Measuring sustainable use:

A method to assess the conservation benefits from sustainable management outside protected areas and to include this information in ecoregional planning

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Preface

It is now widely recognised that protected areas cannot protect the world's biodiversity on their own. Networks of protected areas need to be integrated with other forms of sustainable land use, to build up "biodiversity compatible mosaics" of land and water that in total support biodiversity.

Conservation organisations, governments and communities are starting to wrestle with the challenge of fitting together the different needs and priorities of sustainable development, biodiversity protection and other imperatives such as poverty alleviation and the provision of adequate health care and education. "Sustainable use" is now recognised as a critical component of biodiversity conservation.

One particular challenge is how the rather nebulous concept of sustainable use can be measured, along with its contribution to biodiversity conservation plans. This is more than simply an academic bean counting exercise; if we don't know where sustainable use is taking place and what its real effects are, its integration into conservation plans becomes much more difficult.

The following paper outlines some proposals for how The Nature Conservancy could start to measure and map areas of land and water under sustainable use that provide benefits to biodiversity, thus complementing protected area networks. It addresses immediate needs faced by TNC in its efforts to measure ecoregional conservation success, but has wider applicability particularly with respect to the commitment of the Convention on Biological Diversity to include sustainable use amongst its indicators of biodiversity conservation.

We have developed a methodology which we think could work, and looked at how it might be applied in practice. But this doesn't mean that all the problems are over; there are huge information gaps that still need to be filled in terms of where various sustainable use strategies are being applied and also gaps in our understanding of their real value to biodiversity conservation. The methodology attempts to address these questions.

As yet, the methodology is a theoretical framework. We hope that it will be tested it out in real situations both with TNC staff in ecoregions, and perhaps by other users; after this it may well be revised as we learn how it works out in practice.

Putting this together has been an exciting process. We are grateful to Jamie Ervin and Ian Dutton for commissioning the work and to Jamie for managing us graciously even when deadlines slipped. We are also grateful to all the participants in the workshop held in Dallas, Texas in October 2005 for their input to the thinking.

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Summary

- ✓ **The challenge**: Protected areas cannot conserve all biodiversity but need to be supported by a mosaic of other sympathetic land and water management systems. The importance of "**sustainable use**" systems is recognised by the Convention on Biological Diversity and UNEP and within TNC's programme.

- ✓ **The scope:** we calculated that somewhere in the region of 845 million ha, or 5.7 per cent of the world's terrestrial area, could be described being managed for sustainable use. The degree to which these areas actually support biodiversity is frequently unknown.

- ✓ **Evidence:** There is, however, a growing body of scientific evidence which not only stresses that protected areas alone cannot adequately conserve the world's biodiversity, but supports the hypothesis that land or water use for multiple purposes, such as forestry, fisheries or agriculture, can also support a proportion of biodiversity if managed correctly.

- ✓ **Aims**: This report present a draft **methodology** to capture the degree to which land and water outside of protected areas are managed in a way that conserves biodiversity, and aims to explain how to (a) identify areas, (b) assess their biodiversity value and (c) manage the data including mapping.

- ✓ **Definitions**: A **sustainable use area** is defined in this context as: *An area of land and/or sea outside a protected area, which is managed to have substantial long-term benefits to biodiversity, through specific planning processes that also address human well-being*.

- ✓ **Classification**: Sustainable use approaches are classified in a **matrix**, first according to *management type* (e.g. agriculture, forest management, marine fishing…) and then subdivided by *incentive* (legal requirements, certification, financial…). They are linked to a specific biome(s) and examples are given.

- ✓ **Assessment**: Not all these will have equal value to biodiversity. A method for **assessing sustainable use** methods is given based on ranking according to five elements: *biodiversity value*, *biodiversity planning instruments*, *amount of modification*, *permanence* and *social sustainability*. A scoring system is suggested and tested. Ranking could be undertaken centrally by TNC and data presented either as a single score or disaggregated for the five elements.

- ✓ **Mapping**: TNC needs to map data to plan and measure ecoregional conservation. The availability of **spatial data** for sustainable use is summarised and found to be poor – parallel research in the USA confirms this – although there are some uses for which data exist. Increasing data collection and mapping on sustainable use is identified as a priority.

- ✓ **Data storage**: One option for storing data is the **World Database on Protected Areas**, which might be extended to include sustainable use. The WDPA already includes many sustainable use areas outside IUCN protected areas (e.g. forest reserves, many Ramsar sites, military lands). Existing fields

in the database could be used to include sustainable use without rebuilding the database and some modifications are suggested.

✓ **Recommendations**: sustainable use systems exist and can be classified and mapped. The methodology needs to be tested. Access to spatial data is limited but the schemes we have spoken to are not averse to mapping; most would like to be able to be included within an ecoregional progress report.

In summary, the steps would be:

Step 1: Use the sustainable use matrix to identify and list types of sustainable use within the ecoregion.

Incentive	**Sustainable use system**	**Biome**
✓ Legally-established system		
✓ Third party certification		
✓ Second party certification		
✓ Voluntary agreements		

Step 2: Score each type of sustainable use, drawing on a previously calculated list of scores drawn up using the following system:

Influencing factor	**Ranking**			
Biodiversity value	Biodiversity benefits only off sustainable use area	Unproved biodiversity benefits	Proven biodiversity benefits in sustainable use area	Proven biodiversity benefits on and off sustainable use area
Score	2	2	4	6
Biodiversity planning instruments	Not mentioned	Recommended	Required	Required with monitoring and adaptive management
Score	0	2	3	4
Amount of modification	Cultural almost no natural elements	Cultural ecology some natural elements	Cultural ecology many natural elements	Natural ecology
Score	0	2	4	6
Permanence	Short term (i.e. annual)	Mid term (i.e. 5-10 year)	Potentially long term	Long term
Score	1	2	3	4
Social sustainability	Negative benefits on human wellbeing	Neutral in terms of human wellbeing	Impacts of human wellbeing not known	Positive benefits to human wellbeing
Score	-4	0	0	4

Step 3: Assemble spatial data (maps or if not available point data)
Step 4: Map sustainable use areas using colour coding to distinguish between the degrees of biodiversity protection provided

1. Introduction: The Ecosystem Approach and the role of sustainable use in conservation strategies

It is widely recognised that protected areas cannot, on their own, achieve biodiversity conservation and that they need to be supported by complementary management in other areas. (This issue is discussed in more detail in Chapter 2.) Conservation strategies are therefore increasingly aiming to develop ***biodiversity-compatible mosaics*** across whole ecoregions, landscapes and seascapes. In well-designed mosaics, protected areas provide the core elements of the conservation strategy, ideally made up of representative samples of all natural habitats and containing viable populations of all species. But in reality, protected areas are seldom large enough or secure enough to conserve all biodiversity indefinitely, and isolation can reduce their values and their viability. Conservation planners are therefore increasingly looking to other management regimes to help secure a proportion of biodiversity outside officially protected areas. These can include fully natural areas protected for purposes other than biodiversity (such as watershed protection or military lands) and semi-natural or carefully managed areas. They can serve as buffer zones around protected areas, corridors linking different protected areas and thus ensuring genetic interchange and more generally as habitat for a proportion of wild biodiversity. Such areas can have many different governance types, ranging from state lands to community conserved areas.

The need for a broadscale approach to biodiversity conservation, looking beyond protected area networks, is recognised in the **Ecosystem Approach** developed and supported by the Convention on Biological Diversity[1]. Integration of protected areas with other forms of land and water use is an explicit element in the approach[2], embodied for example in the UNESCO concept of biosphere reserves where a core protected area is buffered by various forms of sustainable use.

The Ecosystem Approach, along with other broadscale strategies, has encouraged conservation managers to look beyond individual sites and at how biodiversity conservation can be integrated with other land uses across larger areas. Ecoregional conservation, described in more detail below, is one manifestation of this changing understanding but many other landscape and seascape scale methods are also based around similar premises.

The importance of sustainable use as a component of biodiversity conservation is recognised by governments, inter-governmental processes and NGOs. For instance, the Convention on Biological Diversity specifically requires Parties to include sustainable use within their biodiversity conservation strategies and is investigating options for measuring this. The Global Strategy for Plant Conservation, from the CBD and UNEP, includes targets relating to sustainable use: e.g. Target 6 "At least 30 per cent of production lands managed consistent with the conservation of plant diversity"; and Target 12; "30 per cent of plant-based products derived from sources that are sustainably managed"[3]. Conservation targets from WWF and IUCN include promotion of sustainable use, for instance in forests[4]. TNC has also recognised the need to include sustainable use in its ecoregional approaches.

Broadly speaking, three management objectives can be identified which together support biodiversity conservation:

- ✓ **Protected areas** managed primarily for biodiversity, i.e. protected areas as defined by IUCN and the CBD
- ✓ **Sustainable use areas** managed for a range of purposes but which can also play a role in supporting or encouraging biodiversity (e.g. organic agriculture, sustainable forest management, hunting reserves)
- ✓ **Mitigation areas**: areas that have little direct benefits to biodiversity on-site, but are managed in ways that mitigate detrimental impacts on biodiversity elsewhere, e.g. mining operations that control off-site pollution, control of water abstraction to minimise downstream effects etc

There is some overlap between all of these and particularly between the second and third, but in this report we concentrate mainly on the second: i.e. on ways of managing land and water that, whilst addressing other priorities, nonetheless consciously provide useful habitat for biodiversity. We define what this might mean more precisely in the following chapter. For now it is worth noting that there are probably several thousand management strategies that could be defined as sustainable use and thus help to support, buffer and connect the more strictly conserved protected areas. For practical purposes, we attempt to catalogue these into a number of broad categories.

Identifying which management approaches are or are not beneficial to biodiversity is itself a considerable challenge. A number of efforts have already been made; for instance, the Meso American Biological Corridor envisages a range of sustainable land uses in combination with officially designated protected areas, with buffer zones and other linking areas (the so-called Corridor (Connectivity) Zones and Multiple-Use Zones), including certified forest management and organic agriculture. But at an ecoregional or global scale determining which management strategies are in place, reviewing these with respect to their potential contribution to broadscale conservation and assessing their effectiveness in terms of biodiversity conservation presents a major challenge.

This report aims to provide a decision making framework, which conservation planners can use to answer these questions. It identifies and defines sustainable use areas that are likely to support biodiversity and provides a methodology for assessing their **conservation value**. It then goes on to suggest how those areas managed in ways which conserve biodiversity can be bought together into a global data source on sustainable use areas.

It would be naïve to assume that this is a simple process. The concepts themselves are tricky and still being developed. Data about sustainable use remain extremely limited and the effectiveness of different strategies is often still untested. What follows should therefore be viewed as preliminary and will doubtless change as we test the ideas out in practice.

Ecoregional Conservation: A global planning instrument

The unit that The Nature Conservancy has chosen for planning and implementing broadscale conservation is the ecoregion. Ecoregions are defined as: *large areas of land and water that contain geographically distinct assemblages of natural communities* and provide ecologically-coherent units within which the needs of biodiversity can be identified and the trade-offs between biodiversity conservation and other legitimate forms of land use can most sensibly be addressed.

A system of ecoregional boundaries of the world has been defined by WWF, so far covering 867 terrestrial ecoregions[5], with marine ecoregions still being mapped and identified. A further analysis identified 237 groupings of these terrestrial ecoregions as larger Global 200 Ecoregions, chosen as being of primary conservation importance[6]. The Nature Conservancy uses the same ecoregions and has developed a series of powerful tools for planning conservation at such large scales[7]. In the process of planning conservation actions across ecoregions, "priority areas" or "priority landscapes" are often identified, usually those areas with the highest biodiversity or occasionally areas at particular risk, and these become the subject of further conservation planning and initiatives[8]. Scale is variable and depends on ecology: for instance there are some very small ecoregions (10's of km^2) and very large priority landscapes (1000's of km^2).

Ecoregional conservation is therefore a complex process for ensuring biodiversity conservation, drawing on a range of tools including protected areas but also various forms of sustainable use and both mandatory and voluntary controls. It assumes a range of partnerships, often with institutions that have not traditionally been seen as involved in conservation. While initial efforts tended to concentrate almost exclusively on identifying new protected areas, this situation is changing and the interplay between protected areas and sustainable use areas is increasingly recognised as a critical element in success.

In these circumstances, success or failure is often difficult to measure; it is far more complicated than for instance estimating total protected areas. Are sustainable use areas really contributing to biodiversity conservation? Come to that, are protected areas really contributing to biodiversity conservation?

Over the past few decades, an enormous amount of effort has been expended in answering these questions for officially protected areas. Data on size, location and management objectives has been built up by the UNEP World Conservation Monitoring Centre, latterly in association with the consortium involved in the World Database on Protected Areas, as described in the section immediately following. Methodologies for determining if these protected areas are actually doing their job have also proliferated. However, until recently far less effort has been put into measuring sustainable use in any general sense, although measurement of specific aspects of sustainable use have developed independently[9]. The Nature Conservancy has identified a need to measure the extent and the value of various forms of sustainable use outside protected areas, to enable more accurate reporting on its own conservation targets and progress within ecoregions. The current report is an early attempt to do this on an ecoregional scale.

Integrating sustainable use into ecoregional conservation

Although as a term "biodiversity" still does not appear in many of the national laws that form the basis for the designation of protected areas, because they were drawn up before the term came into general use, it is not difficult to equate the goals of, for example, wildlife protection or "wilderness management" to the overall goal of protecting and maintaining biodiversity. Whatever wording is used, these aims form the nucleus of the definition of a protected area and the backbone of conservation policies worldwide. But what does it mean when we use the term "biodiversity conservation" as one aspect of defining management practices on land and water outside protected areas? How can conservation planners begin to determine which of the management practices defined under the many sustainable use/ conservation friendly schemes being developed globally can achieve the ultimate goal of biodiversity conservation?

TNC has set itself the task of answering these questions and this paper is an early result. Its aims is *to capture the degree to which land and water outside of protected areas are managed in a manner that conserves biodiversity*, encompassing three major elements:

- ✓ identifying areas which are managed to conserve biodiversity
- ✓ assessing different areas' contribution to biodiversity conservation
- ✓ mapping these areas to capture degree of coverage

All of these are considerable challenges. It is however a challenge the conservation community has faced before, in the context of protected areas. In 1962, at the First World Conference on National Parks, there was a debate about the "nomenclature" of protected areas as the first list of protected areas revealed the wide variety of names of protected areas around the world. By the late 1960s, this concern developed into the more fundamental question: what is a protected area? Thus at the 1969 IUCN General Assembly in New Delhi a resolution passed which sought to define "national park" in the following terms: "a relatively large area where one or several ecosystems are not materially altered by human exploitation and occupation"; and which called on countries "not to describe as national parks" those areas that did not meet the definition. Between 1972 and 1994 a series of initially draft and then refined classification systems for protected areas were developed[10]. Although, still the subject of much debate, definition of a protected area and the accompanying six categories of protected area management objectives (outlined immediately below and discussed in more detail in Chapter 3) have proved a vital global framework for assessing the growing number of protected areas[11].

Definition and six IUCN categories of protected area

An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means.

- ✓ **Category Ia**: *Strict nature reserve/wilderness protection area managed mainly for science or wilderness protection*
- ✓ **Category Ib**: *protected area managed mainly for wilderness protection*

- ✓ **Category II**: *protected area managed mainly for ecosystem protection and recreation*
- ✓ **Category III**: *protected area managed mainly for conservation of specific natural features*
- ✓ **Category IV**: *protected area managed mainly for conservation through management intervention*
- ✓ **Category V**: *protected area managed mainly for landscape/seascape conservation or recreation*
- ✓ **Category VI**: *protected area managed mainly for the sustainable use of natural resources*

Just as there was a need to define and classify protected areas, so too was there a need to develop a global list of protected areas for the purposes of measuring progress towards conservation targets, and, more recently, to be able to map these areas to ascertain global coverage. The development of the World Database on Protected Areas (WDPA) also provided the means to classify a range of attributes including: size, altitude, habitats, realms (using the Udvardy classification system[12]), history (date of establishment, management etc) and species' details. Although the IUCN management categories are not designed to be a comment on effectiveness, in recent years there has been growing interest in management effectiveness. An internationally recognised framework for assessing management effectiveness has been widely adopted[13], various different methodologies have been developed including those capable of being applied on a wide scale[14], and assessments have taken in place in many thousands of protected areas. Although none of these systems are perfect they do provide a logical framework and information base on global protected areas network.

Developing systems for assessing the status of sustainably managed lands and waters outside protected areas, should, we suggest, be compatible and even complementary with the existing framework for measuring protected areas. (Jumping ahead a little in our proposals, this is in part because we suggest that the World Database on Protected Areas could in time be expanded to encompass both protected areas and sustainable use areas.) Table 1 below looks at a range of issues from the perspective of what already exists with respect to protected areas and what is proposed in this report in relation to sustainably managed areas. As such it also provides a summary of what the report will address

Table 1: Comparison of protected area areas and sustainable use areas

Issue	Protected Areas (PA)	Sustainable Use Areas (SUA)	Chapter
Classification	IUCN PA classification system used as the basis of the World Database on Protected Areas (WDPA) and UN list of protected areas	Suggested matrix defining the incentive for sustainable management and management type (e.g.. agriculture, fishing, ecosystem services etc)	3
Definition	IUCN protected area definition	Suggested definition of sustainable use areas	3
Categorisation	Six IUCN PA categories defined by management objective	Suggested categorisation by degree of land modification	3

Issue	Protected Areas (PA)	Sustainable Use Areas (SUA)	Chapter
Effectiveness	Various systems developed to assess effectiveness of management, loosely based on the World Commission on Protected Areas (WCPA) Framework[15]	Suggested methodology for basic assessment of conservation value of different types of management	4
Primary data source	World Database on Protected Areas (WDPA)	At present scattered and hard to find, suggested link to WDPA	5
Data Management	National governments, WDPA consortium	Suggested role of national governments (re CBD commitments) and WDPA consortium (re link to WDPA)	5
Conservation planning advice	There is a considerable body of work on developing effective protected area networks, gap analysis etc	The report addresses two issues: ✓ a review of the biodiversity benefits of sustainable use areas distinguished by management type (e.g. agriculture, marine fishing, ecosystem services etc), including some detailed examples of strategies ✓ advice on using sustainable use areas in ecoregional planning by biome type	2

Assumptions

The process suggested in this report for measuring the contribution of sustainable use areas within ecoregion conservation planning is based on a number of assumptions:

- ✓ Sustainable use areas can provide a genuine and useful contribution to biodiversity conservation
- ✓ Realistic and cost-effective ways of measuring this contribution can be developed and applied
- ✓ Data quality and availability will increase in the coming decades
- ✓ Guidelines for inclusion into a database of sustainable use areas will be transparent, robust and widely agreed
- ✓ Governments and other partners will maintain commitment to mainstreaming biodiversity conservation across the whole landscape and seascape

2. Conservation Values of Sustainable Use Areas

This chapter reviews the need for sustainable use in conservation and summarises what we know about the effectiveness of different systems

Protected areas: limitations and supporting strategies
Protected areas already cover over 10 per cent of the world's land surface, which was the original target for protection identified by The World Commission on Protected Areas (then known as the Commission on National Parks and Protected Areas) at its IVth World Parks Congress in Caracas, Venezuela in 1992. A target which was considered at the time to be little more than an idle dream was in the event reached in less than a decade, and many countries are continuing to establish protected areas. The new *Programme of Work on Protected Areas*, agreed by the Convention on Biological Diversity (CBD) in February 2004[16], adds important impetus to this process.

Yet biodiversity remains in crisis. The CBD estimates that extinction rate are 100-200 times higher than the historical natural level[17], the United Nations Environment Programme identifies severe threats to forest species[18], the Millennium Ecosystem Assessment increases predicted extinction rate to a thousand times historical levels[19] and the IUCN Species Survival Commission draws on its Red List to estimate that 12 per cent of bird species and 23 per cent of mammals are threatened with extinction[20]. **Protected areas are not, on their own, proving sufficient to conserve the world's biodiversity**.

There are a number of reasons for this failure. Ten per cent of the planet's land surface sounds a lot, but is not in itself sufficient to protect all species, and research suggests that many remain entirely outside the protected area system; for example it is thought that 6-11 per cent of mammals and 16-17 per cent of amphibians are at present not adequately represented in protected areas[21]. Many protected areas are in places that are relatively easy to protect from a social and political perspective – deserts, ice-caps and tundra for instance – rather than the fertile lowlands that contain a relatively higher proportion of the world's species, so that the total area masks gaps in protection of important ecosystems. Even more significantly, most protected areas are too small to protect entire ecosystems and if they become isolated as a result of changes in surrounding land use, they can continue to lose species even if they are well managed. In the United States, where protected areas are relatively large, most national parks have lost mammal species since their establishment[22]. Many protected areas are currently being further squeezed as a result of development pressures and their futures remain uncertain[23]. Finally, many protected areas are not managed very effectively, and continue to be degraded through illegal use[24]. The 1992 Global Biodiversity Strategy[25] recognised that even if most of Earth's remaining natural ecosystems could be protected from development, they could not adequately maintain biodiversity. The strategy thus stated that "the success of biodiversity conservation will depend upon how well the overall landscape is managed to minimize biodiversity loss".

Protected areas therefore only work if they exist in a supportive landscape or seascape, which can sustain a proportion of species, or at least allow them passage so that they do not become genetically isolated.

Unfortunately, this is often not the case. Although research suggests that up to half the world's land surface may remain with some degree of natural ecology[26], many ecosystems are continuing to shrink quickly and even places that resemble "wilderness" have often been subtly but profoundly altered, for example through the effects of deliberate fire-setting or grazing by domestic livestock. Anthropogenic pollution affects the entire planet, through climate change and the impacts of persistent, harmful chemicals.

The majority of the world's land surface has already been significantly altered through human intervention, isolating protected areas. In many ecoregions, rate of habitat loss is exceeding rate of protection[27]. Conservation by necessity often takes place in modified ecosystems. The following typology summarises different degrees of modification to the natural environment.

