate additional carbon storage to offset the additional greenhouse gas (GHGs) emitted, so there would be GHGs released into the atmosphere that were not offset, resulting in a net negative ecosystem service outcome.

## THE WAY FORWARD: POSSIBLE STEPS FOR WILDERNESS AREA MANAGERS

Though emerging markets for ecosystem services seem attractive, proactive actions and lobbying would be required to embed them into wilderness area management and strategic planning. Here are the possible steps one could follow so as to secure both the ecological and financial viability of wilderness areas (adapted from Houdet 2011):

1. Defining the scope and baselines of the assessment:

    a. Identifying all key ecosystem attributes (assets – e.g. habitats, species, functions and processes, services), at all relevant scales, and collecting up-to-date data about their conditions;

    b. Identifying stakeholder groups involved, at all relevant scales (local, national, international);

    c. Assessing the institutional and regulatory mechanisms of the wilderness area and its associated ES;

2. Quantifying dependencies and impacts on ecosystem services:

    a. Identifying and quantifying the uses of ES by different stakeholder groups;

    b. Identifying and quantifying the impacts on ES by different stakeholder groups;

    c. Quantifying the associated economic and social benefits (revenues, positive externalities, including the cost of inaction in terms of wilderness attributes) and costs (management and opportunity costs), including externalities;

3. Identifying the various options for securing additional income sources (for both wilderness

*management / restoration and compensation payments for legitimate opportunity costs):*

*a. Identifying desired future conditions, translating them into ES targets (service caps, market drivers), evaluating and prioritising restoration activities (ecological currencies, cost-benefit analysis), and assessing their cost-effectiveness (risk of failure);*

*b. Identifying potential buyers and sellers of ecological currencies (water, carbon, biodiversity) so as to reach ES targets;*

*c. Identifying the most appropriate institutional framework(s) to make the advocated PES schemes cost-effective and socially accepted (e.g. voluntary contractual agreements versus regulated markets);*

*d. Development of a business plan and marketing strategy;*

*4. Implementation of recommendations and pilot-testing.*

# conclusion

This report exposes the key economic dimensions, challenges and opportunities of wilderness areas in Europe.

Though wilderness areas may provide various sustainable ecosystem benefits to many stakeholders, they also imply forgone opportunities, also known as opportunity costs, to others. Making the case for their effective protection and management thus implies efficient stakeholder engagement at all relevant scales, as well as the recognition of both benefits and costs. The economic valuation of ecosystem services could play a very useful role to that end. Yet, there is a general lack of understanding of the actual and potential economic benefits and costs associated with their specific management frameworks and rules: a comprehensive, comparative assessment of the benefits and costs of uses and non-use of ecosystem services for wilderness areas and other types of protected areas in Europe is clearly warranted. This will be useful to establish effective policies and mechanisms for the equitable sharing of costs and benefits arising from the establishment of wilderness areas, as well as create appropriate win-win incentives to overcome opportunity costs for affected stakeholders where this is justified by broader benefits.

Because of the methodological limitations and underlying principles of the economic valuation of biodiversity and ecosystem services (costs-benefits approach), wilderness managers and promoters should put complementary emphasis on accounting for the costs of inaction, i.e. *the costs of not protecting the ecological assets and ecosystem services underpinning wilderness values* (cost-efficiency approach). Indeed, it is often more useful or practical to make decisions based on ranking or prioritising the expected benefits of ecological investments. While monetary measures of ecosystem benefits may be necessary to justify spending on wilderness, non-monetary indicators of the expected socio-ecological benefits can effectively be used to set priorities by determining the greatest benefits per Euro spent.

Furthermore, the recent considerations of budget cuts in various European countries will put pressure on efforts to secure the ecological viability of wilderness areas: in addition to sustainable state subsidies, new financing mechanisms are needed so as to engage stakeholders in cost-effective wilderness conservation, restoration or expansion. From this perspective, the emergence of payments for ecosystem services (PES) seems highly appealing. Combining strategies for mitigating BES loss and remunerating BES supply opens the door to new forms of arbitrage with respect to land-use planning, including the expansion of wilderness areas. This report hence highlights the challenges and opportunities of various types of payments for ecosystem services (including their stacking), as well as possible steps which could be followed so as to secure both the ecological and financial viability of European wilderness areas.

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Central Balkan National Park © Alexander Ivanov


**STUDY BY:**
Dr Joël Houdet,
Integrated Sustainability Services

**PUBLISHED BY:**
PAN Parks Foundation, 2011

**COVER PHOTO:**
Central Balkan NP, Bulgaria © Petar Paunchev

**DESIGN BY:**
Anna Egyed, Hungary

**EDITORIAL ADDRESS:**
PAN Parks Foundation
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