DRAFT REPORT

Global Strategy for Plant Conservation

Convention on Biological Diversity

STAKEHOLDER CONSULTATION ON TARGET 4

"At least 10 per cent of each of the world's ecological regions effectively conserved"
(by 2010)

Compiled for WWF (Lead Organisation for the Consultation)

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List of acronyms

ASEAN	Association of South East Asian Nations
BGCI	Botanic Gardens Conservation International
CBD	Convention on Biological Diversity
CCAD	Comisión Centroamericana de Ambiente y Desarrollo
CI	Conservation International
COP	Conference of the Parties (COP6 = Sixth COP)
EA	Ecosystem Approach (of the CBD)
EBA	Endemic bird area
EU	European Union
EUROPARC	European Federation on Protected Areas
GIS	Geographic information system
GSPC	Global Strategy for Plant Conservation
IUCN	World Conservation Union (formerly International Union for the Conservation of Nature)
NBSAP	National Biodiversity Strategy and Action Plan
NFP	National Forest Programme
NGO	Non-governmental organisation
PA	protected area
Ramsar	Convention on Wetlands of International Importance especially as Waterfowl Habitat
SBSTTA	Subsidiary Body on Scientific, Technical and Technological Advice
SCBD	Secretariat of the Convention on Biological Diversity
SPAW	Specially Protected Areas and Wildlife in the Wider Caribbean Region
SPREP	South Pacific Regional Environment Programme
TBPA	Transboundary protected area
TNC	The Nature Conservancy
UNDP	United Nations Development Programme
UNEP-WCMC	World Conservation Monitoring Centre of the United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFF	United Nations Forum on Forests
WCPA	World Commission on Protected Areas
WPALF	World Protected Areas Leadership Forum
WRI	World Resources Institute
WWF	World Wide Fund for Nature or World Wildlife Fund
WSSD	World Summit on Sustainable Development

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Summary and Key Recommendations

RELEVANCE OF THE ECOSYSTEM APPROACH

EA principle: People with their cultural diversity are an integral component of biodiversity. An implication of this target is recognition that habitats and landscapes have generally been very significantly shaped by human actions and that, for the most part, people will continue to be present and continue to influence their development.

EA principle: The delimitation of ecosystems for conservation action needs to be defined conceptually on scales appropriate to the problems being addressed. An implication for Target 4 is that the geography of conservation actions should be defined according to the systems (political, economic and cultural) being addressed, which will usually not accord with that of ecological regions (defined biologically)

EA principle: Work can involve all three objectives of the CBD, requiring the striking of a balance between them. The striking of balances between conservation and use, and between the interests of various stakeholders, will generally be critical for practical implementation of Target 4.

EA principle: There are uncertainties in managing ecosystems and, consequently, a need for conservation measures to contain elements of 'learning by doing' or feedback from research. Management systems should be adaptive.

EA principle: Benefits need to accrue to those responsible for producing and managing the benefits derived from ecosystems, with a special emphasis on local communities. The involvement of local communities will generally be critical for achievement of Target 4.

CLARIFICATION OF THE SCOPES OF ACTIVITIES

Close co-ordination with Targets 5 and 13. These targets can be considered as the central *in situ* cluster of the Global Strategy, concerned with places important for plant diversity and rich in plant resources supporting local livelihoods.

Ecological regions. These are meso-scale biogeographic units. Parties should choose schemes for ecological regions appropriate to their cases. Most countries already have established systems of classification of vegetation or habitat types, or bioclimatic zones, which they have found appropriate, and which they will often continue to use (and evolve) in conservation planning. At the same time, parties should strive towards common regional and global standards in the designation of ecological regions, to facilitate cross-border comparison, and regional to global monitoring. There is a need for international agencies interested in conservation planning to collaborate towards greater uniformity in the recognition of ecological regions across the world, and to work with parties (on request) so that the latter have the capability to monitor according to international standards.

'At least 10 per cent'. Many people have misunderstood this figure, taking the requirement to be 10%. It is critical to raise awareness of the true target. Within ecological regions, the 'at least 10%' figure should be distributed between habitat types and particular examples of habitat following the principles of systematic conservation planning.

Systematic conservation planning. This is the key planning processed needed to attain the target. It involves the recognition of habitat types and assessment of their conservation values and of those of particular examples of habitat, analysis of protected area systems and identification of gaps in representation, analysis of protected area effectiveness and of measures for improvement, the potential for habitat conservation outside protected areas and of necessary incentives and other measures for its achievement, assessment of the impacts of environmental (including climatic) change and desirable remedial measures, and analysis of threats with the identification of priority tasks for conservation action.