Table 2: Typology of ecological authenticity

No	Category	Description	Scale	Examples
1	Untouched/virtually untouched	Areas effectively untouched by humans or only minimally impacted in particular sites	Large	Ice caps Mountain tops
2	Minimally touched	Areas only minimally affected by human activity	Large	Sandy and dry deserts Some boreal forests and taiga
3	Substantially unaltered	Areas where human impact does not impacts significantly on ecosystem functions: there may be some additions and subtractions from the ecosystem	Large	Tropical moist forests, natural temperate forests, other deserts
3a	Substantially unaltered fragments	Small areas where human activity has not substantially impacted on ecosystem function, but either isolated or surrounded by land that has been more altered	Small	Remote coral atolls, old-growth forest fragments, wetlands surrounded by farmland
4	Historical cultural landscape now reverting to natural	Areas where human management used to exist but has now been abandoned or relinquished, leading to the return of a mainly natural ecosystem	Large or small, often small	Farmland or grazing land reverting to forest, land managed by fire now reverting to natural system
5	Cultural landscape with predominantly natural vegetation	Areas where human management is carried out, albeit on a natural system	Large or small, often large	Savannah ecosystems managed by fire, logged over tropical forest
5a	Cultural landscape with predominantly natural vegetation, now badly degraded	Areas where human management has been carried out on a natural system, leading to loss of natural ecosystem function	Large	Overgrazed areas degrading to desert
6	Cultural landscape with partly natural vegetation	Areas where human management has substantially altered and often simplified natural ecosystems	Large or small	Intensive-managed natural forest, heavily grazed pasture

No	Category	Description	Scale	Examples
7	Cultural landscape with predominantly exotic vegetation	Areas where human management has involved the deliberate introduction of species that have come to dominate the ecology	Large or small	Timber plantations of introduced species, arable crops, grazing land sown with non-native grass
8	Artificial landscape without significant vegetation	Areas where human activity has replaced vegetation entirely	Large or small	Cities, roads etc

The limitations of protected areas and the rapid rate of change in the rest of the world have together prompted increased interest in **broadscale approaches to conservation** that address biodiversity conservation across the whole landscape and seascape. Such approaches, known variously as *bioregional* or *ecoregional* conservation, seek to implement conservation through a mixture of protected areas (which may themselves have a wide range of management approaches) and land and water outside protected areas that is managed in ways that are compatible with broad conservation objectives. As outlined in Chapter 1, broadscale approaches have received official sanction through the development of the *Ecosystem Approach*, a set of principles for broadscale conservation promoted by the CBD[28] that are now being tested and applied[29].

Evidence for the effectiveness of biodiversity conservation outside protected areas

Such approaches assume that biodiversity can be effectively managed outside protected areas. For some management approaches, detailed research has already been completed and we know what they can and cannot offer in terms of providing habitat for biodiversity; in other cases our knowledge remains sketchy and their benefits remain largely a matter of faith or occasional observation. The following section summarises state of knowledge for several different land and water management systems, which form the basis of the methodology described later. We consider nine different management systems:

- ✓ Agriculture
- ✓ Forest management
- ✓ Marine fisheries
- ✓ Freshwater fisheries
- ✓ Ecosystem services
- ✓ Hunting
- ✓ Wildlife protection
- ✓ Cultural protection
- ✓ Recreation and tourism

Agriculture

Expansion of agriculture or grazing, along with intensification of agricultural systems, together poses the largest threat to terrestrial biodiversity. Agriculture takes the best land. Livestock compete with native herbivores. Agrochemicals kill wild species. Agriculture is an important cause of forest loss in the tropics[30] and degrades other habitats; for instance competition with domestic livestock has caused a decline in virtually all wild herbivores in Kenya since the 1970s[31]. The fact that many terrestrial protected areas now have farms jostling against their borders isolates the species living inside and often causes friction, for example because of crop damage from "problem animals" such as elephants or apes.

Conversely, some agriculture can support a proportion of natural biodiversity[32] and some countries are now including farmland in their conservation strategies[33]. A large proportion of species can occur in agricultural systems[34], particularly if these are extensively managed. Depending on how much farming systems change the environment; they can continue to support biodiversity in a number of ways (the divisions between these is not always exact):

- ✓ **Farming in near-natural habitat**: extensive grazing systems in prairie[35], savannah[36], open woodland or heath[37] can maintain habitat in a state that is not particularly different from the original. Although farmers often make specific alterations – for instance through killing predators of their livestock – a large proportion of wild plant and animal species may be able to survive in these conditions and abrupt cessation of grazing can prove detrimental[38].

- ✓ **Farming that provides specific microhabitats for important species**: even quite intensive systems can sustain a proportion of biodiversity by maintaining important microhabitats, such as:

  - ✓ **Hedgerows**, which can support a proportion of species that would normally be associated with forest under-storey. In the UK, almost all mammal species utilise hedgerows on occasion[39] and the presence of hedges significantly increases bird diversity[40]. Hedgerows are also extensively used by mammal and birds species in the United States, albeit generally by commoner species[41]. Whilst unlikely to support viable populations of endangered species, they provide valuable corridors that link populations living in remnant habitats and also play a significant role in supporting a broad range of wildlife species[42].
  - ✓ **Conservation headlands and unsprayed field margins**, important for insects, vascular plants and larger species that feed on these. Research by the Game Conservancy in the UK has identified significant increases in game birds[43] and butterflies[44]. Field margins are now an identified target in the UK Biodiversity Action Plan.
  - ✓ **Agro-forestry systems**, capable of providing migration corridors and feeding places. Coffee grown under a canopy of shade offers a particularly good surrogate of natural forest for many faunal species[45]. For example, Finaca Irlanda in Chiapas, Mexico, one of the oldest organic and biodynamic coffee estates in the world, grows more than 40 varieties of leguminous trees for both shade and nitrogen, which protect species such as puma, wild boar, pheasants and toucans[46]. A recent review of bird distribution concluded that, for crops such as coffee and cocoa, the conversion of primary forest to low intensity systems had less of an impact on biodiversity than the intensification of low intensity systems, although reactions differed amongst bird species[47].

- ✓ **Farming that supports a proportion of biodiversity as a result of its growing practices**: organic agriculture is the most thoroughly studied example and repeated studies show that biodiversity is higher under organic as compared to similar convention systems[48]. For example butterflies[49], arthropods[50], birds (in Germany[51], Denmark[52] and the UK[53]) all showed increases in organic systems. There is still some debate about whether organic agriculture *as a system* is more effective at conserving biodiversity than a package of measures in conventional farming[54]. Several other whole farm approaches are being proposed, such as the so-called "Ecoagriculture" approach[55], although these remain for the most part untested. At the same time, over a billion of the world's poorest people practice an extensive form of agriculture due to lack of resources and agroecology approaches[56] seek to build on this to produce cheap and sustainable alternatives to chemical dependency.

Case study: Biodiversity on lowland organic farms

An overview of research findings from 23 European research projects[57] concluded that organically farmed areas had a much higher level of biodiversity than conventionally farmed areas. A summary of the results found that organic farms had the following advantages over similar conventional farms:

	Abundance	Diversity
Plants	Five times as much biomass of wild plants in arable fields, including more rare and declining arable plants	On arable fields, 57 per cent more wild plant species, two times as many rare or declining wild plant species and several rare species found only on organic farms
Invertebrates	1.6 times as many of the arthropods that comprise bird food; about three times as many non pest butterflies and one to five times as many spiders in the crop area	One to two times as many spider species in cereal fields
Birds	25 per cent more birds at the field edge, 44 per cent more in-field in autumn/winter, 2.2 times as many breeding skylarks and on average more breeding yellowhammers.	

- ✓ **Farming where a proportion of biodiversity relies on cultural landscapes**: in countries with a long history of agriculture, a proportion of biodiversity has sometimes become adapted to managed systems (in part because original ecology may have changed so much that it no longer functions without human intervention). In such circumstances, commonly found in parts of Europe for example, farming is now an essential part of any biodiversity strategy. Examples include cork oak forests and nut forests in the Mediterranean forests of Europe and North Africa, and olive groves in the same region[58].

- ✓ **Conventional farming where management is modified to minimise off-farm impacts**: even in cases where farms provide little habitat for wild biodiversity, careful management can support landscape-scale conservation efforts by for example reducing run-off of agrochemicals into water sources and managing to avoid soil erosion and landslip.

Low-impact agriculture is practised for a variety of reasons including necessity (when farmers cannot afford anything else); ethical choices; market incentives such as certification and value-added products; and direct grant support.

Direct funding of conservation on farmland is increasing. In Europe, for instance, the Common Agricultural Policy provides extensive support for various agri-environment schemes, although the effectiveness of such payments in truly protecting biodiversity has been questioned[59].

Measuring sustainable agriculture: while there is little doubt that well-managed agriculture can contribute to ecoregional or landscape scale biodiversity conservation, measuring and mapping these inputs remains difficult; the likely impacts of different approaches will vary radically and need to be distinguished. We return to this in the methodology section below. Many schemes are currently not well mapped if at all (there are generally not even maps available for areas under organic production, where independent inspection is mandatory, let alone for any of the voluntary schemes currently in operation). Some estimates of total areas under organic production are given in the case study, the extent of other schemes or approaches is generally less well known.

Forest management

Although the timber trade only affects a relatively small proportion of the world's forests these include many remaining natural or near-natural forests, which are amongst the richest in the world, giving it a disproportionately destructive role[60].

However, this damage is not inevitable. Depending on the way that it is managed, a productive forest can contain much or most of its original biodiversity. Management varies from selective logging, where removal of economically valuable trees may only take place every few decades, to intensive planting regimes for fibre where land is ploughed, seeded and harvested every five to eight years. Broadly speaking, biodiversity is likely to decline with intensity of management, until it becomes notably low in monoculture plantations of exotic species.

The science of forest management that leaves space for biodiversity has advanced rapidly in the last two decades, particularly in North America[61] and Europe[62]. In many tropical countries "forest reserves" are already designated in law, providing a variable quality of forest cover ranging from strictly protected natural forests to plantations (see case study). Forest management can provide habitat for biodiversity in a number of ways:

- ✓ **Low intensity management of natural forests**: occasional selective felling may only cause disturbance every few decades and while this certainly impacts on tree composition and the overall ecology of the forest, a large proportion of species may be able to survive this as they would any major disturbance. The positive role of managed forests in biodiversity conservation is now widely accepted in temperate and boreal forests[63], but is still questioned by some conservation organisations as it applies to tropical forestry[64].

- ✓ **Nature-friendly management of secondary forests**: research has shown that fairly discrete changes to managed forests can provide disproportionately large advantages in terms of increasing the range of biodiversity supported, including retention of snags and down logs[65], retention of old stands and veteran trees, changes in composition and greater care in harvesting[66].

- ✓ **Management of forests for specific species**: even quite intensively-managed forests can provide living habitat for key species on occasion; examples include plantation forests managed in Costa Rica for a threatened species of parrot and plantations in the UK managed to maintain dormice populations.

- ✓ **Forests set aside from use**: "management" can include a decision to do nothing. A proportion of forests within managed areas are often set aside for environmental services (e.g. avalanche control) or as a resource for the future. Many of these can have high conservation values. These issues are discussed in greater detail below.

At the same time, measuring the area under "sustainable management" has also become the focus of sustained effort and often quite sharp debate. Attempts to measure progress are often based around sets of criteria and indicators of forest quality and range from global-level systems, through a number of regional initiatives to a wide range of site-level approaches, varying from voluntary codes of conduct through to third party certification schemes. Some key milestones are outlined in Table 3 below[67].

Table 3: Examples of attempts to define forest quality

Criteria and indicators	Details
Global level processes measuring forest quality on a country scale	
International Tropical Timber Organisation	Has a variety of C&I for tropical forests, including for biodiversity[68], natural forest management[69], plantations[70], and forest restoration[71].
UN Forest Resources Assessment	Includes aspects of biodiversity, naturalness and non-timber forest products based on an experts' meeting in Finland in 1996[72].
Regional level criteria and indicator processes measuring forest quality on a country scale	
Ministerial Conference for the Protection of Forests in Europe	Launched in 1993 with a General Declaration and four Resolutions[73]. Has drawn up indicators of good forest management at national level[74], revised[75] and used these to report on European forest status[76].
Montreal Process	Launched in 1993 and drew up C&I of sustainable forest management with 10 non-European temperate countries. Produces regular reports[77] including a definition of sustainable forest management[78].
Tarapoto Process	Launched by the Amazon Cooperation Treaty in Peru in 1995[79] .
Dry-Zone Africa Process	Launched in Nairobi in November 1995[80].
Central American Process	Draft criteria and indicators for SFM were developed at Tegucigalpa, Honduras in 1997. C&I are set at regional and national level[81].
North Africa & Middle East	FAO process – draft C&I were produced in 1997.
African Timber Organisation	P&C for sustainable management of African tropical forests have been developed with the International Tropical Timber Organisation[82].

Criteria and indicators	Details
Stand-level attempts to set criteria of forest quality	
Forest Stewardship Council (FSC)	An accreditation body for independent, stand-level assessment of sustainable forest management.
Programme for the Endorsement of Forest Certification (PEFC)	Programme for the Endorsement of Forest Certification, another stand-level scheme
ISO 14000	The International Organisation of Standardization has developed a certification scheme for timber
Soil Association	The organisation launched a Responsible Forestry Programme in 1994, associated with the Woodmark label and accredited to the FSC
Center for International Forestry Research	Toolkits for choosing and testing criteria and indicators for stand-level forest management, along with national C&I for plantations[83].
IUCN	Software to measure forest wellbeing with variable indicators[84]
ProForest	Indicators of High Conservation Value Forest have been developed at stand[85]and landscape level[86].

Measuring sustainable forestry: Information on many of these schemes is publicly available and the areas concerned are large – 68.13 million hectares of forest were certified by the FSC as of January 6th 2006 for example[87]. The conservation benefits from good forest management should, at least in theory, be amongst the easiest sustainable use systems to measure. Unfortunately, there is little agreement about which of the various systems is the most viable and what should "count" as sustainable forest management. Despite the high profile that sustainable management, and particularly certification, has attracted, there have been few systematic attempts to measure impacts on biodiversity. Judgements about systems should be made on a case by case basis, depending on what conservation plans dictate, but it is sometimes difficult to know what is likely to be beneficial. The "certification wars" that have gripped Europe and North America are illustrative, with various NGOs supporting or attacking the approaches promoted by the ISO[88], PEFC[89] and FSC[90] and for instance questions asked about the impacts of FSC certification on issues such as the bushmeat trade[91]. Little of the information about sustainable forest management is available in geo-referenced form, so there is currently little opportunity to map more than point source data.

Marine fisheries

Over-fishing is devastating commercially available fish species around the world[92], with knock-on effects to the rest of the marine environment[93].

Marine protected areas are currently the poor relation of conservation efforts, with less than 0.1 per cent of the ocean under protection and many current MPAs performing poorly. Although MPAs are expected to increase in number and extent over the next few years, most marine conservation plans can and do look beyond official protection to include other zones that are carefully managed and offer benefits to biodiversity.

High Seas Marine Protected Areas are accepted as a necessary element in conservation strategies[94], but have proven extremely difficult to implement from a political perspective and will also be hard to police; for now other systems of management in these areas remain the only option in many coastal regions.

Marine conservation scientists are increasingly looking towards integrated marine and coastal area management approaches to secure marine conservation targets[95]. A variety of management options are available:

- ✓ **No-take zones**: principal amongst marine sustainable management areas are no-take zones, usually areas of coastal or near-shore waters where fishing communities do not fish, voluntarily or through legislation. Such areas provide breeding grounds for fish and can sustain fishing over a wider area – the transition between management in officially recognised marine protected area and less official no-take zones is often quite gradual and they can offer very similar benefits to biodiversity. Abundant evidence suggests that no-take zones play an important economic and social role by sustaining fisheries[96], often with measurable increases in population occurring very quickly. As a result they are often supported by fishing communities[97]; in many cases communities police their own no-take zones against poaching from outsiders. Such zones can either be temporary or permanent and in some cases it makes sense to shift no-take zones around over time, giving different parts of the marine ecosystem time to recover.

- ✓ **Controls to minimise impacts of fisheries**: even where off-take continues, a series of options are available to reduce the impact and sustain marine biodiversity, including setting minimum size of captured species (to allow young to grow and reproduce) sometimes by adjusting mesh size of nets[98]; setting maximum catch size[99]; and eliminating harmful practices such as bottom trawling[100] (particularly in areas with fragile habitats such as sea mounts of cold-water corals[101]). Some control systems are voluntary, others regulated by force of law; where these are in operation in defined areas they could be recognised as components of sustainable use within conservation planning.

- ✓ **Controls on fish farming**: although farming of fish and other marine animals is in theory a way of reducing pressure on wild populations, associated habitat damage (particularly to mangroves in the tropics[102]) and pollution have meant that marine farming is often instead a cause of stress. More sustainable methods are now being developed[103], including draft standards for organic aquaculture from the International Federation of Organic Agriculture Movements, and the presence of such farms could be important in removing stresses from coastal ecosystems.

Measuring sustainable management of marine fisheries: many of the most effective no-take zones are managed by communities as community conserved areas and may not be recognised or even known about by state conservation bodies. Such areas can be managed just as strictly as "official" protected areas recognised by the government and IUCN, and listed on the World Database on Protected Areas, but in the former case they often remain hidden.

For instance, in the Pacific Islands there is a long history of marine protection, known variously as "Rahui" in Aotorea / New Zealand; "Tabu" in Fiji and "Ra'ui" in the Cook Islands, involving traditional customs of placing prohibitions on taking natural resources until they are replenished. Recently chiefs in the Cook Islands reinstated the Ra'ui, establishing five reserves, accounting for around 8 per cent of the total. These have generally been judged more successful than government efforts at conservation[104].

Although some of these traditional or unofficial activities will be known and can be mapped, others will be hard to discover without a close knowledge of particular regions. The Marine Stewardship Council offers a certification system for sustainable marine exploitation, with a set of principles, rules and independent, third party certification. This provides a reasonably high degree of confidence about the state of a particular fishery, but remains very limited in the number of operations that have been certified and therefore is of little use as yet in terms of global or regional mapping.

Freshwater fisheries

Freshwater ecosystems are amongst the least protected biomes (e.g., only 1.54 per cent of lake systems are in protected areas[105]) and also some of the most threatened – by pollution, over-harvesting, water extraction for irrigation and domestic use, modification of river systems, introduction of alien species and alteration to natural water flows[106]. Freshwaters are generally linear, connected hydrologically and are often at the lowest point in the landscape, meaning that they may be affected by any activities occurring within their catchments[107].

Rapid responses to what is rightly perceived as a biodiversity crisis in freshwaters therefore often by necessity takes place outside protected areas, and can include:

- ✓ **Controls on fishing**: to maintain populations, including voluntary or enforced controls on catch size, minimum size of fish taken, return of off-catch, banning more damaging methods (certain nets, explosives etc) and restocking.

- ✓ **Removal of invasive species**: although it is often not technically possible to eliminate persistent invasive plants[108], fish, crustaceans and molluscs, it is often feasible to reduce their impacts through removal and care to avoid further invasion[109].

- ✓ **"Re-wilding" watersheds**: there is increasing attention being paid to removal of dams and levees, and restoration of environmental flows, to address problems of flooding and dam sedimentation and to increase biodiversity[110]. Such changes generally benefit fish populations and human communities reliant on these.

- ✓ **Control of irrigation extractions**: to reduce damage to freshwater systems through water conservation to reduce net usage[111], rehabilitation[112] and where necessary substitution of more drought-resistant crops or changing farming patterns.

- ✓ **Improvement of aquaculture**: guidelines are becoming available for reduction of pollution and habitat destruction as a result of fish farming and organic standards are in preparation[113].

Measuring sustainable freshwater fisheries: all the above are tools in improving sustainable management but few data exist. There are some specific designations outside protected areas that could be mapped; in particular designated Ramsar sites, where governments have made some commitments to sustainable use and biodiversity conservation, but without necessarily designating a full protected area. (This is currently a matter of debate, some conservation organisations regarding Ramsar sites as equivalent to full protected areas while others do not.) In time, if organic certification of aquaculture progresses, this will provide a reasonable way of measuring progress in one particular area. Many other attempts to introduce sustainable fisheries will remain difficult to map.

Ecosystem services

Attitudes to natural habitats are undergoing an enormous change. Until recently the concept of "wilderness" was viewed almost wholly negatively, literally as "wasted land", but over the last century there has been an awakening to the value of natural ecosystems both from a philosophical and practical viewpoint. With respect to the latter, the value of natural land is increasingly recognised with respect to the ecosystem services that it provides, often at far lower cost than any alternative. As a result, areas of land and water are deliberately being set aside from development not for "conservation" as such but to provide other net benefits. Decisions to set land and water aside for the environmental services they provide are being taken at every level, from individual land owners, through local communities to governments and the international community. While many protected areas themselves also provide environmental services, most of the area set aside for benefits to soil, water or as protection against sudden climatic events are not officially protected areas. These places nonetheless often provide important conservation benefits and can be factored into conservation plans.

Key environmental benefits from natural land include:

- ✓ **Provision of clean drinking water**: forest cover in watersheds provides some of the purest water available and many municipal authorities have deliberately protected forests as a way of ensuring pure drinking water supply. Many of these forests have become incorporated into protected areas; a survey published in 2003 found that a third of the world's hundred largest cities receive a significant proportion of their drinking water from protected areas[114]. But many other cities have maintained forests in watersheds outside officially protected areas, using a mixture of careful management[115] and protection. For example, New York City uses a mixture of protection, set aside and sustainable management to maintain its drinking water[116]. Water services are increasingly being recognised as candidates for Payments for Ecosystem Services (PES) schemes[117].

- ✓ **Prevention of flooding**: although forests are sometimes set aside to prevent flooding (or more often logging bans are introduced after severe flooding episodes as in Thailand in 1985 and China in 1999), there is little evidence that forests provide protection against the most severe floods[118]. However, improved management of floodplains is now recognised as a major way of preventing downstream flood damage and increased flood episodes in some regions have been linked to construction of levees and dykes upstream. The recreation of natural environmental flows is proposed as a key step in reducing flood events[119]. Such approaches, which include both restoration of river flow and also protection of remaining flood plains, clearly also have major benefits to freshwater ecology. Natural vegetation is also known to mitigate the effects of some sudden flooding events, and for instance coastal areas with remaining mangrove woodlands are known to have suffered proportionately less damage in the 2004 tsunami[120].

- ✓ **Hurricanes**: natural vegetation can also mitigate the impacts of hurricanes and associated events, including tidal waves. For example, the loss of coastal marshes is believed to have increased the impacts of Hurricane Katrina on New Orleans during 2005. (With uncanny prescience, the *National Geographic Magazine* published an article predicting the catastrophic impacts of a hurricane shortly before the event and linked this with environmental degradation[121].) These benefits are increasingly being recognised and their costs calculated. For example the Sundarbans mangroves in the Ganges Delta help to protect the coast of Bangladesh and the United Nations Development Programme estimates that without them an additional 2,200 kilometres of embankments would be needed, costing US$294 million (1995 prices) with an annual maintenance bill of US$6 million[122].

- ✓ **Landslides and avalanches**: natural vegetation is often the cheapest and most effective way of reducing the impacts of avalanches or landslides, providing a direct barrier to protect communities or commercially valuable land down-slope. These very visible environmental services were reasons for some of the earliest reforestation programmes in the world, hundreds of years ago in Japan. In Switzerland, 8 per cent of the forest is managed primarily for avalanche protection, with an estimated annual value of 3-4 billion Swiss francs in the late 1990s[123]. In Europe as a whole, 124 million ha or 11.5 per cent of forest and other wooded land is designated to protect soil, water, ecosystem functions and infrastructure and managed natural resources[124]. While some of these areas are managed, albeit with controls, others are left entirely alone.

- ✓ **Drought**: natural vegetation, particularly but not exclusively forests and woodlands, provide emergency resources in times of drought, because natural vegetation in arid areas is often able to withstand dry conditions better than imported crops or exotic trees: in Djibouti for example the Foret du Day has long been a natural buffer against starvation during droughts[125].

- ✓ **Desertification**: natural vegetation can act as a buffer against desertification, although links between drought, desertification, long-term climate changes and human intervention are complex. In Ghana for instance the government is working with local communities to restore sacred groves and plant trees as buffers against spreading deserts[126]. In the Taklimakan Desert in Xinjiang Uygur Autonomous Region of west China, natural vegetation cover has been increased to 50-60 per cent in an effort to reduce desertification[127].

Other environmental services that benefit from natural vegetation include mitigation of sea-level rise, biodiversity prospecting and carbon sequestration to reduce the impacts of climate change. All offer potential benefits to biodiversity conservation, although these are frequently not clear-cut. Almost all the approaches summarised above can and do result in the protection of natural habitats outside protected areas, but at the same time they sometimes also involve sustainable management, restoration or the maintenance of quite altered, cultural landscapes. In every case, judgements will have to be made about the value of individual projects.

Measuring ecosystem services: data availability may also prove to be a challenge. In some cases – forests managed for avalanche control or set aside to protect drinking water sources – detailed information often exists, although it may not be collected nationally or regionally. In other cases, such as projects to provide drought relief or mitigate desertification, data may be far scarcer.

Hunting

Badly-managed hunting creates major threats to biodiversity. Uncontrolled killing – such as is currently happening in many countries as a result of the bushmeat trade[128] – creates an obvious problem, but over-stocking of valued species can also be damaging both because of impacts on vegetation and through persecution of their natural predators, for instance in the case of red deer (*Cervus elaphus*) in Scotland[129].

On the other hand, controlled hunting can maintain wild populations of game animals and, through conserving their natural habitat, also protect associated plants and animals. In some countries private hunting reserves are sometimes more effective than state protected areas, because the former have funds to run more effective anti-poaching operations.

For example, in Nepal Dhorpatan Hunting Reserve covers 1325 km^2 and attracts hunters particularly because of the blue sheep (*Pseudois nayaur*), a prized trophy, which can be shot under licence[130]. Hunting is a major activity on some private game ranches in Argentinean Patagonia, where a mixture of native and introduced species is targeted. In Tanzania during 2002, companies were licensed to undertake professional hunting activities in 131 hunting blocks, earning a total of $ 9.3 million (for instance there are private hunting reserves around the Serengeti National park in Tanzania)[131]. The CAMPFIRE project in Zimbabwe has been developed in association with local communities and offers a rather different approach to game reserves, is a particularly well-known example of a different approach to managing natural resources[132].

From the perspective of conservation planning, such areas provide both opportunities and challenges. Many conservation supporters remain deeply opposed to hunting and there are also social and ethical questions about setting aside large areas of land in private, often expatriate, ownership for the ultra-rich. In April 2005, for example, private game reserves bordering Kruger National Park in South Africa successfully appealed against the Limpopo local government to get further hunting licenses. Some game reserves are well regulated and maintain populations of target species, others tend to over-hunt because of the high profits that can be gained. When private game reserves border protected areas then depletion of species in the hunting area can tempt animals to migrate and be shot in turn, leading to losses from protected areas. The long term impacts of these interactions are still poorly understood. The introduction of species for hunting, or the maintenance of species introduced in the past, can also have impacts on native species: for example this has been the case in New Zealand where some people see introduced mammals as a pest while others regard them as a recreational resource[133]. But it is also undoubtedly the case that some of these lands often offer real benefits in terms of biodiversity protection and sometimes provide valuable buffers to protected areas.

Measuring hunting reserves: at the moment they are with a few exceptions often not included in planning and it was surprisingly difficult to find information about their location in the preparation of this report. The opportunities for reflecting such areas in conservation planning exist but in many cases further information is still required along with some principles and minimal standards.

Wildlife protection

More complex still are areas set aside specifically to protect wildlife outside official protected area networks. The motivation for setting up such areas may be purely as a result of personal interest or a concern for wildlife, or may be commercial, through the use of the reserve as a resource for ecotourism. Private protected areas can in theory be listed on the World Database on Protected Areas, both of which are specific in recognising areas outside state control, but in practice such listings remain rare. Other areas set aside for wildlife protection may not truly be protected areas, but can still offer benefits for biodiversity conservation. A gradation of sites can be identified, as outlined in Table 4 below[134]:

Table 4: Typology of private reserves

Private game ranches	***Suggested definition***: Ranches that maintain a viable population of free-ranging, native wild species in extensive natural conditions, and use these as the basis of for-profit activities ***Incentives***: Mainly economic including consumptive (e.g., hunting and meat), and non-consumptive, (e.g. wildlife-viewing tourism) ***Management***: Run by individual owners or private companies ***Details***: In Southern Africa ranching is often based on antelope species (these account for 90 per cent of all hunted animals), but many ranches offer wildlife viewing of other charismatic species such as rhino, giraffe and zebra. The areas are usually fenced to ensure stocked animals remain within the farm.
Private Conservancies	***Suggested definition***: Groups of commercial farms, livestock farms, mixed wildlife-cattle ranches or game ranches, where neighbouring landowners (either individual or communal landowners) pool natural and financial resources for the purpose of conserving and sustainably utilising wildlife ***Incentives***: Conservation and economic (consumptive and non-consumptive tourism) ***Management***: Conservancies have their own constitutions containing a set of legally binding wildlife management and conservation objectives. ***Details***: Traditionally, the main difference between private reserves and conservancies in southern Africa is that private reserves have completely abandoned conventional agricultural practices, while conventional farming remains an important source of revenue for members of a conservancy. However, in recent years conservancy members are increasingly abandoning livestock rearing

Private Nature Reserves	***Suggested definition***: Areas managed by private individuals, trusts or companies with the primary objective of conserving wildlife and natural habitat ***Incentives***: Conservation and/or economic (non-consumptive tourism) ***Management***: Management objectives vary from strict protection (no consumptive use) to the sustainable use of wildlife, the main focus is typically on wildlife-viewing tourism. ***Details***: Usually, these reserves no longer have any livestock on their land and may have removed fences to ensure that wildlife is free ranging

Private game ranches in most cases probably do not meet the criteria of a protected area, private conservancies will do so some of the time and private nature reserves will do so frequently. But all can play an important role in conservation planning. In Namibia for example private reserves form a buffer around some of the larger protected areas, private game / cattle ranches maintain semi-natural habitat over large areas elsewhere and community-managed conservancies provide valuable wildlife habitat.

Measuring private protection: while there is certainly no single source of data, many countries have information. The situation is currently fluid, because it is likely that more of these areas will eventually be incorporated into the WDPA. There are moves to develop certification schemes for private protected areas, for instance in South Africa[135].

<u>Cultural protection</u>

Early analyses of threats to wildlife often identified local communities as the main causes of loss. While this is indeed sometimes the case, in many other situations local communities, including indigenous peoples, have management systems in place that provide effective protection for wild species, in ways that may be unrecognised by central governments and protected area agencies. They are sometimes threatened by external changes or cultural changes within communities, but in other cases remain surprisingly resilient.

The value of such **Community Conserved Areas** is increasingly being recognised and they are being incorporated into conservation plans and where necessary supported. A broad typology of sites has been identified[136]:

- ✓ Self initiated by communities, when facing resource shortages, or external threats
- ✓ Initiated with the help of NGOs or development agencies to respond to resource shortages
- ✓ Initiated by state-sponsored programmes or by individual government officers

They can take a number of forms; depending on the primary motivation for management (these can sometimes be combined in a single site):

- ✓ **Community-based natural resource management**: CBNRM, effectively the sustainable off-take of resources – fruit, game, livestock fodder, building materials, fuelwood, medicinal herbs etc – from otherwise natural systems.

- ✓ **Sacred natural sites**: areas that are set aside because they are of high importance to a particular faith. It has been estimated that there are as many sacred natural sites as there are protected areas, although the former are usually smaller. Sacred sites are sometimes very strictly protected, to the extent that no-one is allowed to enter, and on other occasions used for CBNRM activities; they are often more effectively conserved than protected areas[137].

- ✓ **Other culturally important sites**: communities also choose to protect sites for other reasons – aesthetic, because of historical or family associations etc.

Community conserved areas have been defined as: *natural and modified ecosystems, including significant biodiversity, ecological services and cultural values, voluntarily conserved by indigenous peoples and local and mobile communities through customary laws or other effective means.* Co-managed areas are*: areas where decision making power, responsibility and account ability are shared between governmental agencies and other stakeholders, in particular the indigenous peoples and local and mobile communities that depend on that area culturally and/or for their livelihoods*[138]*.* Some community-conserved areas (CCAs) may be protected areas (in fact many state-owned protected areas overlap with areas traditionally managed by communities), whilst others have management regimes with proven benefits for biodiversity[139].

Currently very few CCAs are designated as protected areas, because national laws and policies only recognise state-run protected areas. In some cases, for example, protected areas legislation does not permit private or communal property to exist within nationally defined protected areas[140]. Many CCAs are based entirely on customary rules and agreements, with no intervention by government agencies, no relation to official policies and no incorporation in formal legislation. Furthermore, these areas are often subject to a degree of confidentiality over the exact location, boundaries and resources that they contain. It is therefore not surprising that their contribution to a country's conservation initiatives often goes unnoticed and unsupported; and that it has proved difficult to assess or map their contribution to global biodiversity conservation.

Some information is nonetheless becoming available. Policy recognising traditional and indigenous rights has resulted in a significant increase in the area of community-owned and administered forests. Globally, it has been estimated that 420 million hectares forest are owned/ administered by communities (see Table 5). In the 18 developing countries with the largest forest cover, over 22 per cent of forests are owned by or reserved for communities, i.e. three times the amount owned by individuals and companies. In some of these countries (e.g. Mexico and Papua New Guinea) the community forests cover 80 per cent of the total[141]. If the current trends in forest tenure continue, some 50 per cent of the developing country forests will be community-owned or -administered by 2015[142]. Furthermore, 14 million ha of land in is dedicated to wildlife protection or wildlife management in Southern Africa much of it is on communal land (see box on Namibia below)[143].

Table 5: Estimates of area of community-conserved forest landscapes[144]

Management types and estimated area	Examples: Estimated areas and management type
120 million ha Large areas of natural habitat with indigenous and traditional stewards that achieve similar conservation as the public protected areas	✓ Part of the 103 million ha of indigenous reserves or territorial lands in the Brazilian, Peruvian and Bolivian Amazon[145] ✓ 1 million ha in the southern cone of Latin America[146] ✓ 5 million ha of forested areas of British Columbia, Ontario, Saskatchewan and Quebec provinces in Canada, where Indigenous Peoples continue to have important use rights over extensive territories[147] ✓ 8 million ha of community-managed forest lands within the U.S. Inter-Tribal Timber Council member territories[148] ✓ 3 million hectares of community or village forests devolved to traditional populations in 5,000 African communities[149]
100 million ha Working landscape mosaics managed by communities and compatible with or favourable to biodiversity conservation	✓ 7 million ha of agroforests in Africa[150] ✓ 7 million ha managed as commercially viable Community Forestry Enterprises in southern Mexico of the nation's 40 million ha of forest under ejido and community ownership[151] ✓ 3 million ha of indigenous eco-management in Central America[152] ✓ 1.7 million ha traditional coffee cultivators in Latin America, many of whom are found in the humid cloud forest ecosystems[153] ✓ 1.1 million ha of forest have been handed over to nearly 14,000 Forest User Groups in Nepal[154] ✓ 20 million ha of complex agroforestry livelihood systems in South and Southeast Asia, including traditional and tribal peoples with successional forests[155] ✓ 5 million ha community forestry initiatives in Sub-Saharan Africa[156]
100 million ha Natural forests on the agricultural frontier with community-driven conservation initiatives	✓ Extractive reserves in Brazil, which are now expanding as new groups of producers seek to form community concessions in the Amazon[157] ✓ Buffer zones around protected areas (total area is unknown, but there are many examples of community managed buffer zones, such as the 0.4 million ha of forest concessions of communities in the Maya Biosphere Reserve, Guatemala[158]) ✓ Transmigration areas of the Indonesian and Malaysian archipelago where agricultural systems incorporate agroforestry and successional forests[159] ✓ Upland migrants who have maintained forested landscapes in some regions of the Philippines[160]
100 million ha Intensively-managed landscapes being actively restored by communities to conserve values	✓ A portion of the 150 million ha of community plantations and forests in agricultural villages in China[161] ✓ 10 million ha of agroforestry in South Asia with successional forests or restored forest landscapes where settled agricultural communities have reforested areas adjacent to their communities and protected them from grazing[162] ✓ Bushcare programs in Australia establishing biodiversity reserves in farmlands set aside for watershed rehabilitation[163]

Measuring cultural protection: the exact contribution these areas play in biodiversity conservation needs more investigation; however there is a slowly developing body of research which is indicating the importance of these areas. For example, there is evidence of marked improvement in conservation of forests (both increased area and improved density) and enhanced soil and water management, in the 1.1 million ha of forest which has been handed over to the Forest User Groups in Nepal since 1980[164]. In South America, CCAs are the backbone of national conservation systems, with an estimated 84 per cent of lands now lying within the National Parks of the Spanish-speaking countries of the region within indigenous and community lands[165] (in many areas communities are regaining legal land and management rights to these areas).

Case Study: Conservancies in Namibia
The main objective guiding the current legislation governing wildlife use on freehold and communal land in Namibia is based on the premise that if land holders have sufficient decision-making authority over wildlife and are able to gain a benefit from its use, then they are likely to use wildlife sustainably and wildlife will be conserved outside of protected areas. The manifestation of this objective is the rapidly growing number of conservancies – institutional mechanisms which enable group management of natural resources in a sustainable manner to provide a range of benefits for conservancy members[166].

There are currently two broad approaches to conservancy development based on the dual land tenure system in Namibia. On freehold land individual farm owners with conditional rights over the use of wildlife voluntarily form conservancies through agreeing to collaborate in the management of wildlife and other natural resources. There are currently 25 freehold conservancies, covering about 4.7 million ha and supporting some 30,000 people. On communal land residents acquire conditional rights over wildlife use and commercial tourism through the formation of a conservancy and its registration by government. There are 42 registered communal conservancies covering almost 10,500,000ha and supporting more than 120,000 people (the population of Namibia is only 1.8 million).

This policy approach to the management of freehold and communal land has clearly been successful with major increases in wildlife on freehold land since the early 1970s[167]; between 1972 and 1992 wildlife numbers increased by about 70 per cent. Increases have also been observed in communal conservancies. In Kunene region aerial surveys show that elephant numbers have more than doubled since the early 1980s, while springbok, oryx and mountain zebra have increased over 10 times. Extensive road counts indicate that numbers of springbok, oryx and mountain zebra more than tripled between 2000 and 2004. Independent estimates suggest that black rhino have more than doubled over the past 30 years. Poaching of black rhino has become rare on the communal land of Kunene Region, much of which is now covered by conservancies. Most communal area conservancies employ their own game guards, and use a common system for monitoring wildlife and problem animal incidents[168]

Recreation and tourism
Tourism is now the single largest industry in the world and is itself a major cause of environmental degradation, particularly through habitat destruction, fossil fuel use and impacts on local communities. However, well-managed tourism is also a stimulus for conservation, because a growing proportion of tourists want to travel to natural or near-natural landscapes and experience wildlife.

Protected areas are themselves often major tourist attractions, for example IUCN category II protected areas are identified particularly for ecosystem protection and recreation (the classic "national park" as it is interpreted in North America, Australia and the tropics). However, some countries set aside additional areas for tourism, or at least partly for tourism, where controls are not as strict as in a fully protected area but where there will nonetheless be benefits for biodiversity.

These can include:

- ✓ **Areas of coast designated for tourism**: but where care is taken to ensure that sensitive species remain undisturbed. For example nesting turtles and protected along the coast near Dalyan in southern Turkey, despite the area being an important tourist destination.

- ✓ **Hiking areas**: areas set aside specifically for recreation (walking, picnics, camping), often with commercial management (farming, forestry) taking place alongside but with some controls to maintain landscape and biodiversity. For example Finland has eight hiking areas designated, outside the protected areas system but with acknowledged biodiversity values.

- ✓ **Outdoor pursuit areas**: natural land set aside for sports of various kinds including mountain biking, paint-balling, and orienteering. Such areas are often privately owned, and are not managed for biodiversity, but because they rely on the presence of natural or neat natural habitat they will incidentally protect a proportion of biodiversity. For example, Coed y Brennin forest in Snowdonia, Wales is a major international centre for mountain biking and this is now influencing the management of the surrounding forest to emphasise natural species and processes.

Measuring recreational areas: although some areas will be mapped and described, details of others (for example sensitively-managed coasts) will not. There have been major moves to develop certification of environmentally and socially responsible tourism operations[169], including marine tourism[170], and some certification companies already in operation, such as Green Globe. Although ecotourism remains a minor part of the tourist industry, its presence in many of the most sensitive habitats means that increasing knowledge about the impacts is disproportionately important.

Conclusions

There are clearly a huge range of practical sustainable use strategies, most of which are already an integral part of the conservation activities of both governments and non-governmental organisations. Our ability to map these at the present time is limited and patchy: we return to this issue in future chapters. A surprising number of these also have still not been systematically assessed for their benefits to biodiversity, which are mainly inferred. (This is also true for more traditional conservation tools including protected areas.) The blanks in our understanding need to be filled in over the next few years, even while we are employing these strategies within conservation.

3. Classifying Sustainable Use Areas

Including managed landscapes and seascapes within ecoregional conservation programmes, and measuring the results, both require that we have a fairly clear understanding of what "sustainable use" means in this context. This section starts by summarising existing definitions of protected areas and goes on to build a comparable definition and classification system for sustainable use.

Defining protected areas

Much effort has been put into defining the limitations of what can and cannot be called a protected area and there are currently two significant definitions

IUCN defines a "protected area" as: *An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means*[171].

The Convention on Biological Diversity has a slightly different definition, which focuses more narrowly on the biodiversity component of protected areas:

The **CBD** defines a "protected area" as: *"A geographically defined area which is designated or regulated and managed to achieve specific conservation objectives."*

The CBD also recognises the six IUCN management categories, which divide protected areas according to their management objectives, as outlined below:

- ✓ **Category Ia:** ***protected area managed mainly for science or wilderness protection*** – an area of land and/or sea possessing some outstanding or representative ecosystems, geological or physiological features and/or species, available primarily for scientific research and/or environmental monitoring.

- ✓ **Category Ib**: ***protected area managed mainly for wilderness protection*** – large area of unmodified or slightly modified land and/or sea, retaining its natural characteristics and influence, without permanent or significant habitation, which is protected and managed to preserve its natural condition.

- ✓ **Category II**: ***protected area managed mainly for ecosystem protection and recreation*** – natural area of land and/or sea designated to (a) protect the ecological integrity of one or more ecosystems for present and future generations, (b) exclude exploitation or occupation inimical to the purposes of designation of the area and (c) provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible.

- ✓ **Category III**: ***protected area managed mainly for conservation of specific natural features*** – area containing specific natural or natural/cultural feature(s) of outstanding or unique value because of their inherent rarity, representativeness or aesthetic qualities or cultural significance.

- ✓ **Category IV**: ***protected area managed mainly for conservation through management intervention*** – area of land and/or sea subject to active intervention for management purposes so as to ensure the maintenance of habitats to meet the requirements of specific species.

- ✓ **Category V**: ***protected area managed mainly for landscape/seascape conservation or recreation*** – area of land, with coast or sea as appropriate, where the interaction of people and nature over time has produced an area of distinct character with significant aesthetic, ecological and/or cultural value, and often with high biological diversity. Safeguarding the integrity of this traditional interaction is vital to the protection, maintenance and evolution of such an area.

- ✓ **Category VI**: **protected area managed mainly for sustainable use of natural resources** – area containing predominantly unmodified natural systems, managed to ensure long-term protection and maintenance of biological diversity, while also providing a sustainable flow of natural products and services to meet community needs

At the moment it is being tacitly assumed that the IUCN and CBD definitions are to all intents the same, but this is not really true; IUCN puts much higher emphasis on associated social and cultural values. Under some interpretations of the IUCN definition, these can sometimes be the primary reason for protection (particularly in category V, see following paragraph), which implies that not all IUCN protected areas would meet the definition of the CBD. To make matters more complicated, some institutions, particularly conservation NGOs, have tended to downplay or sometimes ignore Category V and VI protected areas in their conservation planning.