Relationships of planning to implementation, Some priorities within ecological regions will already be known and actions should proceed immediately. Planning should be conceived as embedded within implementation, rather than the other way round.

Roles for protected areas. This is not a protected area target, but protected areas (all IUCN categories) will generally be among key instruments needed for its delivery. The possibilities for enlargement of protected area systems vary greatly between ecological regions. The desirability of increasing the representation of particular habitat types in protected areas will vary. In some cases; it will not be necessary for 'at least 10%' of a habitat type to be so represented. In other cases, habitat types are so reduced and threatened that all remaining areas should be included in protected areas.

Regional co-operation. This will typically be highly desirable because ecological regions and habitats are not defined politically (many transgress national borders), lessons can be shared and joint measures to build capacity undertaken. Regional meetings will often proved useful for catalysing action.

RECOMMENDED ACTIVITIES UNDER THE CROSS-CUTTING TARGETS OF THE STRATEGY

Target 3. There is an urgent need to find 'more effective ways of doing things' with respect to all aspects of systematic conservation planning and implementation. There are particular needs relating to the involvement of local communities in protected areas, and the development of financial and other incentives for conservation.

Target 13. Education is urgently needed to draw attention to the values of plants and conservation. Key elements should include building on local values of plants, spreading awareness of the ecological services derived from protected areas and promotion of the concept of inter-generational equity.

Target 15. Enhanced professional capacity is much needed, with priorities varying between countries and regions. There is especially a need for professional conservationists, able to work with users of plant resources and landowners in inter-disciplinary ways. The existence of skilled motivated professionals is considered critical for achievement of the target.

Target 16. Network development is key at all levels (including internationally and between communities and individual conservationists) to share experiences, undertake joint analyses, and develop more effective models with protocols (Target 3).

DEVELOPMENT OF BASE-LINE DATA

Roles for parties and national/regional activists. Much data sometimes exists at national levels, but often needs collating and analysing, with research undertaken to fill gaps. Such activities are part of systematic conservation planning. Data acquisition will be a continuing process.

Roles for international agencies. These have key roles in: (1) collating information from the national level for the purposes of global monitoring; (2) providing data to countries and plant conservation activists; (3) developing international standards; and sometimes (4) involvement in collaborative projects. Agencies should collaborate with one another to share information and develop standards. The key fields for the development of standards (with some key agencies indicated) are: (1) categorisation of protected areas (IUCN); (2) categorisation of the management effectiveness of networks and individual protected areas (WWF); and (3) recognition of ecological regions (UNEP-WCMC plus partners).

Sub-targets with milestones and indicators

Sub-target 1: Parties to engage in systematic conservation planning, including protected area assessments and identification of key fields for capacity-building.

Milestone: All parties to have initiated systematic conservation planning (by end-2005).

Indicator: Report to CBD.

Milestone: Identification of new sites for protected areas and processes initiated for their designation (by end-2006).

Indicator: Sites indicated on maps; field visits to proposed sites.

Sub-target 2: Parties to initiate work on cross-cutting targets of the strategy.

Milestone (Target 3): Systems operative to develop more effective practices (by end-2005).

Indicator: Records of meetings of review groups, at least one of which should be concerned with protected area/community relationships.

Milestone (Target 14): Parties to develop education programmes drawing attention to the benefits of plants and of how people can be involved in conservation (by end-2005).

Indicator: Incorporation in school curricula and on radio/TV.

Milestone (Target 15): Parties to develop training programmes, including for work at the people/plant interface (by end-2005).

Indicator: Existence of programmes; interviews with staff and students.

Milestone (Target 16): Parties to promote networks of groups and individuals (by end-2005).

Indicator: Existence of active networks; productive meetings.

Sub-target 3: Regional co-operations assured.

Milestone: Regional meetings involving botanical experts/conservation activities (by end-2005).

Indicator: Records of meetings; products known to governments.

Sub-target 4: International standards developed.

Milestone: Meetings held on the development of relevant international standards.

Indicator: Records of meeting.