In recent years, the concept of "protected area" has been broadened and extended to reflect the wider uses – and to some extent the priorities imposed from outside – that are driving protected area management. Officially recognised protected areas now include "extractive reserves" (category VI), where a proportion of the protected area is used for sustainable forms of production, and landscape protected areas (category V) where biodiversity is embedded as one element in a working, usually traditional, landscape. Protected areas such as rubber tappers' reserves in the Amazon (Category VI) and some national parks in Europe (Category V) are very different from the traditional concept of a strictly protected reserve. In theory, each category has clear guidelines that separate the land from other more conventionally managed areas[172], the key point being that the area must be managed so that the long-term protection and maintenance of its biodiversity is assured. A clear distinction still exists between protected areas and other land and WCPA has stated this in a number of ways, for instance with respect to forestry:

WCPA believes that large-scale commercial activities such as clearcutting, plantation establishment and other forms of industrial management, unrestrained tourism and other major infrastructure projects are not compatible with any protected area designation[173]*.*

Nonetheless, the boundaries of "protected" and "non-protected" areas are sometimes in danger of becoming blurred. As the areas listed in the *United Nations List of Protected Areas* are categorised by governments, the criteria for qualification inevitably vary between states (even though they are guided by the IUCN management categories). There is consequently continuing disagreement about exactly when an area can be classified as a "protected area". To some extent, this confusion may be due to the fact that governments, feeling under pressure to create more protected areas, are "squeezing" as much land into protected area categories as possible. Whether this is the best approach to a truly sustainable ecosystem management policy is open to question. Many uses may be legitimate, but not be compatible with protected areas. In the United States, for instance, all National Forests are currently listed as Category VI whilst in Canada they are not.

"Forest protected areas"* and *"protected forest areas"

Typifying the debates about definitions is disagreement about the term for describing protected areas within forests. WCPA prefers "forest protected area" over "protected forest area" because the former places the emphasis on the "protected area" while the latter could also refer to some of the broader land-use categories referred to below. Some stakeholders disagree and for instance the Ministerial Conference on the Protection of Forests in Europe explicitly developed a classification system that includes both protected and protective forests (see page 60).

Some of the following discussion about sustainable use might, in some circumstances, also apply directly to officially "protected areas" to judge if they are really fulfilling biodiversity aims.

Defining sustainable use areas

Broadscale conservation management strategies rely on land and water outside protected areas to conserve a proportion of biodiversity and to serve as buffers around and corridors between more strictly protected areas. But "sustainable use" is an extremely vague term that can be interpreted in different ways. If "sustainable use" is to serve as a practical conservation designation that can be factored into plans and programmes, a more precise definition is needed. A draft definition for use in the context of conservation planning is suggested below:

Sustainable use areas: *An area of land and/or sea outside a protected area, which is managed to have substantial long-term benefits to biodiversity, through specific planning processes that also address human well-being.*

The definition contains a number of important elements:

- ✓ …"**managed**"… implies that the land or water is actively subject to management decisions, even if the decision is for non-intervention. The definition does not apply to areas that are untouched simply because they have not been reached by the "development frontier" as these have no guaranteed security.

- ✓ …"**substantial, long term**"…implies that the benefits are significant enough to warrant inclusion in conservation plans and will be maintained long enough to contribute effectively to conservation strategies. Unlike protected areas, which at least in principle are permanently protected, sustainable use areas can be more ephemeral as many are predicated on a range of schemes, policies and subsidies which can be altered or dropped at very little notice, this definition however eliminates the very short term, such as single year payments for set aside of farmland or other ephemeral schemes.

- ✓ …"**benefits to biodiversity**"… in this context benefits are assumed to be to naturally occurring biodiversity and species that require care to survive (i.e. not just supporting a few primary colonisers or universally common species)

- ✓ …"**specific planning processes**"… means that benefits are not simply accidental (and therefore not secure) but are recognised and planned for

- ✓ … "**human wellbeing**"… is emphasised because these *are* use areas and need in addition to address human needs. We propose that sustainable use should also have some social function and contribute to the general good; human wellbeing is defined by IUCN as: *a condition in which all members of society can determine and meet their needs, from a range of choices*[174]

Different schemes will offer very different levels of benefit to broadscale biodiversity conservation strategies. Some will be equivalent to protected areas: indeed management choices such as total protection to maintain watershed values can sometimes provide better benefits for biodiversity than many protected areas. Others will have much more marginal value, including for instance farming systems that encourage a proportion of biodiversity. Some schemes may focus on particular species or groups, such as shade grown coffee as a way of providing corridors for passerine birds. In a later section we provide some guidance for judging between schemes including a simple scoring system.

One methodological challenge that will appear in some cases will be in distinguishing between sustainable use areas and those falling within Category V and VI. This is beyond the scope of the current report; we note in passing that some areas currently defined as "protected areas" in the UN List of Protected areas, including in the United States, might be better classified as "sustainable use" areas.

There is also a practical question of minimum areas to be included within "sustainable use". In general, the impacts of very small areas (of a few hectares) are likely to be negligible and we would advise against including these in planning or measurement. However there will be exceptions, such as places where management has been modified to protect particular species or ecological processes.

Matrix of sustainable use areas

A simple matrix has been developed in order to identify and summarise information on different sustainable use systems, and this is described below. Some way of summarising information is needed as there are already literally thousands of different biodiversity-compatible management strategies covering millions of ha of land worldwide. In 2002, a review by the International Institute for Environment and Development (IIED) identified over 280 cases of actual and proposed payment schemes for services of carbon sequestration, biodiversity conservation, watershed protection, landscape beauty and for combinations of these services[175]. There are over 350 organic certification bodies in 57 countries and globally over 24 million hectares of land managed organically[176]; the precise details of certification vary particularly with respect to biodiversity management. Environmental certification has also increased rapidly with the recreation/tourism sector. By 2000, there were some 250 voluntary initiatives including tourism codes of conduct, labels, awards, "benchmarking" and "best practices". About 100 of these are eco-labelling and certification programmes offering logos, seals of approval, or awards designed to signify socially and/or environmentally superior tourism practices[177]. In the US alone, according to a survey by the Defenders of Wildlife, there are 33 federal conservation incentive programmes and well over 400 state-specific programmes[178].

Sustainable management systems have also proliferated in forestry. There are over 20 different forest certification schemes, with widely different standards and values. Within some of the "umbrella schemes" such as the Forest Stewardship Council, there are many different national standards or standards of particular certifying bodies[179]. In addition, there are many other codes of practice or voluntary management controls, including controls on bushmeat hunting in concessions, which can have a major impact on animal conservation in the tropics. Many countries have "forest reserves"; some of these are virtually the equivalent of protected areas (and in some African countries are being incorporated into the protected areas system[180]) while others are strictly aimed at commercial forest management sometimes with exotic species. In the temperate countries no-cut areas for avalanche control can create important biological corridors and similar set asides for erosion control are found in many tropical countries. Forests play an important role in maintaining the purity of water used in many domestic water supplies[181].

In the marine realm, there are a bewildering array of different management regimes, many aimed at addressing local or global population declines in commercial fishes but also aimed at coral reef protection and maintenance of other valuable species. These vary from fishing access agreements[182], no-take zones and formal certification schemes such as those developed by the Marine Stewardship Council.

On land there are also a range of management systems that have incidental but important benefits for wildlife. Hunting reserves are paradoxically more effective at maintaining game animals than protected areas in some countries, because there are funds to run effective anti-poaching operations.

As mentioned above, sustainable use of the components of biological diversity is one of the three objectives of the Convention on Biological Diversity. National reporting (as specified in Article 26 of the Convention), also provides an indication of the interest and commitment to implementing biodiversity-compatible management strategies. In 2001, Parties were requested to submit their second national reports: a total of 105 reports were received from the 188 signatory parties. These reports have all been digitised and are available on-line[183]. Appendix A provides details of the responses to some of the questions related directly to sustainable use. In particular, of the 105 responses, 14 per cent stated that programmes were in place, and 28 per cent stated programmes were being developed, to identify and ensure the adoption of economically and socially sound measures that act as incentives for the conservation and sustainable use of components of biological diversity.

158. Are programmes in place to identify and ensure the adoption of economically and socially sound measures that act as incentives for the conservation and sustainable use of components of biological diversity?	a) no	9% (18)
	b) early stages of development	24% (45.67)
	c) advanced stages of development	4% (8.5)
	d) programmes in place	14% (26.67)
	e) review of implementation available	2% (4.17)
	No answer	1% (2)
	No report	44% (83)

Ways of defining different types of sustainable use
Given the large number of biodiversity-compatible management strategies in existence, and the even larger number that are likely to be developed in the near future, the development of a simple hierarchy to describe the various management measures will help in the development of methodologies for measuring conservation status. The first hierarchy suggested below categorises sustainable use with respect to various **management types**:

- ✓ Agriculture
- ✓ Forestry
- ✓ Fishing (marine)
- ✓ Fishing (freshwater)
- ✓ Ecosystem services
- ✓ Wildlife
- ✓ Culture
- ✓ Hunting
- ✓ Recreation

To relate these specifically to the work on TNC, in the following matrix these strategies are also organised by biome:
- ✓ Forest
- ✓ Freshwater
- ✓ Arid lands
- ✓ Grasslands
- ✓ Marine

(There is inevitably some overlap and repetition through using these categories; for instance farming systems can appear in several biomes.)

A second way of categorising sustainable use may also be useful in terms of identifying the political and economic drivers that encourage people to adopt them – i.e. the form of **incentive** they offer. These range from legally enforced schemes through various forms of incentives to completely voluntary agreements. Four categories are proposed for sustainable use areas defined by the type of incentive:

- ✓ **Legally-established statutory framework**: i.e. legal forms of management outside protected areas

- ✓ **Third party certification**: when an independent body, of both supplier and customer organizations, gives written assurance that a product, service, process or system conforms to specific requirements. These independent bodies can also be accredited, a procedure by which an authoritative body gives formal recognition that a party is competent to evaluate the competence of certification bodies[184].

- ✓ **Second party certification/assessment**: when conformity to specific requirements is carried out by a customer of the supplier organisation[185].

- ✓ **Voluntary agreements**: a self-assessment of a supplier's declaration of conformity[186].

These distinctions have also been incorporated into the matrix. Along with a classification scheme that defines different sustainable use approaches in terms of management types, biome and incentive as suggested above, the matrix set out in Table 6 also includes various **examples** of biodiversity-compatible management strategies already in existence.

Thus, for example: Forest management is a *management type*; Third Party verification is an *incentive* for adopting this form of management; FSC certification is an example of the *biodiversity-compatible management strategy*; the relevant *biome* is in this case forest; and Woodmark is an *example* of all these elements.

Similarly, provision of ecosystem services is a *management type*; one *incentive* of which can be legally established systems; watershed management is a *biodiversity-compatible management strategy*; the relevant *biome* is forest; and the catchment management measures undertaken by Melbourne Water in Australia provide an *example* of this type of strategy.

Table 6: Matrix of sustainable use management measures

Incentive	Sustainable use strategy (selection)	Biome	Examples
1. Management Type: Agriculture			
✓ Legally-established system	Agrochemical control	Freshwater/Grasslands	EU nitrogen control zones
✓ Third party certification	Organic certification	Grasslands (forest)	Soil Association
✓ Second party certification	Self assessment schemes	Grasslands	Ben and Jerry's
✓ Voluntary agreements	Agreements	Grasslands/Freshwater	NZ *Dairying and Clean Streams*
2. Management Type: Forest management			
✓ Legally-established system	Forest reserves	Forest	Uganda forest reserves
✓ Third party certification	Forest Stewardship Council	Forest	Woodmark, SCS
✓ Second party certification	ISO-14000 forest standards	Forest	Tree farm
✓ Voluntary agreements	Codes of practice	Forest	British Columbia code of practice
3. Management Type: Marine fishing			
✓ Legally-established system	Government no-take zones	Marine	Some Pacific islands
✓ Third party certification	Marine Stewardship Council	Marine	W Australia rock lobster fisheries
✓ Second party certification	ISO certification for fisheries	Marine	(currently being discussed)
✓ Voluntary agreements	Community no-take, codes	Marine	FAO *Code for Fisheries*
4. Management Type: Freshwater fishing			
✓ Legally-established system	Fish management areas	Freshwater	Florida
✓ Third party certification	Organic aquaculture certification	Freshwater	
✓ Second party certification	ISO certification for fisheries	Freshwater	(currently being discussed)
✓ Voluntary agreements	Voluntary landowner agreement	Freshwater	Freshwater reserve in Quebec
5. Management Type: Ecosystem services			
✓ Legally-established system	Avalanche control	Forest	Switzerland
✓ Third party certification	Forest managed for water quality	Forest/Freshwater	FSC outside Stockholm
✓ Second party certification	ISO 1400 certification	Forest/Freshwater/Marine	Santa Clara
✓ Voluntary agreements	Retention of mangroves for fish	Forest/Freshwater/Marine	Madagascar

Incentive	Sustainable use strategy (selection)	Biome	Examples
6. Management Type: Hunting			
✓ Legally-established system	Hunting reserves	Forest	Swiss Jura
✓ Second party certification	Bushmeat controls	Forest/Grasslands/Arid lands	proposed by Bushmeat Crisis TF
✓ Voluntary agreements	For-profit hunting reserves	Grasslands/Arid lands	Southern Africa
7. Management Type: Wildlife protection outside protected areas			
✓ Legally-established system	Protection of endangered species	Forest/Grasslands	European lynx
✓ Voluntary agreements	Private protected areas	Grasslands	South Africa, Brazil
8. Management Type: Cultural protection			
✓ Legally-established system	Cultural site with biodiversity	All biomes	Angkor Wat in Cambodia
✓ Voluntary agreements	Sacred sites	All biomes	Tembawang in Borneo
9. Management Type: Recreation / tourism			
✓ Legally-established system	Recreational park with wildlife	All biomes	Dyrehaven park, Copenhagen
✓ Third party certification	Certification of eco-lodges	All biomes	Green globe tourism certification
✓ Second party certification	ISO certificates for eco-lodges	All biomes	
✓ Voluntary agreements	Protection of breeding sites	Freshwater, marine, grasslands	Nesting shore birds in Wales

4. Assessing Conservation Value of Sustainable Use Areas

The Nature Conservancy has identified three basic measures of ecoregional status: biodiversity status, threat status and conservation status (i.e. legal protection status and management status). If sustainable use areas are to play a major role in ecoregional conservation strategies, these measures will have to be applied to them as well.

This will not necessarily be easy. Measuring conservation success in protected areas, which are on the whole dedicated to biodiversity conservation, has proved surprisingly difficult. Measuring success in sustainable use areas, where biodiversity values have to compete with many other demands, is likely to be substantially more difficult. But it is perhaps even more important. As mentioned above, "sustainable use" areas will not all provide equal benefits to biodiversity. Some can be equivalent to the best protected areas but most will offer far more marginal advantages and they cannot be classified as a single entity, but instead need to be graded so that they can be properly integrated into conservation plans.

Bearing these challenges in mind, in this section we suggest a methodology for the basic assessment of the conservation value of different sustainable use areas. Specifically we suggest:

- ✓ A matrix of five **measures** (with four **ranks**) of conservation value to measure "degree of confidence" in relation to the extent to which sustainable use areas will really conserve biodiversity
- ✓ Protocols to help guide those using the methodology

The methodology could be used in several ways:

- ✓ To assess specific biodiversity-compatible strategies
- ✓ To assess individual sustainable use areas

This is inevitably a fairly simplified approach. There will be major differences even within particular systems: for instance the biodiversity conservation value of organic coffee grown in an agro-forestry system will be far greater than the biodiversity value of a large-scale organic wheat farm, but at least the following starts to distinguish between the degrees of benefit offered by different approaches.

Note that as in the case of the IUCN protected area categories, this methodology is based on management objective and does not say anything about how effectively it is applied. To use the same analogy as above, a badly managed organic farm will offer a lot less than a well-managed farm that prioritises biodiversity. This is important but beyond the scope of the present study.

(Chapter 8 includes some detailed examples of using this methodology on specific sustainable use strategies)

Methodology for measuring conservation value

One important challenge in measuring sustainable use outside protected areas (and within Category V and VI protected areas) is to provide enough information for meaningful conservation decisions without excessive demands on field staff. Rather than expecting conservationists to make decisions about the value of each individual example, the following method can be used to help to "grade" sustainable use systems with respect to factors such as their value to biodiversity and their permanence. We propose a format for ranking different types of sustainable use that could be carried out by TNC headquarters (or by anyone that they appoint), to provide a standard "template" for national or state offices giving the calculated conservation values of particular strategies. (In time such an approach might be used more generally for instance within the CBD.)

A matrix for determining the conservation value of any particular sustainable use management system is outlined below, ranking each system against five questions:

- **Biodiversity value**: the overall benefit to biodiversity on and off the sustainable use area

✓ proven benefits to biodiversity on and off sustainable use area
✓ proven benefits to biodiversity on sustainable use area (including high benefits to one or a small group of species but not general ecosystem benefits)
✓ unproven benefits to biodiversity on sustainable use area
✓ no proven benefits on site but benefits off sustainable use area (e.g. reducing pollution in watersheds)

Box: biodiversity value

As mentioned in chapter 2, this value is often inferred rather than proven at the moment and careful assessment of the values of many sustainable use systems is urgently needed. Others have now been clarified as a result of research (for example no-take zones in marine areas, well-managed private reserves and organic agriculture). For this reason we propose that the status of our understanding should be reflected in the scoring system: scores can increase as soon as we learn more. This will also provide an incentive for those involved in sustainable use to collect the evidence to prove the reality of benefits if they exist. Benefits can also be direct or indirect: i.e. the area under sustainable management can support species or in some cases can reduce off-site effects, such as pollution, which ensure that species survive downstream.

- **Biodiversity planning instruments**: the extent to which biodiversity conservation is a conscious strategy of the biodiversity-compatible management system:

✓ specific planning for biodiversity a requirement, including adaptive management (e.g. monitoring and adaptation, regular updating)
✓ specific planning for biodiversity a requirement but only once
✓ specific planning for biodiversity recommended
✓ no specific planning for biodiversity mentioned

Box: Biodiversity Planning
The need to monitor and then adapt is particularly important for sustainable use systems, as sustainability is clearly not a "state" but rather a dynamic process which management aims towards. The sustainable use of components of biodiversity is one of the three objectives of the CBD. To further these objectives COP5 requested the development of "practical principles, operational guidelines and associated instruments, and guidance specific to sectors and biomes, which would assist Parties and Governments to develop ways to achieve the sustainable use of biological diversity, within the framework of the ecosystem approach" (decision V/24). Following a series of international workshops and consultations a series of principles and guidelines were published[187]. These guidelines stressed the need for monitoring and adaptive management: (b) 5: *Sustainable use of biodiversity components will be enhanced* ***if*** *adaptive management is practiced and relies on science and traditional and local knowledge, based on iterative, timely and transparent feedback derived from monitoring the use, the environmental socio-economic impacts, the resources and ecological changes.* The principles and guidelines go on to recommend strategies in relation to adaptive management, monitoring and choice of indicators.

Management planning is widespread, with, for example, approximately 1.7 billion ha of forests (or 43 per cent of world's total forests) are reported to be covered by forest management plans[188].

- **Amount of modification**: the extent to which the natural ecology is changed (i.e. distinguishing between uses that maintain relatively natural systems and those that convert to cultural systems with biodiversity value)
  - ✓ natural or near-natural (e.g. natural forest set aside for watershed protection, natural coastline)
  - ✓ altered, but still with a great deal of natural ecology (e.g. managed forest, rivers managed for fishing). This criteria can also cover areas which are being restored to a more natural ecology (e.g. savannah managed by regular burning, managed forest)
  - ✓ altered with a highly modified ecology (e.g. organic farm)
  - ✓ altered with almost no natural elements (e.g. FSC certified plantation)

Box: amount of modification
In general, biodiversity is best supported by the least modified ecology, but this assumption needs to be qualified. Modified landscapes can sometimes have higher numbers of species although these will tend towards being pioneer species that are often more resilient and rarer species will be disadvantaged: for instance felling a forest will often result in a burst of weed species but the loss of those associated with mature stands and dead wood. Another qualification relates to areas that have been managed for a long time, where species have become adapted to management systems (and often where elements of the original ecology have disappeared and been replaced to some extent by human management). Conservation of some of these areas is a priority – for instance the nut and cork forests of the Mediterranean region. However, this needs to be qualified: conservation in Europe has long tended to assume that continual management intervention is "good" for wildlife and these beliefs are now being challenged by proponents of restoration and "re-wilding".

- **Permanence**: one major problem with most forms of sustainable use is that they are voluntary and often temporary; this attempts to show permanence:
  - ✓ Probably long-term (e.g. avalanche control forests)
  - ✓ Potentially long-term (e.g. FSC certification, organic farm,)
  - ✓ Mid term (e.g. grant-driven easements, set asides, no-take zones etc)
  - ✓ Short term (e.g. annual one-off schemes)

Box: permanence:
The fact that some forms of sustainable use may be temporary has been used as an argument against their inclusion in conservation plans. There is some justification for this but it is also a criticism that can be levelled at protected areas, which only survive as long as governments do not de-gazette them or private land-owners change their minds. We have tried to reflect this by distinguishing between those uses that are probably long-term (either because of the degree of commitment involved or because they are the only logical use for land or water) and those that are far less secure. Areas of forest set aside to stop avalanches covering a village are a lot more secure than annual set aside payments to a farmer who would be happy to use the land for whatever was most profitable, and there is an argument for not including areas at the extreme end of impermanence.

- **Social sustainability**: a socially unsustainable system is unlikely to survive and this distinguishes different degree of benefits to humans:
  - ✓ positive improvements to human wellbeing
  - ✓ impacts to human wellbeing not known
  - ✓ neutral with respect to human wellbeing
  - ✓ generally has negative costs on human wellbeing

Box: social sustainability
We include social issues for two reasons: first, responsible conservation actions take social issues fully into account, particularly as they relate to the poorest and least powerful members of society, and second, conservation that does not take social issues into account generally fails anyway. Here the fine-tuning should be towards ensuring that benefits reach the most needy; there is plenty of evidence that sustainable use systems make money but unfortunately far less confidence that this reaches the poorest members of society (not a problem confined to sustainable use of course). There are many tools available for measuring changes in well-being.

It will be clear that many of these are value judgements, although the literature review in Chapter 2 of this report provides a baseline to help make these judgements.

If the different answers to each of the five questions are given a numerical score, these can provide a crude estimate of the overall value of a particular sustainable use to biodiversity, with respect to issues such as immediate value to biodiversity, naturalness and security. Some suggested scores are given below

Table 7: Matrix for ranking the conservation values of different sustainable use management systems

Influencing factor	Ranking			
Biodiversity value	Biodiversity benefits only off sustainable use area	Unproved biodiversity benefits	Proven biodiversity benefits in sustainable use area	Proven biodiversity benefits on and off sustainable use area
Score	2	2	4	6
Biodiversity planning instruments	Not mentioned	Recommended	Required	Required with monitoring and adaptive management
Score	0	2	3	4
Amount of modification	Cultural almost no natural elements	Cultural ecology some natural elements	Cultural ecology many natural elements	Natural ecology
Score	0	2	4	6
Permanence	Short term (i.e. annual)	Mid term (i.e. 5-10 year)	Potentially long term	Long term
Score	1	2	3	4
Social sustainability	Negative benefits on human wellbeing	Neutral in terms of human wellbeing	Impacts of human wellbeing not known	Positive benefits to human wellbeing
Score	-4	0	0	4

Examples of using the scoring system to assess conservation value

Below are examples of minimum scores for a small selection of types of scheme. Individual examples of these types may well have higher scores, if they set their operating standards at a higher level, for example by requiring biodiversity planning instruments or including social standards.

- **Organic agriculture (IFOAM Accredited)**

Minimum total score: 13
Individual scores
Proven biodiversity benefits on and off site: 6
Biodiversity planning instruments not mentioned: 0
Cultural almost no natural elements: 0
Potentially long term: 3
Positive benefits to human wellbeing: 4

- **Forest managed for water quality**

Minimum total score: 23
Individual scores
Proven biodiversity benefits on and off site: 6
Biodiversity planning instruments required: 3

Natural ecology: 6
Long term: 4
Positive benefits to human wellbeing: 4

- **Forest Stewardship Council**

Minimum total score: 17
Individual scores
Unproved biodiversity benefits: 2
Biodiversity planning instruments required: 3
Cultural ecology many natural elements: 4
Long term: 4
Positive benefits to human wellbeing: 4

- **Private reserves**

Minimum total score: 17
Individual scores
Proven biodiversity benefits on and off site: 6
Biodiversity planning instruments recommended: 2
Natural ecology: 6
Potentially long term: 3
Neutral in terms of human wellbeing: 0

- **Agriculture set aside schemes**

Minimum total score: 7
Individual scores
Unproved biodiversity benefits: 2
Biodiversity planning instruments required: 3
Cultural almost no natural elements: 0
Mid term (i.e. five to ten year): 2
Neutral in terms of human wellbeing: 0

These scores are summarised in Figure 1 overleaf, which also breaks them down into their different components. Such graphs for all relevant forms of sustainable use could be a part of the reporting framework.

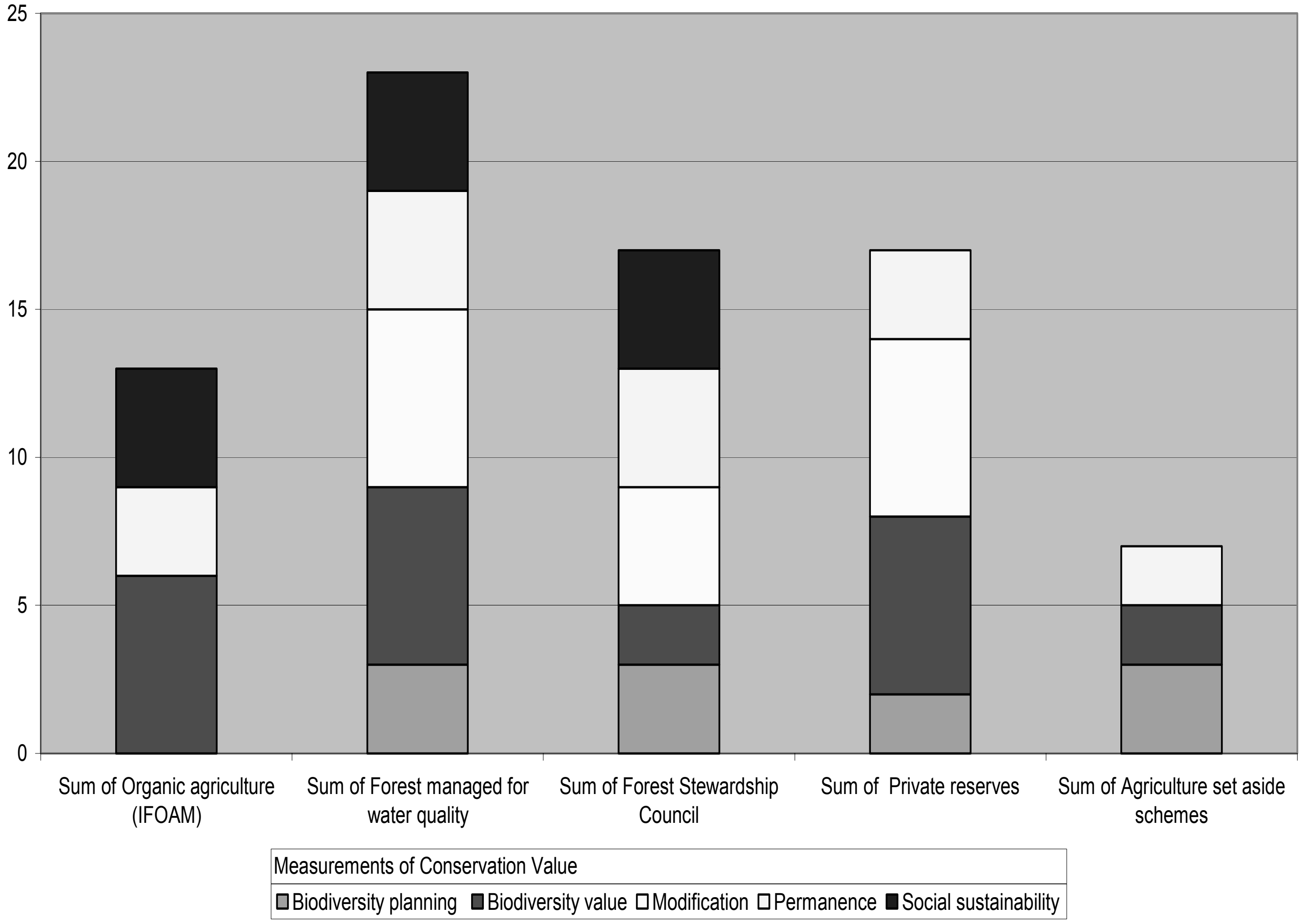

Figure 1: Examples of different "scores" for sustainable use

Assessing conservation value
The scoring system can be used in a variety of ways:

- ✓ Summing the values to create a single "score" for a particular form of sustainable use

- ✓ Presenting scores for the different influencing factors separately so that, for instance, value to biodiversity can be compared with the length of time that a particular sustainable use strategy is likely to survive

- ✓ Mapping, different elements (e.g. biodiversity value or level of modification) by using **colour codes** to indicate differences in values. For instance once data are spatially recorded, using the matrices would allow ecoregions to get a better indicator of the permanence of the sustainable use system, of how much of the land under sustainable use remains in a more-or-less natural state, etc.

5. Mapping Sustainable use areas

Why Map?
At a landscape or ecoregional scale, conservation planning relies on a sophisticated understanding of geography and the relation of different management systems with each other. Most ecoregional conservation plans start with a network of existing and planned or desired protected areas. These are, wherever possible, strengthened through the designation of buffer zones where management is tailored to minimise threats to protected areas. They are also increasingly linked through use of biological corridors and other forms of sympathetic land or water management. Sustainable use areas therefore frequently complement the conservation "skeleton" provided by protected areas. In heavily populated and managed landscapes, sustainable use areas may be numerically far more important than protected areas and can account for the majority of biodiversity conservation although it is likely in these situations that biodiversity is relatively low as compared with more pristine sites.

Most planning systems rely heavily on mapping both to plan and measure the success of ecoregional conservation policies. This is for example central to TNC's ecoregional status measures and to the development and implementation of ecoregional plans. It follows that sustainable use management systems will also need to be mapped if they are to be represented effectively in broadscale conservation planning – for instance to see how effectively they provide corridors of buffer zones, whether they connect sensitive habitats, if they are likely to provide watershed protection etc. This means that in addition to information about the type and location of sustainable use systems we also require data on their geographical scale and location – i.e. geo-referenced data that can be included on maps for planning and monitoring ecoregional conservation.

Sustainable Use Areas: Global Data Availability
Preliminary research suggests that for many, probably most, sustainable uses, geo-referenced data are not usually either required or collected. One early action point for those interested in compiling information on sustainable use (which includes the CBD) should therefore be to encourage those collecting information to start including maps and GIS data within their requirements. For example, neither organic nor forest certification currently requires maps of the areas certified, thus only providing point source data (which itself might be useful) with only limited information about scale and location.

Table 8 below summarises likely map availability for the sustainable use schemes summarised earlier in the matrix.

While this demonstrates the current scarcity it also suggests that for some of the most valuable sustainable use areas, from the perspective of biodiversity conservation, there may already be information available for collection: for example conservation easements, fishing no-take zones, forest reserves and other forms of forest management. Even in these cases however, the quality of information will be very variable in different countries.

Table 8: Availability of spatial data for sustainable use areas

Sustainable use strategy	Availability of geo-referenced data		
	Usually available	**Point data only**	**Not usually available**
Management Type: Agriculture			
Agrochemical control			✓
Organic certification		✓	
Self assessment schemes			✓
Easements, set aside schemes	✓		
Agreements			✓
Paying farmers for wildlife losses			✓
Management Type: Forest management			
Forest reserves	✓		
Forest Stewardship Council		✓	
ISO-14000 forest standards		✓	
Grants		✓	
Codes of practice			✓
Management Type: Marine fishing			
Government no-take zones	✓		
Marine Stewardship Council		✓	
ISO certification for fisheries		✓	
Tradable fishery catch quotas			✓
Community no-take, codes		✓	
Management Type: Freshwater fishing			
Fish management areas	✓		
Organic aquaculture certification		✓	
ISO certification for fisheries		✓	
Conservation easements	✓		
Voluntary landowner agreement			✓
Management Type: Ecosystem services			
Avalanche control	✓		
Forest managed for water quality	✓		
ISO 1400 certification		✓	
Payment to keep forest for HEP	✓		
Retention of mangroves for fish			✓
Management Type: Hunting			
Hunting reserves	✓		
Bushmeat controls		✓	
Protecting elephants for hunting	✓		
For-profit hunting reserves	✓		
Management Type: Wildlife protection outside protected areas			
Protection of endangered species			✓
Private protected areas	✓		
Management Type: Cultural protection			
Cultural site with biodiversity	✓		
Sacred sites			✓
Management Type: Recreation / tourism			
Recreational park with wildlife	✓		
Certification of eco-lodges		✓	
ISO certificates for eco-lodges		✓	
Protection of breeding sites		✓	

There are today many global data sets on land use and land coverage, but at present data have been focused more towards “quantity”, i.e. ensuring global coverage of basic land use data, rather “quality”, i.e. a more detailed analysis of a landscape or seascape quality either in terms of productive capacity or biodiversity conservation[189]. Although it may be possible to make some broad-brush assessment of landscape using satellite imagery, the data publicly available, such as Google Earth[190] or the FAO GeoNetwork[191] do not have resolutions clear enough to be able to distinguish anything more than the dominant land cover features.

There may also be cases where such data is considered commercially or politically sensitive. Initiatives such as the Conservation Commons, which seeks to make public information of relevance to conservation, may help to encourage data owners to make information more widely available.

Increasing both the quality and quantity of geo-referenced data on sustainable use is a key requirement in increasing the effectiveness of sustainable use as a component of broadscale conservation planning.

Sustainable Use Areas: National Data Availability
Whilst global data on sustainable use systems remain scarce, many nations are beginning to build capacity in spatial assessment, in part due to the need to report on global commitments, such as the CBD.

In South Africa, for example, the results and recommendations of South Africa’s first National Spatial Biodiversity Assessment (NSBA) have recently been launched[192]. The NSBA project looked at four habitats: terrestrial, freshwater, estuarine and marine environments, and mapped protected and sustainable use areas, grouped into three main types:

- ✓ Type 1: National Parks, Provincial Nature Reserves, Local Authority Nature Reserves and Department of Water Affairs and Forestry (DWAF) Nature Reserves
- ✓ Type 2: Mountain Catchment Areas, Wildlife Management Areas, private nature reserves, National Heritage Sites, DWAF Forest Areas, South African National Defence Force (SANDF) property, bird sanctuaries and botanical gardens
- ✓ Type 3: Informal game farms, private game reserves and conservancies.

In terms of protection, Type 1 is seen as having the most secure legal status, whilst Type 3 is described as not providing “secure long-term protection for biodiversity” but is clearly still seen as important when establishing conservation priorities[1]. A slightly less sophisticated exercise has also taken place in Namibia, with the development of an Atlas of data for the country[193]. Data include: registered and emerging conservancies on freehold and communal land (see page 29); the state protected area network; proposed changes and additions to the protected area network in the near future; point locations of the four Ramsar sites; and the boundary of the Sperrgebiet, Diamond area 1 (excluding the portion in the Namib Naukluft Park)[2].

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[1] The NSBA can be downloaded from: http://www.sanbi.org.za/frames/biodiversityfram.htm; a CD containing the GIS layers will be available shortly
[2] Full metadata has been developed and is freely available at:

Such national assessments are still rare. However, at a national level individual government agencies or ministries are more likely to hold spatial data on land use. For example, many forestry departments or ministries have GIS data on forest reserves, but this is rarely available on the web. For example, in the US, the Forest Inventory and Analysis (FIA) Program of the U.S. Department of Agriculture, which has conducted inventories and assessed the status and change in forest resources in America since the 1930s, does not release the coordinates of sample locations[194]. Similarly, there is at present very little co-ordination nationally or sub-nationally between various forms of conservation activity; either at the local authority level or by NGOs (see box #).

Box: Extract from Kenneth Mulder's report on attempts to map conservation programmes in the US state of Oregon.

"Despite the significant level of conservation activity in the state, with several programs at least possessing point data and acreages for their projects, it appears little progress has been made toward incorporating such stewardship lands into ecoregional assessments. This is despite an expressed desire on the part of both TNC-Oregon and the Oregon Natural Heritage Program to include such data whenever feasible. The conclusions I have drawn from this as well as from my conversation with them is that either:

- ✓ Data from these programs is too scattered and expensive to gather and properly digitize;
- ✓ Maintaining such databases is viewed as too difficult due to the heterogeneous nature of the data and the turnover rate of enrollment; and/or
- ✓ The impact of these programs on biodiversity preservation is seen as too small to warrant the effort."

Creating a World Database on Conservation Areas

As we have shown above, there is currently very little systematic collection of data about sustainable use and at present most sustainable use strategies are not represented on maps or through data that can be mapped.

For conservation planners, this represents a serious problem. Table 9, provides a partial picture of the land area which could be considered as being managed for biodiversity conservation. Even this brief analysis indicates that somewhere in the region of 845 million ha, or 5.7 per cent of the world's terrestrial area, could be described as a "conserved area" or "sustainable use area". Couple this to the over 10.99 per cent protected (IUCN category I-IV), and then lands managed with the conservation of biodiversity in mind cover 16.7 per cent of the world. Currently, we have little to no data on the conserved areas and GIS boundary information is only available for 37 per cent of the protected areas on the WDPA[195].

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http://209.88.21.43/met/wwwroot/data/Atlas/Atlas_web.htm

Table 9: Global area protected and conserved for biodiversity

Protected and Sustainable use areas	Hectares	Source
Total Protected Areas (IUCN Category I-VI) (December 2005)	**1,631,129,742**	**World Database on Protected Areas (WDPA)**
Other areas listed WDPA which are not necessarily protected areas (see below)	331,583,205	World Database on Protected Areas (WDPA): http://sea.unep-wcmc.org/wdbpa/
Community-owned or administered forest (2002)	420,000,000	White, A. and A. Martin (2002); *Who owns the world's forests?* Forest Trends, Washington DC
Farmland under organic management (2004)	26,300,000	Helga Willer and Minou Yussefi (Eds.) (2005); *The World of Organic Agriculture 2005 Statistics and Emerging Trends*7th, revised edition, February 2005, IFOAM, Bonn, Germany
Forest Stewardship Council certified (9/11/2005)	67,160,000	http://www.certified-forests.org/
PEFC (Programme for the Endorsement of Forest Certification schemes) certified (30/11/2005)	133,889,563	http://register.pefc.cz/statistics.asp
Total Other Conserved Areas	**845,043,205**	

There is a clear and growing need to rectify this situation; in this respect we note that the Convention on Biological Diversity is suggesting that Parties include sustainable use amongst indicators of biodiversity conservation and is investigating ways in which this might be measured and mapped. Currently, the nearest equivalent is the World Database on Protected Areas (WDPA), an online database managed by the UNEP-World Conservation Monitoring Centre in association with a consortium of NGOs. Although the WDPA is officially a database of protected areas, as recognised by IUCN, it has in effect started to assemble data on several other types of areas important to conservation that are outside officially protected areas. For example:

- ✓ All **Ramsar sites** are listed in the WDPA although many are not actually protected areas – Ramsar listing requires some level of protection but the Ramsar Bureau is explicit that listing is not the equivalent of protected status

- ✓ All **natural World Heritage sites** are listed in the WDPA; as in the case of Ramsar not all are protected areas (although most are and all contain some protected areas within them)

- ✓ All **MAB biosphere reserves** are listed as protected areas, although most of these actually contain a core area (within IUCN categories I-VI) and additional land that is outside full protected areas

- ✓ Many **forest reserves** are listed (for instance most African forest reserves) and these vary from being equivalent to protected areas to intensive plantations of exotic trees

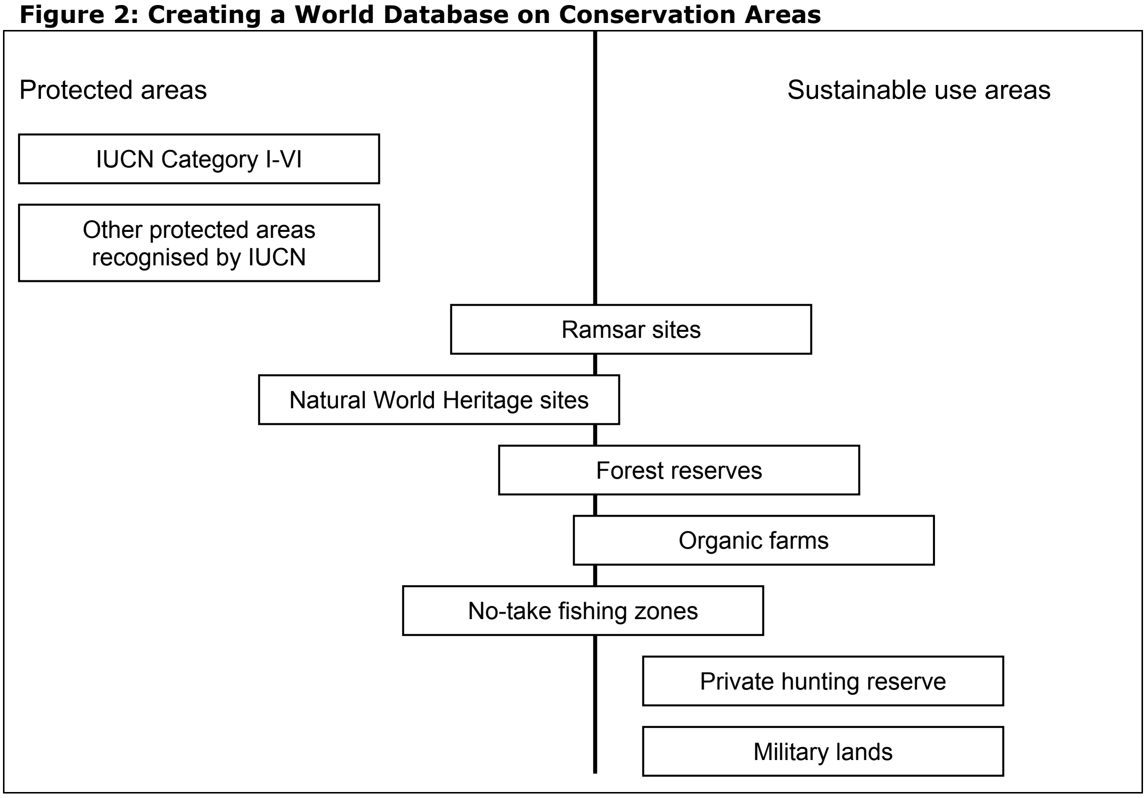
- ✓ Some **military lands** (training grounds etc) are listed in the WDPA

- ✓ In the United States all National Forests are listed (in fact under Category VI) but many of these are commercial forests

In addition, there are many protected areas that have not been assigned IUCN categories; so clearly already there is a degree of confusion that needs to be addressed.

One option that bears consideration would be to make a virtue out of the current confusion surrounding what is and is not listed on the WDPA and expand it to include areas of land or water outside official protected areas that nonetheless perform a significant conservation function. In this way the WDPA might over time develop into a much broader World Database on *Conservation* Areas (or something similar), of which protected areas would be a subset. How this might relate to existing designations in practice is illustrated by the diagram below.

Figure 2: Creating a World Database on Conservation Areas



Note that this does not say anything definitive about how effective the system is in conserving biodiversity – in some cases for instance private hunting reserves are very effective at preserving species but they are clearly not protected areas. The figure above refers rather to the extent to which management objectives are aimed at biodiversity conservation. The case study at the end of this chapter provides one example of how including data, currently held on the WDPA, can provide a very different picture of conservation across a whole continent (Africa) for one biome (forests). Table 10, below, continues this theme by comparing protection levels (protected areas classified as IUCN Category I-VI and "other area" on the WDPA) for several key ecoregions around the world.