THE REPORT

TARGET 4

At least 10 per cent of each of the world's ecological regions effectively conserved (by 2010)

1. Origin of the consultation

The Global Strategy for Plant Conservation (GSPC) was adopted under the Convention on Biological Diversity (CBD) in April 2002. A follow-up meeting of a Global Liaison Group was held in Cartagena, Colombia, in October 2002, at which it was decided that further consultation on the targets of the GSPC was needed. Lead Organisations were proposed for some targets. It was later decided by the Secretariat of the CBD (SCBD) that Dr Peter Wyse Jackson of Botanic Gardens Conservation International (BGCI) would assist with co-ordination of the consultations, with a single document, based on their results, prepared for submission to a meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) to be held in November 2003.

A Working Document emanating from the Cartagena meeting was made available to the World Wide Fund for Nature (WWF) in February 2003. WWF was proposed in this document as the Lead Organisation for Target 4. Submission of reports by Lead Organisations was requested by end-June 2003. A degree of relaxation in this deadline later became possible, following a decision that the results of the consultation would not be discussed at SBSTTA in November 2003, but rather at a later date.

On receiving the Working Document, WWF agreed to act as Lead Organisation for Target 4, on the understanding that this would only be for the purpose of the present consultation. WWF will consider later whether to continue to act as Lead Organisation for Target 4, if so requested.

2. Requirements of the consultation

The Working Document emanating from the Cartagena meeting states that Lead Organisations are expected to assume senses of responsibility for the targets, facilitate stakeholder involvement and undertake specific actions towards their achievement. As regards the present consultation for Target 4, WWF is expected to consult stakeholders to:

- Recommend how the Ecosystem Approach (EA) of the CBD can be applied to achieve the target.
- Clarify the scope of activities of the target.
- Recommend activities under the cross-cutting targets of the GSPC (Targets 3, 14-16) to achieve the target.
- Develop base-line data for the target.
- Develop sub-targets, milestones and indicators for the target.

3. Measures taken to consult stakeholders

In April 2003, Kristina Plenderleith was engaged to work with Alan Hamilton of WWF-UK to undertake stakeholder consultations and help prepare this report.

In view of the time constraint (original deadline: end-June 2003), consultation has largely been through electronic forms of communication and visits to only a few organisations. It has not proved possible to convene more general meetings. It was proposed to the SCBD and Dr Peter Wyse Jackson that consultation of Representatives of the Parties to the CBD could best be achieved if Lead Organisations for the various targets of the GSPC work together to undertake such consultations as opportunities arose. This method of consultation was suggested because it was postulated that recommendations for follow-up activities for at least certain groups of targets would probably be similar in outline, though differing in detail. Given the time constraint, this was proposed as a practical way of achieving adequate consultation (especially of Representatives of the Parties) for the GSPC as a whole.

The main thrust of the consultation over the May-June period has been directed at organisations thought to have information relevant to the target from an international perspective. Interviews were sought with knowledgeable people in these organisations.

A request was made to attend a meeting entitled '2010 – The Global Biodiversity Challenge' convened on 21-23 May 2003 in London, UK, organised by the SCBD in partnership with the World Conservation Monitoring Centre of the United Nations Environment Programme (UNEP-WCMC) and the United Nations Development Programme (UNDP). The meeting was held as a response to Decision V/26 adopted at the 6th Conference of the Parties (COP6) of the CBD in April 2002 to articulate a framework of action for a target at COP6 that *'commits parties to a more effective implementation of the Convention's objectives and to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national levels'*. This target was endorsed by the Hague Ministerial Declaration and by the World Summit on Sustainable Development (WSSD) in its Plan of Implementation (September 2002). Given this COP6 target and the identical date of 2010 (shared with the GSPC), it was thought that this meeting would be a very useful venue to gather the views of stakeholders, especially of Representatives of the Parties to the CBD. In the event, the meeting was oversubscribed and we could not attend, though we have been able to consult a summary report of the proceedings of the meeting.

Our stakeholder consultation between May-June 2003 was undertaken partly through the use of a questionnaire (Annex 1). The questions were chosen to cover matters of definition, availability of data, recommendations for processes to achieve the target, etc. Whenever possible, the questionnaire was delivered in face-to-face meetings and those interviewed were encouraged to expand their responses on matters in which they were particularly knowledgeable. Annex 2 lists organisations and individuals approached for this consultation and the response of the approaches.

It was decided not to present the views of individual stakeholders in this report. Different people frequently made similar recommendations and often also referred to the same published documents. The discursive account given here is considered to provide a reasonable guide to the views of the stakeholders consulted, backed up with some references to the literature.