Table 10: Using the WDPA to identify Sustainable use areas in Ecoregions

Ecoregion	PA I-VI	Other Areas
AT0109: Eastern Arc forests (Eastern Africa: Central Tanzania, extending into Kenya). This ecoregion cover 23,700 km^2 in the tropical and subtropical moist broadleaf forests biome. Some of the forest, approx 1,900 km^2, is protected in the Udzungwa National Park, but most of the remaining forest area is found in forest reserves established for water catchment purposes[196].	5.31%	28.40%
AT0111: Eastern Guinean forests (Western Africa: Ghana, Ivory Coast, Benin, and Togo). The tropical and subtropical moist broadleaf forests of this ecoregion are highly fragmented, and very little of the 189,400 km^2 area is protected. However, satellite imagery indicates that hundreds of square kilometres of forest might still survive, though it is believed that they are being rapidly cleared for agriculture. In Ghana, for example, there are also a large number of forest reserves that are used for timber production which can contain significant levels of biodiversity even after they have been logged. As high forest is generally absent outside these reserves (except for sacred forest patches) then their role in biodiversity conservation is very important[197].	1.45%	20.60%
AT0709: Kalahari Acacia-Baikiaea woodlands (southern Africa: including parts of Botswana, northeastern Namibia, Zimbabwe, and northern South Africa). Several large, well known protected areas (i.e. the Central Kalahari Game Reserve in Botswana) provide protection for the 335,500 km^2 of tropical and subtropical grasslands, savannas, and shrublands in this ecoregion. In the mid-1970s the Botswana government proposed a network of Wildlife Management Areas (WMAs). The WMAs are mostly in areas of land adjacent to reserves and are designed as areas where the wildlife industry can be developed on a sustainable basis, which would greatly increase protection in the ecoregion. However, though designated, none of the WMAs has yet been gazetted, partly because of opposition from the cattle lobby at the national level and from villagers who regard hunting as their right, and resent having to pay for a license[198].	11.00%	14.90%
AT0907: Zambezian flooded grasslands (Angola, Botswana, Democratic Republic of Congo, Malawi, Mozambique, Tanzania, Zambia). An ecoregion of 153,500 km^2 flooded grasslands and savannas. Six of the wetlands comprising this ecoregion are designated as protected areas according to IUCN criteria, and three floodplains (Okavango, Bangweulu Swamps, Lake Chilwa) are designated as Ramsar sites. Other portions of the ecoregion are contained within Game Controlled Areas or similar designations that allow controlled hunting[199].	33.70%	13.20%

Ecoregion	PA I-VI	Other Areas
AT1013: Southern Rift montane forest-grassland mosaic (Southern Africa: Southern Tanzania into Malawi). The protected area network throughout most of this 33,500 km^2 ecoregion of montane grasslands and shrublands is inadequate with the exception of the Nyika Plateau area. Part of Chirobwe mountain in the Dedza-Chirobwe Highlands has a forest reserve, although this is under pressure from wood collectors. The Mbeya Region of Tanzania's Southern Highlands contains 28 forest reserves of 1,350 km^2 (although several of these fall outside of the ecoregion's boundaries), but these have low levels of management and are often subject to illegal pitsawing, fuelwood collection, grazing, hunting, and uncontrolled burning. Many of these reserves are completely surrounded by and somewhat encroached upon by cultivation. Besides these official forest reserves, there are numerous smaller traditional forest reserves in the Southern Highlands, established by local communities for a variety of cultural reasons. At least 94 are known from the Rungwe district. Although many of these reserves are no longer maintained, and are under increasing pressure from cultivators, evidence suggests that they could play a valuable conservation role if appropriately supported by government[200].	10.30%	11.50%
AT1402: East African mangroves (Mozambique, Tanzania, Kenya, and Somalia). Although some areas of the 15,100 km^2 of mangrove are found in protected areas, other large mangrove stands in Tanzania and Kenya have been designated as forest reserves. These are managed by special mangrove units within the Forestry Division, which in Tanzania have developed and are implementing management plans. However, these plans may not be adequate given the complexity of mangrove ecosystems, and the links to distant headwater areas of watersheds, which are the source of many of the impacts[201].	5.88%	14.80%
IM0140: Northern Triangle subtropical forests (Northern Myanmar). Because of its remoteness and inaccessibility, very little of this ecoregion, which covers an area of 53,900 km^2, has been substantially altered by human activity. More than 90 percent of the habitat is still intact in large habitat blocks, but there is little formal protection apart from the Piodaung Wildlife Sanctuary. However, the forests on hill slopes are being rapidly cleared for shifting cultivation. The shifting cultivation cycle has also been reduced from twelve to twenty years to five to eight years, resulting in the perpetuation of a bamboo subclimax that has begun to replace the broadleaf forests. Most of the areas covered by dense forest are demarcated as reserved forests[202].	0.02	23.60

Expanding the WDPA

It would theoretically be possible to include other sustainable use areas even within the current format of the World Database on Protected Areas, if existing data fields were adjusted slightly. The WDPA is updated using a database format of 21 fields, where possible augmented with associated GIS data.

The 21 data fields for national protected areas are given in the table below. For protected areas to be included in the database the very minimum information requirements are:

- ✓ Area name
- ✓ Designation (i.e. type of protected area, national park, nature reserve etc)
- ✓ Status (i.e. Proposed or Designated)
- ✓ Establishment date (date of establishment as current designation)
- ✓ Longitude and Latitude
- ✓ Area (ha)
- ✓ Source of information

For protected areas to appear in publicly available formats (i.e. WDPA CD ROM, UN List or on the UNEP-WCMC web site - http://sea.unep-wcmc.org/wdbpa/) they should first adhere to the IUCN definition of a protected area. (This is not as easy as it sounds: the precise interpretation of the definition differs in different parts of the world and is currently under review.) Countries are encouraged by governments to assign IUCN categories to their protected areas but not all do – and in fact very few countries have assigned categories to all their protected areas. Partly this is due to lack of time, partly because countries are either confused about which categories to assign to some of their protected areas or more rarely reject the whole category system.

Therefore, lack of an IUCN protected area category does not necessarily imply that something is not a protected area. But, confusingly, not everything on the WDPA is a protected area. A good proportion of the 43,000 odd uncategorised areas may more properly be classified as "sustainable use areas" and therefore already form a core of data on these wider uses.

There is in theory little reason why sustainable use areas should not be included in the WDPA or WDCA. In the following table we examine the existing data fields and consider what if any changes might be needed to include sustainable use areas.

Extending the WDPA would create additional, probably unwelcome work for governments, many of whom are already frustrated by the scale of the reporting procedure. However, at least initially effort could focus on a few of the most significant sites (and reporting would also often involve different departments). It is also possible that in some cases central databases could be used, in the case for instance of certification schemes or similar.

Table 11: National Sites Data Structure

Field Name	Field Description	Field Text Options	Adapting the WDPA to the WDCA
SITE_CODE	Unique ID for Site (used in the WDPA)		The site code would need to distinguish PA and sustainable use outside PA
AREANAME	Name of site (Official)		
ISO3	ISO Standard Short Country Code		
COUNTRY	Short Country Name		
LAT	Latitude - Location of Site (Decimal Degrees)		
LON	Longitude - Location of Site (Decimal Degrees)		
DESIGNATE	Designation of site e.g. National Park, Nature Reserve etc		Description of the site's principles use
IUCNCAT	IUCN Management Category	Unset: when no information is known or where site has STATUS (see below) of Voluntary or Recommended, In preparation or Proposed. UA: when site has DESIGNATION of Cloud Forest Site/Region and Special Site of Scientific Interest (neither fall under IUCN classification) or the STATUS of Degazetted. Categories Ia to VI: site has to be at least Designated and not Degazetted	A choice would need to be made about which categorisation system was most suitable. For consistency, management objective might be most appropriate, in which case there would be a much longer set of possibilities (similar to those listed in the matrix of sustainable use areas)
STATUS	Current Status of Site e.g. Designated, Proposed etc	Unset: when the status of the site is not known Voluntary – unrecognised: when a site is protected but not by national legislation and is not recognised as a protected area by governing agency Voluntary – recognised: when a site is protected but not by national legislation but is recognised as a protected area by governing agency	In the case of sustainable use, this field could be used to indicate the permanence of the site, e.g.: ✓ Probably long-term (e.g. avalanche control forests) ✓ Potentially long-term (e.g. FSC certification, organic farm,) ✓ Mid term (e.g. 5-10 years e.g. grant-driven

Field Name	Field Description	Field Text Options	Adapting the WDPA to the WDCA
		Recommended: when a site has been put forward to be protected but no formal proposal has been formulated (site does not physically exist) In preparation: when a site has been put forward to be protected and a formal proposal has been formulated and passed on to national government or governing agency for approval (site does not physically exist) Proposed: national government or governing agency have formally proposed site for designation under national legislation (site does not physically exist) Designated: site has been created as a protected area under national legislation (site physically exists) Extended/Reduced: when a site has had an officially recorded increase or decrease in size Reclassified: when a site has had an official change in designation or IUCN category Adjustment (exact nature unknown): when a site has had an official dated change but the exact details of the change are unknown Degazetted: when a site is no longer a protected area (offiically removed from the national protected area system) (site does not physically exist)	easements, set asides, no-take zones etc) ✓ Short term (e.g. annual one-off schemes
EST_DATE	Establishment date of site status (current/historical)		Time that sustainable use management was adopted
ADMIN	Administrator of site (i.e. the body which appoints/regulates the management/ manager of the site perhaps in the longer term)	These three fields have the same standard options for text entries: Unset: used when there is no information for any of the three fields	These three fields seem to overlap. One could be used more explicitly for governance type (for both protected areas and sustainable use areas) while another could reflect more traditional ownership

Field Name	Field Description	Field Text Options	Adapting the WDPA to the WDCA
MANAGEMENT	Management of site (i.e. the agency/person who controls or directs the day to day running of the site)	Unknown: used in any of the three fields when at least one of them is known Public – National: i.e. a national agency Public – State/Provincial: i.e. a provincial/state led agency Public – Local: i.e. a village/town based or community based organization/agency Private: i.e. privately owned or the organization is private Communal: i.e. when the site is managed/owned by a community or a number of villages Parasatal: i.e. a site is owned or controlled wholly or partly by the government Other (Please specify): This provides a separate free text field (up to 255 characters) and can be used to record more specific information about who owns, manages or administers a site	(which would probably have to be extended from the current list)
OWNER	Owner of site		
AREA_HA	Total area of site in hectares		
NOTES	Extra info taken from sites designation/status sheet in WDPA.		
SOURCE	Source taken from sites designation/status sheet in WDPA.		
MARINE	Does the site have a marine element – description of types e.g. no take zone.		
MARINE_HA	Marine area in hectares or % of total area that is marine.		
ALT_MIN	Minimum elevation in meters of site		
ALT_MAX	Maximum elevation in meters of site		

Field Name	Field Description	Field Text Options	Adapting the WDPA to the WDCA
RELATIONSHIP	What is this sites relationship in regards to other protected areas e.g. is contained by a larger national or international protected area. Other relationships are coincident/common boundary, contiguous/adjacent, shared boundary, transboundary and site contains. We require type of relationship and the name/ID of other site/s.		

Case study: Forest Reserves – Potential Biodiversity Reserves

In many countries forest reserves have an important role to play in the conservation of biodiversity. But how is this role recognised when measuring and mapping sustainable use areas? Globally, there is currently no agreed format for assessing the degree to which forests reserves contribute to protection, how this contribution is recognised or if this type of conservation management contributes to global conservation targets. Forests reserves in some countries appear on the World Database on Protected Areas, whilst others, often with similar management objectives, do not. Forest reserves are therefore an interesting example of where the line between protected areas and sustainable use areas needs to be clarified. This short case study therefore introduces the issues globally, and then highlights research work which indicates the role that forest reserves play in biodiversity conservation in Africa[203].

The relationship between sustainably managed forests and national protected area networks has been the subject of debate throughout the world, and countries differ in the way that they designate their forests with respect to protected area status. For instance the United States counts many of its National Forests as protected areas (usually designated as Category VI) while Canada does not, although management is not dissimilar. Some countries, such as India, already make a clear distinction between protective forests (e.g. forests protected to control soil erosion or avalanches or to protect drinking water supplies) and forest protected areas (i.e. forests primarily protected to conserve biodiversity). The question of the relationship between protective forests and protected areas has become so heated in Europe that the Ministerial Conference on Protection of Forests in Europe has developed its own categorisation system to supplement the IUCN definition (see Table 12)[204]. Within Africa, a number of countries have converted some of their forest reserves into protected areas (often upgrading them to National Parks), or more commonly zoned forest reserves and identified smaller protected areas inside them[205]. Globally, some 477 million ha (12 per cent) of forests are were under formal forest protection decrees or laws[206]

Table 12: Classification proposed by the Ministerial Conference for the Protection of Forests in Europe

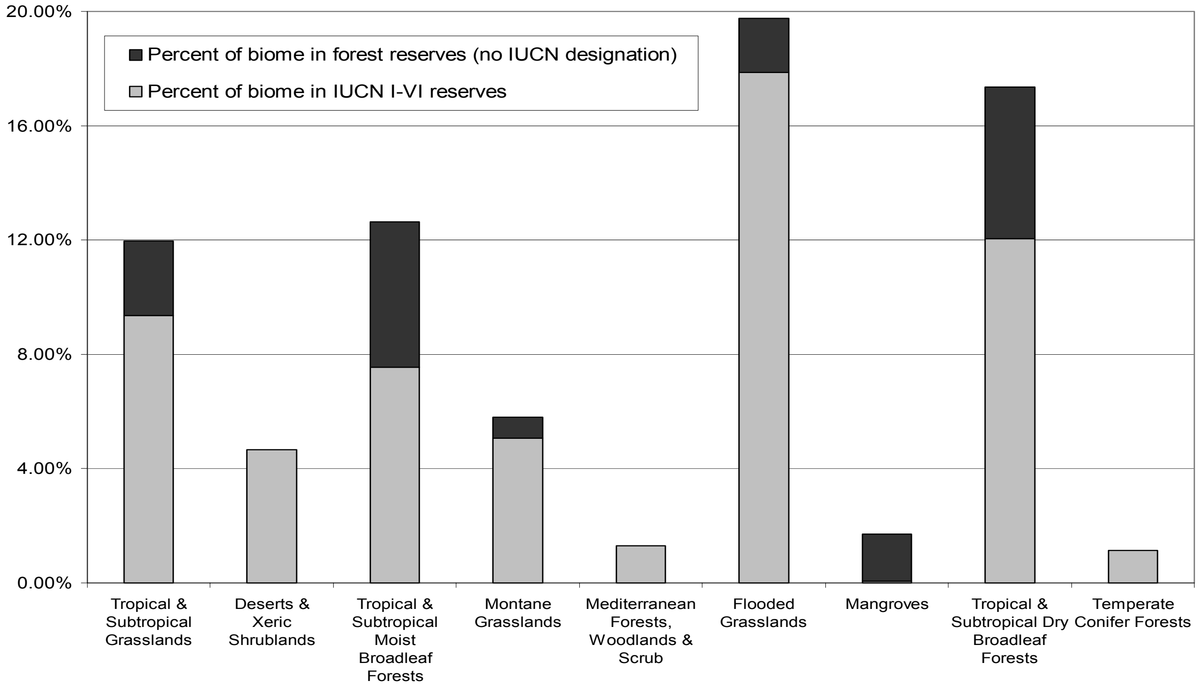
MCPFE proposed categories		IUCN
1. Management objective: "Biodiversity"	1.1 "No active intervention"	I
	1.2 "Minimum intervention"	II, (IV)
	1.3 "Conservation through active management"	IV, (V)
2. Management objective: "Protection of landscapes and specific natural elements"		III, (V, VI)
3. Management objective: "Protective functions (soil, water, natural hazards)"		Not applicable

Forest reserves in Africa

Typically African protected areas fall into categories such as National Park, Game Reserve, Game Controlled Area –established and managed by government wildlife conservation agencies. In addition to these areas there are large numbers of reserve managed by government forestry agencies, termed forest reserves, national forests, production forests, or state forests. These reserves have purposes ranging from plantation forestry, sustainable utilization of natural forest, to complete protection for watershed or biodiversity conservation. Reserves managed by government forestry agencies are typically not accorded protected area status and have not therefore been assigned IUCN categories.

Although Africa has an impressive system of protected areas, with some countries having very high levels of protection, there are significant gaps in the networks in terms of their coverage of biodiversity conservation. Reservation, or the act of dedicating a surveyed area of land to forestry, has been the main forest management strategy in Africa for the last century[207]. By reserving what in some cases are effectively still almost or completely natural forests, forest reserves have become important reservoirs of biodiversity. Countries with particularly biologically important and relatively well-managed forest reserves include Tanzania[208], Ghana[209], Uganda[210], Kenya[211], Zimbabwe[212] and Sierra Leone[213].

Figure 3: The contribution of forests reserves to the major African forested biomes[214]



A series of studies coordinated by the Universities of Copenhagen and Cambridge, the Western Cape Nature Conservation Board, the WWF-US Conservation Science Programme and Conservation International's Center for Applied Biodiversity Science[215], have identified important gaps in current protected area networks with respect to:

- ✓ **Plants**: in coastal Gabon-Cameroon, in the various tropical montane forest areas (Cameroon Highlands, Eastern Arc Mountains, Ethiopian Mountains), in lowland coastal eastern Africa, and in the South African Cape[216].

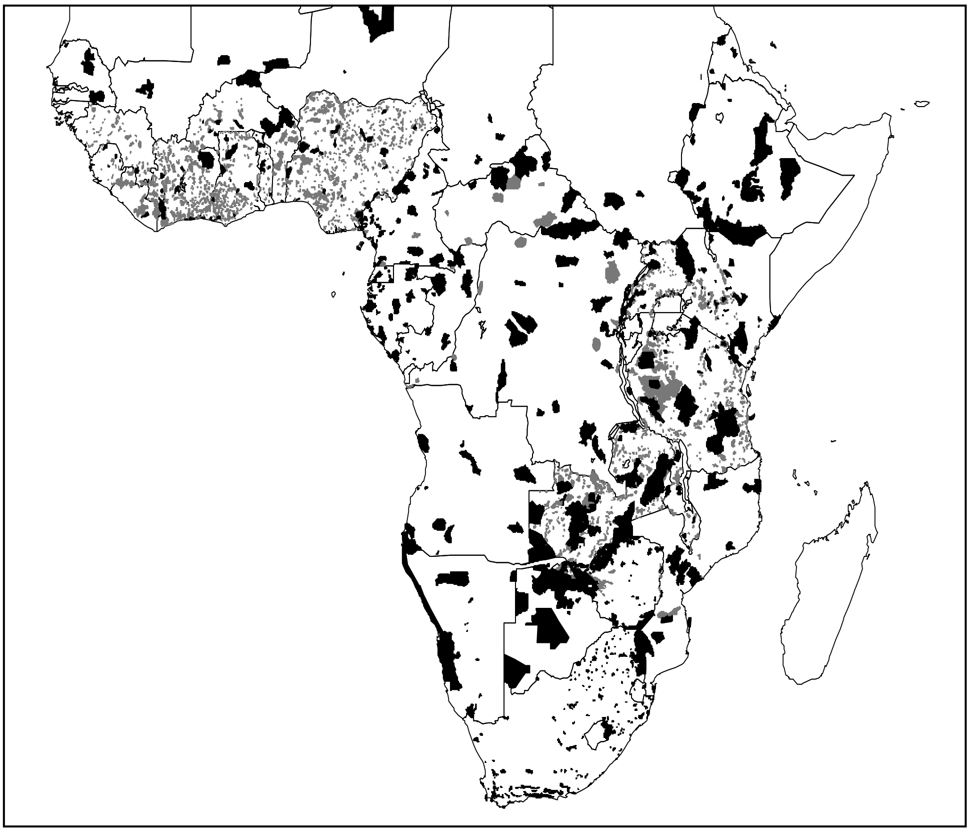
- ✓ **Mammals**: in the Horn of Africa (especially Somalia), Cameroon Highlands, parts of Eastern Africa Coastal Forests and Eastern Arc Mountains, Albertine Rift Mountains and larger reserves in South Africa[217].

- ✓ **Birds**: in the Mount Cameroon-Bamenda highlands (Cameroon), the Angolan scarp (Angola), the Drakensberg Highlands (South Africa), the Highveld (South Africa), the Eastern Arc Mountains (Tanzania), the eastern African coastal forest mosaic (Kenya and Tanzania), the Albertine Rift (Uganda, Rwanda, Burundi, eastern Democratic Republic of Congo and western Tanzania), and the Ethiopian Highlands[218].

- ✓ **Forests**: Analysis of the 2005 WDPA suggests that only 7.55 per cent of tropical and subtropical moist and broadleaf forests are protected in IUCN category I-IV protected areas, although by adding Forest Reserves to the protected area network the savannah woodlands, moist rainforest, flooded grasslands and dry forests would all exceed 10 per cent reserve coverage[219] (see Figure 4).

Many of these areas also appear in regional and global analyses of biodiversity richness, such as the biodiversity hotspots developed by Conservation International[220], WWF's Global 200[221], the WWF and IUCN Centres of Plant Diversity[222] and the Important Birds Areas identified by Birdlife International[223]. Many of the existing gaps in protection of high biodiversity forest habitat are covered by forest reserves. For example, the majority of the Red Listed plants in the forested habitats of the eastern African coastal forests and the Eastern Arc Mountains of Tanzania and Kenya are found within forest reserves[224].

Figure 4: Distribution of protected areas (IUCN I-VI) reserves (black) and forest reserves (grey) across Africa (from the August 2003 version of the UNEP-WCMC protected area database)[225]



The WDPA includes details of many countries' forest reserves, for instance, throughout Africa there are more than 4,300 forest reserves that comprise approximately 616,700 km^2 [226] (see Figure 4). Although there are moves in some countries to categorise some of these reserves and include them in the protected area database, this may take some time and is unlikely to include all the reserves in the region[227]. Further reclassification of forest reserves to protected areas, may also attract opposition from local people, who are already short of land and resources and have become used to and perhaps reliant on the unofficial resources available in forest reserves. Upgrading the protection status of such areas would require careful negotiation and some trade-offs between provision of resources to support human wellbeing and biodiversity protection: such trade-offs are never easy to achieve in practice. In some cases, ensuring that forest reserves are sustainably managed may be a better option than trying to set them aside altogether.

It is clear however that much of Africa's biodiversity does exist in these forested areas, and the conservation management objectives of these areas should be recognized in international accounting of areas dedicated to biodiversity conservation.

6. Steps to mapping sustainable use areas within ecoregion conservation programmes

The various steps outlined above could together create a methodology for assessing the contribution of sustainable use areas to ecoregion conservation. Figure 5 below outlines a process to pull the various components together into workable process.

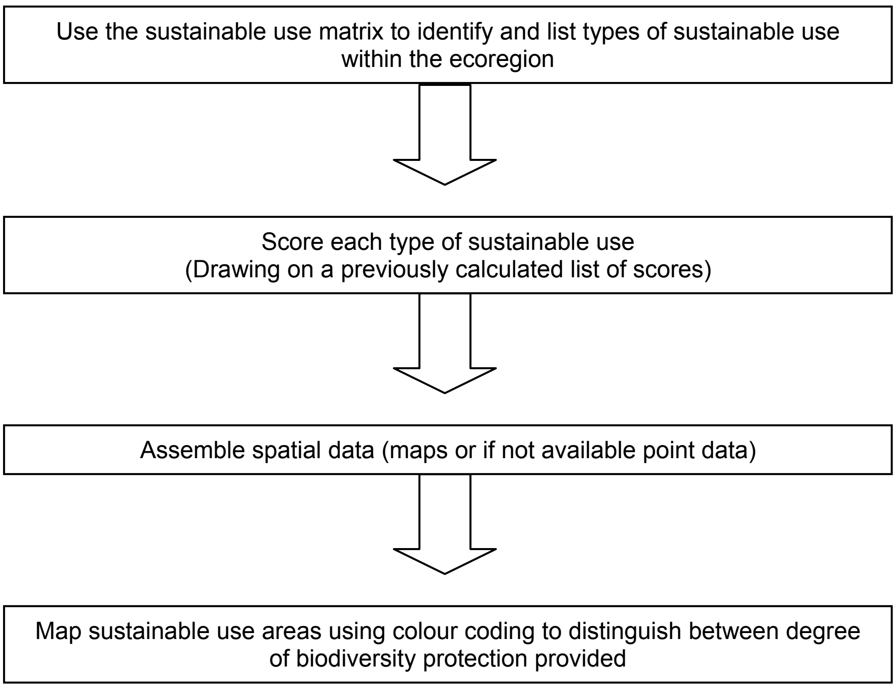


Figure 5: Process of applying the methodology

If The Nature Conservancy approved the methodology, we propose testing it out in 2-3 regional offices to assess its suitability for wider application.

7. Recommendations and Next Steps

A wide range of sustainable use systems exist. Classification is possible and a classification system has been proposed that reflects management type and incentive.

These do not all have equal value to conservation but a form of ranking and weighting is possible and could be carried out centrally, thus providing field staff with an agreed set of values

At the moment, access to spatial data is limited and virtually non-existent in many parts of the world; some management types are far more likely to have been mapped than others. (For instance no-take fishing zones and forest reserves are likely to exist on maps while organic farms or areas where voluntary controls are in place probably do not.) The schemes that we have spoken to are not averse to the principle of mapping and indeed welcome the chance to feature as a conservation benefit; with some directed advocacy the amount of data available could increase rapidly in the future.

TNC needs to comment on the work to date; if there is approval of the general approach a number of immediate next steps are needed:

- ✓ Developing scores for all the various sustainable uses identified to act as a reference within a "user's manual" to the methodology
- ✓ Testing the methodology by mapping sustainable use in 2-3 regions
- ✓ Exploring options for including sustainable use on the World Database on Protected Areas
- ✓ Drawing up a strategy to increase the amount of spatial data available and identifying sources, in association with the Conservation Commons

8. Examples and assessments of conservation value of selected sustainable use areas

The following section gives some examples of scoring of selected types of sustainable use; if the system is widely adopted this should be carried out for a far larger range of sustainable use approaches.

IFOAM Accreditation Programme[iii]

strategy	category
Agriculture	**Third Party**
Summary: Accreditation of organic certifiers worldwide to International Federation of Organic Agriculture Movements (IFOAM) Norms (Standards and Criteria) to aid international equivalence in organic certification	

Background

The IFOAM Accreditation Programme (IAP) was established by the International Federation of Organic Agriculture Movements (IFOAM) in 1992. The aim of IAP is to ensure the equivalency of organic certification bodies world-wide by confirming whether they meet IFOAM Norms – the Criteria for Certification Bodies and the IFOAM Basic Standards.

Accreditation is a procedure, similar to certification, but one step removed from the farm and manufacturer. Through a process of evaluation an authority gives a formal recognition that a certification body is competent to carry out certification of organic farms and facilities.

The IFOAM Basic Standards and the IFOAM Criteria, which together form the IFOAM Norms, are set by the IFOAM membership and appointed committees. As such, they are internationally adopted independent standards, which allow for flexibility, diversity and regional variations. The Norms are reviewed, revised and developed in line with IFOAM's three-yearly General Assembly.

The IFOAM Basic Standards are the basis of the organic movement worldwide and many of the organic standards which have been developed. However, only those standard setting organisations which are accredited by IFOAM are approved to use the IFOAM logo. The Basic Standards define the principles, recommendations and required baseline standards that guide operators in producing their organic crops (they also cover the handling and processing of organic commodities).

The IFOAM Accreditation Programme is managed by the International Organic Accreditation Service Inc (IOAS) under a licensing agreement with IFOAM. IOAS is a non-profit organisation registered in the USA. IOAS operates independently from other activities of IFOAM and has offices in the USA, Europe and Australia.

[iii] Although organic production, and the IFOAM Accreditation Programme, cover much more than agricultural production (i.e. processed products, fish and forestry products), in this context just terrestrial based agricultural production is reviewed.

Scale
There are currently 30 certifiers accredited by IFOAM in 16 countries ranging from Israel to China and from Argentina to the USA. Most certifiers operate in 20 or 30 different countries on several different continents[iv].

Minimum conservation value
Overall ranking: 13

Influencing factor	Ranking	Score
Biodiversity value	Proven biodiversity benefits on and off site	6
Biodiversity planning instruments	Not mentioned	0
Amount of modification	Cultural almost no natural elements	0
Permanence	Potentially long term	3
Social sustainability	Neutral in terms of human wellbeing	4

Discussion of ranking
Each ranking is discussed below. For each influencing factor a brief overview of literature on the subject and/or a justification of ranking is given, followed by examples of the statements in the IFOAM Basic Standards which relate to the ranking decision. The figures given in brackets refer to the paragraph in the IFOAM Basic Standards (2002 version) which sets out the basic standards requirements; "operators" are the individual or business enterprise, responsible for ensuring that products meet the certification requirements.

- **Biodiversity value**

Ranking: Proven biodiversity benefits on and off site

In the last few years there has been an increase in the documented evidence of the beneficial role organic agriculture can have in biodiversity conservation[228,229,230]. Most recently, two of the biggest conservation organisations in the UK (Royal Society for the Protection of Birds and English Nature) "identified a wide range of taxa, including birds and mammals, invertebrates and arable flora that benefit from organic management through increases in abundance and/or species richness". The study, which reviewed 76 research projects from Europe, Canada, New Zealand and the US, found that organic farming increases abundance and/or species richness at every level of the food chain – from bacteria to mammals. The review concluded that organic farming aids biodiversity by using fewer pesticides and inorganic fertilisers, by adopting wildlife-friendly management of habitats outside production areas and by mixing arable and livestock farming[231].

The first standards requirement in the IFOAM Basic Standards is that "operators shall take measures to maintain and improve landscape and enhance biodiversity quality" (2.1.1).

Off site benefits are harder to quantify as the research base is thin. However, the research that has taken place shows lower per hectare emissions of CO_2 (between 40-60 per cent) in organic farming systems as compared to conventional ones

[iv] A frequently updated list of certifiers accredited by IFOAM can be found on: http://www.ioas.org/WEBSITE/pdfs/050215%20ACB%20List.pdf.

and lower NH_3 emission potential. There is clearly less risk to ground and surface water pollution from synthetic pesticides, soil erosion is less likely and nutrient balances of nitrogen, phosphorus and potassium tend to be zero. The few research projects undertaken on the subject have also shown that energy consumption on organic farms is lower than on conventional farms and energy efficiency higher[232].

Off site effects are mitigated by various standards, including:

- Nutrients and fertility products shall be applied in a way that protects soil, water, and biodiversity. Restrictions may be based on amounts, location, timing, treatments, methods, or choice of inputs applied (4.4.2)
- Chilean nitrate and all synthetic nitrogenous fertilizers, including urea, are prohibited (4.4.7)
- [Pest, disease and weed management products …] If the ecosystem or the quality of organic products might be jeopardized, the *Procedure to Evaluate Additional Inputs to Organic Agriculture* and other relevant criteria shall be used to establish whether the product is acceptable (4.5.2)
- Operators shall not deplete nor excessively exploit water resources, and shall seek to preserve water quality. They shall where possible recycle rainwater and monitor water extraction (2.2.6)

- **Biodiversity planning instruments**

Ranking: Not mentioned

IFOAM is currently developing global *Biodiversity and Landscape Standards* to be included within its Basic Standards. The standards require that a biodiversity and landscape management plan be drawn up for each farm, and include sections on genetic diversity, species diversity, ecosystem diversity, landscape, pastoral lands, water management and handling and processing. However, the current (2002) iteration of the standards does not include any mention of biodiversity plans.

- **Amount of modification**

Ranking: Cultural almost no natural elements

Although the level of modification varies greatly within different agricultural regimes (for example arable crops are grown on land which is modified far more than in the case of pastoral grazing). However, those certifiers accredited by IFOAM are particularly well placed to serve producers who wish to sell their products internationally. Production aimed at international markets it likely to more intensive (and thus more modified) than organic producers growing for home consumption or local markets.

This said the IFOAM standards do require that operators shall take measures to maintain and improve landscape and enhance biodiversity quality (2.1.1) and they prohibit the clearing of primary ecosystems (2.1.2).

- **Permanence**

Ranking: Potentially long term

At the first IFOAM Conference in 1978 an eight-point definition of sustainable food and farming was adopted, which was used to form the basis of the IFOAM Standards. Lady Eve Balfour described the objective as being both holistic and long term – "The criteria for a sustainable agriculture can be summed up in one word 'permanence', which means adopting techniques that maintain soil fertility indefinitely; that utilise, as far as possible, only renewable resources; that do not grossly pollute the environment, and that foster life-energy (or if preferred biological activity) within the soil and throughout the cycles of all the involved food-chains".

Although most certifiers only certify organic production annually, the fact that farmers have entered into a certification system, usually implies that the conversion to organic production is at least "potentially long term". One reason is that most producers will need to go through a conversion period (usually two years) before gaining organic status. The IFOAM standards state (3.1.1.): There shall be a period of organic management, meeting all the requirements of these standards, before the resulting product may be considered as organic.

- **Social sustainability**

Ranking: Neutral in terms of human wellbeing

It is likely that the social environment of those engaged in organic agriculture generally improves[233], however this can only really be assessed on a case by case basis. If we assume that the baseline of social sustainability is that all basic human rights and working conditions as stated in the various international conventions are met, then the IFOAM standards, which reiterate these conventions, will ensure that there is no negative effect on human wellbeing. This is not however a guarantee that there are any positive benefits to wellbeing by being engaged in organic production.

The IFOAM Basic Standards includes a chapter on Social Justice Standards, which refer to and are based on all the conventions of the International Labour Organisation on welfare labour and the human rights charter of the United Nations[234]. The UN Charter of Rights for Children is also referred to. Specifically, the standards require that operators have a policy on social justice (8.1) and state that in cases where production is based on violation of basic human rights and clear cases of social injustice, that product cannot be declared as organic (8.2).

Costa Rican Payments for Environmental Services Programme

Management Type	Incentive
Ecosystem services	**Legally established system**
Summary: National system for sustainable forest management through a Payment for Environmental Services Programme (PES).	

Background

Costa Rica has until recently had one of the highest rates of deforestation in the world, mostly due to conversion of land to agriculture or grazing. One result has been the deterioration of water services[235].

In an effort to halt the decline in forest cover and the environmental services linked to forestry, the Costa Rican "Pagos de Servicios Ambientales", or Payments for Environmental Services Programme (PES), was introduced in 1995. It aims to provide direct payments to landowners for the ecological services which their lands produce when they adopt land use and forest management techniques that do not harm the environment and which maintain quality of life.

The PES is executed through the *Fondo Nacional de Financiamiento Forestal* (FONAFIFO) and the *Sistema Nacional de Areas de Conservacion* (SINAC)[236]. It is funded mainly from a system that allocates one third of the revenues from a fossil-fuel sales tax to FONAFIFO[237]. As part of the PES, a forestry law was enacted that recognised four environmental services provided by forest ecosystems:

- ✓ mitigation of green house gas (GHG) emissions
- ✓ hydrological services, including provision of water for human consumption, irrigation and energy production
- ✓ biodiversity conservation
- ✓ provision of scenic beauty for recreation and ecotourism[238].

Scale

PES has provided payments to more than 4,400 farmers and forest owners[239]. The programme has been popular with landowners and requests to participate have been beyond the level of available funding[240]. There are limits to the area of land which can be included in the scheme (see Table 13)[241], and during the first four years of the programme more than 80 percent of PES contracts were awarded to land parcels less than 80 ha in size[242].

Table 13: PES Contracts by Land Type

Contract	Maximum Area (ha)	Land Owner Type
Individual	300	Individual land owner
Global	300 by land owner There is no limit for NGOs	Individual small and medium land owners associated to a local NGO
Indigenous Reserve	600	Indigenous Reserve Development Association

Minimum conservation value
Overall ranking: 18

Influencing factor	Ranking	Score
Biodiversity value	Proven biodiversity benefits in sustainable use area	4
Biodiversity planning instruments	Required	3
Amount of modification	Cultural ecology many natural elements	4
Permanence	Potentially long term	3
Social sustainability	Positive benefits to human wellbeing	4

Discussion of ranking

✓ **Biodiversity value**
Ranking: Proven biodiversity benefits in sustainable use area

There has been much debate how best to achieve the ecosystem services recognised in the forest law[243] and on the exact role the PES is playing in Costa Rica in reversing forest loss and conserving biodiversity.

A major study of forest cover from 1960 to 2000 in the Chorotega region of Costa Rica found two well-defined land cover change processes during the 40 year period. The first period of extensive/intensive cattle ranching practices contributed to significant forest degradation and a decline in forest cover between 1960 and 1980. During the second period, from 1980 to 2000, a dynamic process of secondary forest growth resulted from a combination of internal and international market forces and conservation initiatives[244]. The underlying reasons for this period of forest recovery are however unclear. There is some evidence that pasture was becoming less profitable, particularly in marginal areas, and that abandonment of these areas lead to forest growth[245]. Others however argue that pastures remain viable[246].

Given the popularity of the PES scheme and the amount of land involved it seems likely that the PES is contributing to the recovery of forest cover in Costa Rica. Although the major changes in levels of deforestation started before the PES system was implemented, a previous more limited incentive system, the Forest Credit Certificate (Certificado de Abono Forestal), was put in place in 1986[247]. It may be however that the PES is best suited to marginal lands with some threat of environmental damage and with a moderate conservation opportunity. In these areas modest subsidies may "tip the balance" in favour of sustainable land use[248]. This hypothesis is backed up by a study in the Lake Arenal area of Costa Rica, which found that livestock and dairy production generally produced a higher income than water service payments, and incentive payments did not even provide enough income for ranchers to reforest steep slopes used for cattle ranching and agriculture. However, a related study did find that small landowners are more inclined to accept the incentives[249].

It seems likely therefore that PES schemes are being implemented primarily on small areas of land, by small-scale landowners on marginal areas which are not profitable for ranching agriculture. Given this, the scheme's contribution to biodiversity conservation will be greater if these areas are contiguous and if areas which are being restored can act as buffers to areas of high biodiversity value, such as protected areas. However, research into deforestation and secondary growth trends within and around protected areas between 1960 and 1997 suggests the increasing isolation of protected areas. Although there has been negligible rate of deforestation inside national parks and biological reserves, outside there were significant forest losses in a 10-km buffer zone around the protected areas (there was however a net forest gain for the 1987/1997 time period within a 1-km buffer zone)[250].

✓ **Biodiversity planning instruments**
Ranking: Required

Management plans, which include information on land tenure and access, topography, soils, drainage, fire prevention plans and monitoring schedules, have to be prepared by participants who wish to take part in the scheme. The plans must be certified by a licensed forester and these obligations are recorded in the public land register, thus applying to any future purchaser of the land[251].

✓ **Amount of modification**
Ranking: Cultural ecology many natural elements

Forest restoration is one of the major objectives of the PES scheme. In addition to preserving the world's remaining tropical rainforests, the need to convert degraded and abandoned pasturelands into secondary forests provides the best opportunity for halting the downward trend in tropical forest cover[252]. The resulting forests are not the same as primary forests, and will take a long period of time to reach a similar ecology, but very quickly contain many of the elements found in natural forests.

✓ **Permanence**
Ranking: Potentially long term

PES contracts are generally over five years, but commitments can be for as long as 10-15 years. At present, there are three different types of PES contracts:

- ✓ *Forest conservation contracts*: approx. US$200 per ha over a five-year period for forest conservation easements. Eighty-five per cent of contracts in the PES programme to date support forest conservation easements, which target the conservation of vegetative cover in primary and secondary forest areas. Contracts are for five years, but can be renewed depending upon funds availability.
- ✓ *Sustainable forest management contracts*: approx. US$300 per ha over a five year period, for sustainable forest management easements. Nine per cent of contracts in the ESP programme support sustainable forest management. Landowners must make a commitment to maintain forested areas for a period of 15 years.
- ✓ *Reforestation contracts*: approx. US$540 per ha over a five-year period, for reforestation easements. Landowners must make a commitment to maintain reforested areas for a period of fifteen to twenty years, depending upon tree species.

✓ **Social sustainability**

Ranking: Positive benefits to human wellbeing

Although the PES scheme is not a social welfare programme, from the start the state and various social organisations assumed that it would contribute to rural poverty alleviation in Costa Rica[253].

One detailed study of the social effects of the PES on local communities has been carried out in the Central Volcanic Mountain Range Conservation Area, with a particular focus on the Virilla watershed. The study concluded that as well as having financial benefits – an average increase of approximately 15 per cent in the household disposable income (equivalent to an average of approximately $4,200/yr per property), with a range of $880-$11,200) and resulting increased farm investment – the main impact of the programme relates to capacity building at various different levels. Landowners have also benefit directly from capacity building and advice on a range of management issues such as: the planting process, fertilisation, management, design and maintenance of paths, harvesting, and minimising the risk of illegal hunting within the properties. Capacity building in agro-conservation and integrated management of small farms (agro-forestry, organic compost and fertilisers, wormeries, improvement of species for feeding livestock, etc.) has overall resulted in a more a holistic approach to farm management[254]. There has also been a substantial improvement in environmental education and solid waste management, involving schools, parents and civil society.

More generally, PES can help empower small- and medium-scale private landowners in the conservation and management of forest ecosystems and in making choices that contribute to sustainable development[255].

Village Fisheries in Samoa

Management Type	Incentive
Marine fishing	**Voluntary agreements**
Summary: Village Fisheries Management Plans allow for the devolution of powers in inshore fisheries management back from the national government to the villages and local fishers and for effective conservation policies to be established.	

Background

With the exception of the highly migratory pelagic fish stocks, the narrow natural resource base of many of the Pacific islands make them particularly vulnerable to natural disasters, inappropriate development and mismanagement[256]. The population of Samoa, in the South-western Pacific, has increased 5–6-fold in the past 150 years. Wetlands, lagoons and coral reefs have been seriously degraded because of inappropriate land-use and fisheries practices and many fish and invertebrate stocks have declined[257]. Fisheries were also badly affected by two major cyclones in the beginning of the 1990s. Cyclone Ofa left an estimated 10,000 islanders homeless in February 1990 and Cyclone Val resulted in millions of dollars in damage in December 1991. As a result, GDP declined by nearly 50 per cent from 1989 to 1991[258].

Given these challenges a research programme was established in 1990 to determine the status of the coastal and inshore environments, to monitor inshore subsistence and commercial fisheries, to determine the status of stocks, and to identify potential management actions. An inventory of inshore resources was produced using aerial photography and ground and underwater surveys. Fisheries catch and effort were established through a national census, questionnaire surveys in households and schools, and creel and market surveys[259]. The results contributed to the development of a major aid programme set up in 1995 by the Australian government (AusAID) to assist Samoa to establish an effective inshore fisheries and environmental management programme. A key strategy was the devolution of powers in inshore fisheries management back from the national government to the villages and local fishers. An inshore fisheries extension capability was developed within Samoa's Fisheries Division to assist villagers to undertake their own environmental and fisheries surveys; identify major factors affecting fisheries; identify ways of reducing these factors; establish (between village council and national government) an agreed Village Fisheries Management Plan and regulations; and establish their own fisheries management bodies[260].

Scale

Samoa consists of two main islands, Upolu and Savaii and seven smaller islands (only two of which are inhabited). The total land area is 2,935 sq. km. In 1999 the population was of about 168,000 people, living in 326 villages. About 230 villages are considered to be coastal villages. Thirty percent of these coastal villages now have village fishery management plans and marine reserves have been established in approximately 60 locations[261].