4. Application of the Ecosystem Approach to Target 4

An Ecosystem Approach (EA) is required of all work under the CBD, including, therefore, of activities proposed to meet Target 4 of the GSPC. Twelve principles, developed during a

workshop in Malawi in 1998, form its core (UNEP/CBD/COP/4/Inf.9). These principles, and some of their implications for Target 4, are presented in Annex 3. In brief, the following aspects of the EA are considered of particular significance for Target 4:

- *People, with their cultural diversity, are an integral component of biodiversity.*

  In practical terms, this draws attention to the fact that habitats and landscapes have generally been very significantly shaped by past human activities and that, for the most part, **people will continue to be present and continue to influence their future development**, including whether they are effectively conserved.

- *The delimitation of ecosystems for conservation action needs to be defined conceptually on scales appropriate to the problems being addressed.*

  Although ecological regions are defined by parameters of the natural environment, the geographical **demarcation of areas for conservation action will generally not accord to ecological regions**. This is because practical management of the land and its resources is concerned with smaller basic geographical units than ecological regions (farms, reserves, etc.) or groups of these units (e.g. reserves administered by a Forestry Department), and also because conservation actions are effected through political, cultural, social and commercial systems, which have their own geographies. The single most important political entity for conservation action is the state, given the reality of modern political systems.

- *Work can involve all three objectives of the Convention (conservation; sustainable use; and fair and equitable benefit-sharing in relation to access to genetic resources), requiring the striking of a balance between them.*

One of the challenges is to achieve **balances between conservation of biological diversity and use of biological resources**, appropriate to particular circumstances. Uses may be consumptive or non-consumptive (spiritual, recreational, etc.). There are important questions of rights and responsibilities, equity and compromise.

- *There are uncertainties in managing ecosystems and, consequently, a need for conservation measures to contain elements of 'learning-by-doing' or feedback from research.*

There are many unpredictabilities about the consequences of conservation measures. **Management systems need to have elements of adaptability**, to be able to take account of the results of monitoring, as well as new information from research.

- *Benefits need to accrue to those responsible for producing and managing the benefits derived from ecosystems, with a special emphasis on local communities.*

Benefits can accrue on different scales and thus there are responsibilities at all social levels. Local communities are of special significance for biological conservation, because the 'local' is where people live, and local people can have strong cultural or economic dependencies on local natural resources.

5. Clarification of the scope of activities of the target

5.1. About habitats and ecological regions

5.1.1. Target 4 is fundamentally about conservation of habitats and landscapes

In part, Target 4 is about planning on relatively extensive scales. In terms of everyday human experience, an ecological region is a very large area, containing a great diversity of natural and man-made features, and many different types of habitat. Target 4 is centrally concerned with **more natural types of habitat, and with how patches of these are distributed in the landscape, and managed**. Basic units of concern for this target are therefore habitat types (e.g. in the UK, perhaps beech forest, chalk grassland, etc.) and habitats (meaning, in the present context, particular patches of habitat types).

Conservation planners within countries often have **established ways in which habitat types or vegetation types are recognised and classified for conservation** and other land-use purposes. For example, many conservation planners in Uganda are likely to refer, as a major source of reference, to *The vegetation of Uganda* (Langdale-Brown, Osmaston & Wilson, 1964), while those in South Africa might similarly consult *Vegetation of Southern Africa* (Cowling, Richardson & Pierce, 1997). An alternative approach, based on 'landscape units' is being pioneered by English Nature, the statutory body responsible for conservation in England. English Nature has divided the country into 120 'Natural Areas', each delimited by geology, landscape features, wildlife, climate and human activity, with soft boundaries allowing for gradual transitions (English Nature, 2001/2). Whether other countries will follow a similar approach will be seen. In any case, it is expected that countries will continue to use the systems of classification of habitat or vegetation types, 'natural areas' or similar landscape units that they consider best serve their purposes, hopefully with improvements over time.

An extra dimension in conservation planning is added if **national schemes are referred to wider systems of classification** of habitat types, vegetation types, natural areas or similar units. An example of a wider scheme that has become widely accepted over a large area is *The vegetation map of Africa* (White, 1983), the tool reported to be most widely used by conservation planners on the meso-scale in Africa (Burgess *et al*., in prep.).