Minimum conservation value
Overall ranking: 15

Influencing factor	Ranking	Score
Biodiversity value	Proven biodiversity benefits in sustainable use area	4
Biodiversity planning instruments	Required	4
Amount of modification	Cultural ecology many natural elements	4
Permanence	Potentially long term	3
Social sustainability	Neutral in terms of human wellbeing	0

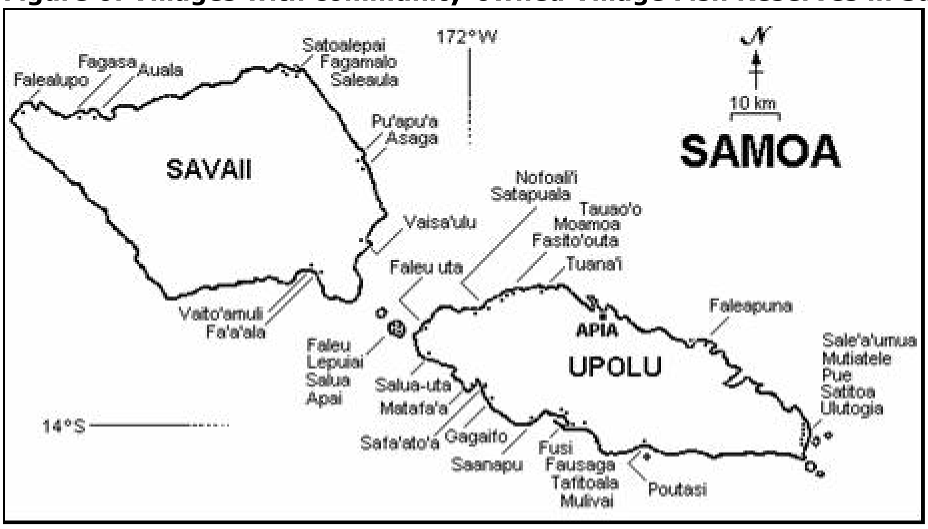
Discussion of ranking

✓ **Biodiversity value**
Ranking: Proven biodiversity benefits in sustainable use area

The Village Fisheries Management Plans list the resource management and conservation undertakings of the community, and the servicing and technical support required from the Fisheries Division[262].

Many of the Management Plans (38 as of the late 1990s) included the establishment of small Village Fish Reserves (see Figure 6) in part of their traditional fishing areas. Although many of the community-owned reserves are small (size ranges from 5,000 to 175,000 m^2), their large number, often with small distances between them, forms a network of fish refuges. Such a network should maximise linking of larval sources and suitable settlement areas and provide the means by which adjacent fishing areas can be replenished with marine species through reproduction and migration. As the Reserves are being managed by communities which have a direct interest in their continuation and success, prospects for continuing compliance and commitment appear high.

Figure 6: Villages with community-owned Village Fish Reserves in Samoa



Globally, research into the role of no-take areas and marine protected areas in increasing fishery stocks and ensuring an ecosystem approach to marine biodiversity protection, is leading to greater numbers of such areas being established. These management tools have also been recognised at a policy level (i.e. the commitments made at the World Summit on Sustainable Development)[263].

Although there has been no scientific research carried out on fish stocks in relation to this network of reserves, interviews in 15 fishing villages suggested that the reserves improved lagoon environments and stock status at least within the reserves, if not yet in adjoining areas. In combination with a general recovery of reefs and lagoons from the destruction of the cyclones of the early 1990s, this has resulted in fish populations recovering some way towards their pre-cyclone levels[264].

The effect of the conservation measures on different species has been variable. Again, although no detailed research has been undertaken, the extent of recovery (e.g., in terms of catch rate per hour) was estimated by some villagers to have reached approximately 50 per cent of pre-cyclone levels in Upolu and close to 100 per cent in Savaii. In the lagoons, grey mullet (*anae*) are widely reported to have made a substantial recovery, perhaps due to a reduction in the number of fish fences and traps. Trevally, parrotfish and surgeonfish populations are also reported to have recovered, while milkfish numbers remain low. Red lipped mullet (*ia'eva*) were reported by fishers to have made an almost complete recovery in Pu'apu'a on Savaii. Shellfish have also recovered, to perhaps 30 per cent of pre-cyclone levels. Turtles are reported to be abundant in many areas, particularly in Aleipata and Savaii[265].

✓ **Biodiversity planning instruments**
Ranking: Required

The co-management regime is dependent upon the development of Village Fisheries Management Plans. Each plan sets out the resource management and conservation undertakings of the community, and the servicing and technical support required from the government Fisheries Division. Community undertakings range from enforcing laws banning destructive fishing methods to protecting critical habitats such as mangrove areas[266].

✓ **Amount of modification**
Ranking: Cultural ecology many natural elements

Marine environments in the Pacific have been altered by over-exploitation, the use of destructive fishing methods (including explosives, chemicals and traditional plant-derived poisons) and environmental disturbances. The Fisheries Management Plans developed in Samoa included undertakings to support and enforce government laws banning the use of chemicals and explosives to kill fish. Traditional destructive fishing methods such as the use of plant-derived fish poisons (*ava niukini*) and smashing of coral to catch sheltering fish (*fa'amo'a* and *tuiga*) are also banned[267]. This not only provides the opportunities for fish stocks to replenish, but allows for the overall marine environment to recover.

✓ **Permanence**
Ranking: Potentially long term

Despite concerns over declining fish stocks, government actions and national laws to protect fish stocks are rarely successful. This is due to many factors, including poor enforcement regimes and particularly the lack of community involvement. Fishing communities are often repositories of valuable traditional knowledge concerning fish stocks, and have a high level of awareness of the marine environment. In addition, many subsistence fishers in tropical regions live in discrete communities that have some degree of control, either legal or traditional, of adjacent waters. Together, these factors provide an ideal basis on which communities can be encouraged and motivated to manage their own marine resources[268].

This certainly seems to be the case in Samoa. An evaluation of the AusAID project concluded that: "Overall, the environmental impact of fisheries extension and training project is considered to be highly positive and the project is among the Pacific region's more successful projects from an environmental perspective. Building on traditional management practices and providing village communities with the power to enforce them has resulted in a high level of ownership of the project, and a real sense of commitment to conservation"[269].

✓ **Social sustainability**
Ranking: Neutral in terms of human wellbeing

Marine organisms are an important protein source in the diet of many of Samoa's coastal communities. The marine environment also provides the primary source of income for many households; the 1999 Agriculture census indicated that one-third of the total number of households in Samoa was engaged in some form of fishing during the week prior to the census[270].

The communities who have developed Fisheries Management Plans clearly expect that, by banning fishing over parts of their traditional fishing area, fish catches in adjacent areas will improve. The short-term effects of the community-based fisheries management are however either neutral or negative, particularly as the establishment of reserves restricts fishing areas, and the banning of destructive techniques has halted these highly productive, if extremely damaging, fishing methods. While fish stocks are recovering, therefore, a residual effect of the low catch rates in most of the period since 1991 has been to limit the extent to which some villagers have resumed fishing[271].

The Sacred Spiny Forests of Madagascar

Management Type	Incentive
Cultural protection	**Legally-established system**
Summary: New management agreements between local communities and the Malagasy government are providing additional protection for the Sacred Forests of the Spiny Thickets Ecoregion of Madagascar.	

Background

Madagascar is noted for its high levels of endemism, which resulted from the island's isolation from Africa some 125 million years ago[272]. The country is also noted for its environmental degradation, with about 80 per cent of its original forest cover lost and deforestation continuing at a rate of about 200,000 ha annually[273].

The spiny thicket or "spiny desert" of southern Madagascar has the highest percentage of plant endemism in the country; 48 per cent of the genera and 95 per cent of the species occurring in the ecoregion[274]. The spiny thicket ecoregion covers some 4,430,000 ha[275]. From satellite images, it has been estimated that between 1,400,000 and 1,700,000 ha of intact habitat still remains in the ecoregion; mainly in the northwest and extreme southeast of area[276].

Principle threats to the forests are small-scale, but widespread, exploitation for firewood and charcoal production and selective logging for construction wood. These threats are particularly significant as the spiny thicket forest type has a naturally slow rate of growth and regeneration[277]. Much of the inland area has been replaced by secondary grassland and wooded grassland[278]. Official protection levels are low, with protected areas covering no more than three per cent of the ecoregion[279].

Forests have traditionally held a central position within the social and cultural life of the communities of southern Madagascar, inspiring respect through a great number of taboos and norms. Traditionally, the hunting "fady", or taboos, of two of the local tribes (the Antandroy and Mahafaly) protected many animal species. However, with the increased movement of people across the region, the local fady on certain animals is becoming less effective as a means of protection[280]. The spiny forests also provide 75 per cent of the medicinal plants used in Madagascar. The sources of many of these medicinal plants are the sacred forests, where the remains of royal ancestors are buried, which have been zealously protected for centuries. Many local traditions and customs have prevented the destruction of these forests. However, the biodiversity of these sacred forests is now also being threatened by the overexploitation of forest resources to meet growing human needs. In recent years, traditional faith leaders have expressed concern for the conservation of these forests and have developed partnerships with conservation NGOs and the Ministry of the Environment, Water and Forests to strengthen the conservation and management of the forests[281].

Scale
Sacred forests can be found in about 1.4 per cent (or 63,000 ha) of the Spiny Forest ecoregion of Madagascar[282]. Ensuring their effective management therefore offers a major opportunity to increase biodiversity conservation within the ecoregion.

To date, the Mahafaly (meaning "Those who make taboos") and Tandroy communities of Southern Madagascar, local authorities and the Malagasy government have committed to conserve the sacred forests of Sakoantovo (6,163 ha) and Vohimasio (30,170 ha)[283]. It is hoped that these new agreements will inspire other communities to conserve the unique biodiversity of the island.

Minimum conservation value
Overall ranking: 16

Influencing factor	Ranking	Score
Biodiversity value	Unproved biodiversity benefits	2
Biodiversity planning instruments	Required	3
Amount of modification	Cultural ecology many natural elements	4
Permanence	Potentially long term	3
Social sustainability	Positive benefits to human wellbeing	4

Discussion of ranking

✓ **Biodiversity value**
Ranking: Unproved biodiversity benefits

The sacred forests of Sakoantovo contains habitat typical of the spiny forest and a transitional zone to riparian forest. The Vohimasio forest is also in a transitional zone from humid forest to spiny forest[284]. Although the high level of endemism of the Spiny forest is well known, there has been surprisingly little monitoring of species populations[285]. Scientific evidence on the role of sacred forests in forest conservation is thus at present lacking. It is clear, however, that the species likely to suffer most from forest clearance are those of high conservation priority due to their restricted geographic range[286]. Forest conservation is thus of extreme importance for the many endemic species found in this region of Madagascar.

As noted above, plant endemism in the spiny forests is extremely high – 95 per cent of the species occurring in the ecoregion[287]. The fauna includes: three strictly endemic mammals, the white-footed sportive lemur (*Lepilemur leucopus*), giant-striped mongoose (*Galidictis grandidieri*) and gray-brown mouse lemur (*Microcebus griseorufus*) and six other lemurs found only in spiny thicket and the adjacent Succulent Woodlands ecoregion, red-tailed sportive lemur (*Lepilemur ruficaudatus*), Verreaux's sifaka (*Propithecus verreauxi*), the ring-tailed lemur (*Lemur catta*), forked-marked lemur (*Phaner furcifer*), fat-tailed dwarf lemur (*Cheirogaleus medius*) and gray mouse lemur (*Microcebus murinus*)[288]. The mongoose species is considered endangered on the current IUCN Red Data List, and Verreaux's sifaka and the ring-tailed lemur are vulnerable[289]. There are also several endemic reptiles and eight endemic bird species to the ecoregion[290].

✓ **Biodiversity planning instruments**
Ranking: Required

Biodiversity planning in the sacred forests mixes traditional practices with current conservation practice. Traditional customs are often complex, with for example, the Mahafaly people recognising nine categories of sacred forests, with a range of management regimes and sanctions. The most important is a forest with a tomb of a king or a dignitary where customary law allows only specified persons – usually members of the royal family – to enter, collect products or make fire[291]. By devolving the control and management of the areas and their natural resources to their traditional stewards, it is hoped that these traditional practices and their conservation benefits will be strengthened.

The responsibility for management of these sacred forests has thus been transferred to the local population through an agreement between the Ministry of the Environment, Water and Forests and local communities represented by their traditional leaders. The communities are organised through a management structure and a *dina* (customary law) regulating use. The transfer provides communities with the authority to control access to sacred forests and enforce sustainable management[292]. Through these Local Management Committees, the communities commit to the sustainable management of the forests and develop management plan for the area.

✓ **Amount of modification**
Ranking: Cultural ecology many natural elements

Although these are cultural sites and are subject to resource extraction, the sacred forests of the spiny thicket ecoregions are extremely rich in wildlife which indicates that modification is limited. Sakoantovo, for example, has healthy populations of five species of lemurs[293].

✓ **Permanence**
Ranking: Potentially long term

The sacred forests have survived many centuries of population increase and environmental degradation. The formal partnership between local communities and government to manage these areas for both cultural and conservation objectives both formalises and strengthens these traditions.

✓ **Social sustainability**
Ranking: Positive benefits to human wellbeing

The conservation of these sacred forests benefits biodiversity and helps reinforce traditional social and cultural practices. The devolution of management to local communities ensures the continued importance of local and community values and practices.

The Forest Stewardship Council

Management Type	Incentive
Forest	**Third-Party Certification**
Summary: The Forest Stewardship Council (FSC) is the best known and most extensive forest certification body, which aims to promote responsible management of the world's forests.	

Background

Forest certification was introduced in 1993 as a market-based response to address public concerns related to deforestation in the tropics and forest degradation in the temperate and boreal regions, the resulting loss of biodiversity and the perceived low quality of forest management in areas where traded wood products are sourced.

The Forest Stewardship Council (FSC) scheme is the only international certification system with wide geographical coverage, in particular in tropical countries where biodiversity conservation needs are greatest. The FSC standards are also the most rigorous of all the certification systems with respect to biodiversity conservation[294].

FSC certification is carried out by inspectors from FSC-accredited certification bodies, who assess if forest management complies with the internationally-agreed FSC 10 Principles and Criteria of Sustainable Forest Management. The Principles specify minimum standards of forest management that must be met before a producer can be certified[295].

Scale

A recent analysis suggests that the original intention to save tropical biodiversity through certification has not yet succeeded[296]. Most of the certified area is in the temperate and boreal zone, with Europe as the most important region. Less than 20 per cent is in tropical countries (see Table 14), although this area is increasing. It should be noted however that other certification schemes, such as the Programme for the Endorsement of Forest Certification schemes (PEFC), have even more limited coverage (of the 2,305 certificates issues by PEFC, only five are in a developing country)[297].

Table 14: FSC Certified Forests (as of 9/11/05)[298]

Region	% certified
Europe	50.85
North America	31.12
Latin America and the Caribbean	11.99
Asia Pacific	3.52
Africa	2.52

From a global perspective the overall impact from certifying comparatively well-managed forests is likely to be limited[299]. For example, in Bolivia, where the largest area of forest (more than two million ha) in the tropics has been certified[300], certification is dominated by five large companies that are already among the best performing forest managers in the country. Only comparatively small levels of improvement in management have thus been obtained through certification, whilst major deforestation persists unabated. There is the intention that certification will become an accepted and necessary step in marketing timber products so that all producers will be certified as a matter of course, but this still appears to be a long way off.

FSC certification has thus tended to provide regulation-based verification of compliance with already established norms. Therefore, as the analysis below indicates, although there is evidence that certification produces biodiversity benefits by further improving management in forests that are probably already fairly well managed, the incentives offered by certification have not yet been sufficient to prevent continuing deforestation to supply the timber trade, and the volume of certified forest products currently on the market is too small to reduce logging pressure significantly in high conservation value forests (HCVF) [301]. Only if improved practices spread to poorly managed forests, particularly in developing countries, will a significant impact on forest conservation be seen. Nonetheless, certification offers important gains in situations where managed forests have high biodiversity or where they adjoin protected areas.

Minimum conservation value
Overall ranking: 17

Influencing factor	Ranking	Score
Biodiversity value	Unproven biodiversity values	2
Biodiversity planning instruments	Required with monitoring and adaptive management	4
Amount of modification	Cultural ecology many natural elements[v]	4
Permanence	Potentially long term	3
Social sustainability	Positive benefits to human well-being	4

Discussion of ranking

✓ **Biodiversity value**
Ranking: Unproven biodiversity benefits in sustainable use area

Principle 6: Environmental Impact
Forest management shall conserve biological diversity and its associated values, water resources, soils, and unique and fragile ecosystems and landscapes, and, by so doing, maintain the ecological functions and the integrity of the forest[302].

A global review of 156 active FSC certificates in 1999, quantified the type of corrective actions that were required of companies as they underwent audits prior to certification. The results provided clear evidence that companies were required to adapt their management during the certification process in ways that would benefit biodiversity. For example, 38 per cent companies were required to improve the protection of representative ecosystems within their borders, 37 per

[v] This depends to some extent on the type of forest being certified – which ranges from natural forests with minimal management to plantations

cent of companies had to improve their management of rare, threatened or endangered species and 24 per cent were required to conduct an Environmental Impact Assessment[303]. Follow-up surveys reinforce these results, and have also shown that most FSC-certified companies have established significant protected set-asides within their forests[304]. Certification of forests in Sweden has probably added around 250,000 hectares to the protected forest estate[305]. Further research in Europe, has shown that FSC certification has provided an incentive to manage forests closer to their potential natural vegetation by increasing the diversity of trees and mixed stands, improving the protection of rare and threatened species and their habitats, and reducing the use of chemicals in forest management[306].

Specific requirements for FSC certification include:

- ✓ An Environmental Impact Assessment
- ✓ Rare, threatened or endangered species and their habitats must be managed for and maintained.
- ✓ Representative samples of ecosystems must be protected.
- ✓ The use of genetically modified organisms is prohibited.
- ✓ The use of exotic species should be carefully controlled.
- ✓ With very few exceptions, the conversion of natural forests is prohibited[307].

✓ **Biodiversity planning instruments**
Ranking: Required with monitoring and adaptive management

FSC's Principle 7 (see box below) details that management and monitoring plans need to be in place for a forest to be certified. A 2002 analysis of the changes forest managers have had to make to obtain FSC certification on 18 million ha of forests in Estonia, Germany, Latvia, Russia, Sweden and the UK, showed, amongst other things, that certification led to significant improvements in management planning[308]. Specific improvements were noted in developing management objectives, long-term forest plans and long-term sustainable harvest production. Importantly, objectives are also now being monitoring and the results fed back into planning. Furthermore, local consultations improved local planning and co-ordination.

Principle 7: Management Plan
A management plan – appropriate to the scale and intensity of the operations – shall be written, implemented, and kept up to date. The long term objectives of management, and the means of achieving them, shall be clearly stated.

7.1 The management plan and supporting documents shall provide: a) Management objectives. b) Description of the forest resources to be managed, environmental limitations, land use and ownership status, socio-economic conditions, and a profile of adjacent lands. c) Description of silvicultural and/or other management system, based on the ecology of the forest in question and information gathered through resource inventories. d) Rationale for rate of annual harvest and species selection. e) Provisions for monitoring of forest growth and dynamics. f) Environmental safeguards based on environmental assessments. g) Plans for the identification and protection of rare, threatened and endangered species. h) Maps describing the forest resource base including protected areas,

planned management activities and land ownership. i) Description and justification of harvesting techniques and equipment to be used.
7.2 The management plan shall be periodically revised to incorporate the results of monitoring or new scientific and technical information, as well as to respond to changing environmental, social and economic circumstances[309].

✓ **Amount of modification**
Ranking: Cultural ecology many natural elements

FSC certified forests can range from near natural forests to plantations, but certification does place restrictions (see below) on forest conversion. One interesting finding from the survey of six European countries mentioned above was that in the most "man-made" forests, FSC certification has resulted in moves towards restoring natural processes, including lower impact silviculture[310].

Principle 6: Environmental Impact
6.10 Forest conversion to plantations or non-forest land uses shall not occur, except in circumstances where conversion: a) entails a very limited portion of the forest management unit; and b) does not occur on high conservation value forest areas; and c) will enable clear, substantial, additional, secure, long term conservation benefits across the forest management unit[311].

This principle reflects the original aims of certification, to reduce forest loss and degradation. The precise interpretation of this principle, which remains weaker than some conservation organisations would have liked, depends on the interpretation of High Conservation Value Forests (HCVF). Although there is now a methodology for identifying HCVFs[312], this has only been applied in a few places to date.

Principle 10: Plantations
10.4 The selection of species for planting shall be based on their overall suitability for the site and their appropriateness to the management objectives. In order to enhance the conservation of biological diversity, native species are preferred over exotic species in the establishment of plantations and the restoration of degraded ecosystems. Exotic species, which shall be used only when their performance is greater than that of native species, shall be carefully monitored to detect unusual mortality, disease, or insect outbreaks and adverse ecological impacts.
10.5 A proportion of the overall forest management area, appropriate to the scale of the plantation and to be determined in regional standards, shall be managed so as to restore the site to a natural forest cover[313].

Accepting plantations within the FSC was a controversial move, with some NGOs strongly opposed to the principle of large-scale plantations; it would be fair to say that the decision pushed some NGOs into opposition[314], while failure to have included them would have had the same affect with some forest products companies. The FSC is currently undertaking a major review of its relationship with plantations[315]. There are few places where plantations are likely to have high biodiversity benefits and therefore using the FSC as a filter of sustainable management might mean removing the subset of FSC certified forests that are exotic plantations.

✓ **Permanence**
Ranking: Potentially long term

In theory, forest certificates are awarded annually and a company can drop out at any time; this happens sometimes. But most of the more responsible companies, who are prepared to invest the time and money in gaining a certificate, see it as a long-term commitment, particularly if their suppliers are demanding certified products. Certification is increasingly being seen as a long-term necessity for responsible forest managers.

✓ **Social sustainability**
Ranking: Positive benefits to human well-being

The FSC mission is to promote environmentally appropriate, socially beneficial, and economically viable management of the world's forests. It defines socially beneficial forestry as forest management which: "helps both local people and society at large to enjoy long-term benefits, and also provides strong incentives to local people to sustain the forest resources and adhere to long-term management plans"[316]. A wide range of benefits from certification have been documented[317], but it has been hard to establish specific trends and there have been concerns that certification is not making a difference to those who need it most[318].

Generally, the FSC has not as yet created a viable market for small, developing country producers to access independently, and although community forest enterprises account for some 25 per cent of all FSC certifications (figures for 1999, with trends continuing into 2002), they only account for a very small area (3 per cent) and are generally aid projects in developing countries. The projects are however using the FSC as a tool to help alleviate poverty through improved forest management[319].

The FSC has recognised the need to enhance the fulfilment of its social objectives, and has recently developed policy to ensure enhanced compliance with the FSC's "social" Principles and Criteria and more equitable access to FSC forest certification among all forms of forest users and tenure holders[320].

Principle 3: Indigenous People's Rights
The legal and customary rights of indigenous peoples to own, use and manage their lands, territories, and resources shall be recognized and respected.

Principle 4: Community Relations and Workers' Rights
Forest management operations shall maintain or enhance the long-term social and economic well-being of forest workers and local communities[321].

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