Target 4 requires states to engage in conservation planning and related action. Such planning and action should not be one-off events, but rather processes that should continue indefinitely. Because of the complexity and diversity of the environment (including its human component), the range of potential activities involved in conservation planning and action is vast and cannot all be listed here. However, a flavour of some of the key measures that will be needed to achieve Target 4 is illustrated by this brief list:

- Identification and classification of habitat types.
- Mapping areas of habitat types.
- Assessing the conservation values of habitat types (in general, and in terms of particular areas).
- Assessing threats.
- Devising ideal conservation networks (e.g. perhaps with extensive areas of certain habitat types, corridors, micro-reserves, etc.).
- Assessing management requirements for habitat types (in general) and in terms of particular areas.
- Reviewing legal and other instruments, and instigating new legislative and other supportive measures.
- Negotiating with stakeholders.

- Identifying more effective management practices, key areas for training and other capacity-building measures, and mounting related capacity-building initiatives.

An advantage of making conservation planning more systematic is that recommendations can be backed by sound arguments and are thus more likely to be credible and defensible in the face of opposition from other interests. Those responsible for conservation planning and implementation should therefore avail themselves of the best information, advice and skills that they can attain.

There is a rapidly growing discipline known as '**systematic conservation planning**', developing models and protocols of great relevance to Target 4 (Cowling, 1999; Kier & Barthlott, 2001; Pressey, 1999). A future issue of the journal *Biological Conservation*, to be published in 2003, will be devoted to the topic. Australia and South Africa are two of the countries in which 'systematic conservation planning' is most advanced. Those implementing Target 4 are advised to keep abreast of developments in this field and to explore their relevance to their own cases.

Conservation planning (and consequent recommendations for management) should be based not only on knowledge of present patterns of plants and animals on the ground, but also of the evolutionary, ecological and other **processes** that have been responsible for these patterns. Conservation planning will be greatly strengthened if biogeographic models are predictive, which requires assessments of processes likely to influence the survival and distribution of organisms in the future.

Target 4 is about both natural habitats (in the sense of those entirely lacking human influence) and semi-natural habitats (influenced by people to some degree – much the commoner condition). One of the challenges with Target 4 will be to judge **which particular semi-natural habitats should be included** as contributions towards its attainment. The emphasis is clearly on 'wild' plants and habitats, but the boundary between 'wild' and 'artificial' is often imprecise. Traditional agricultural systems can be rich in plant diversity, in terms of both crop and ‘wild’ plants (Jenkins & Kapos, 2000; Tuxill & Nabhan, 2001). Where human populations are relatively low, cultivation may shift periodically within the wider landscape, so the temporal as well as the spatial distinction between wild and artificial also becomes blurred. An understanding of the cultural and economic, as well as of the biological and ecological, dimensions of ecosystems is required.

Take the example of the 'North Atlantic moist mixed forests ecoregion', an ecological region recognised by WWF (WWF, 2003). This ecological region covers substantial areas of western Europe, including large parts of France and the UK. Those familiar with this region will know that virtually all modern habitat types present (including forest types) have been strongly influenced in their properties by past human action. Furthermore, a considerable number of the habitat types present, that are generally regarded as of high conservation value, are not forest at all (despite the name given to the ecological region). They include various types of wetland, coastal habitat, heathland and grassland – many of which owe their existence to human activities. Probably, most conservation planners would include areas of these habitat types as contributions towards Target 4, even though they are far from natural (in the sense of the hypothetical pre-human vegetation) and are often dependent on human activities, such as certain types of livestock grazing, for their continuing existence. This example of an ecological region (which is probably not atypical) demonstrates the need for conservation planners and managers to have a **good understanding of the habitat types present in their ecological regions from diverse perspectives**, if they are to make wise decisions about the selection of conservation areas and how they should be managed.

Another aspect of this target that will require informed judgement will be to decide the **degree to which habitats (including specific areas of habitat) need to be permanent** to

count toward the target. Even habitats unaffected by people (an unusual condition) are liable to change, for instance due to evolutionary processes, the natural spread of species and external natural events (some aspects of climatic change, volcanism, etc.). Semi-natural habitats are invariably subject to successional forces inducing change. While it must be recognised that change is an inevitable feature of both natural and semi-natural habitats, it is also necessary to recognise that a **high degree of permanency** in the retention of certain areas of habitat for conservation purposes is desirable under modern conditions. This is because pressures on the natural environment can be so great today that areas of habitat can be lost very quickly and (for practical purposes) irreversibly, unless there is resolute determination to defend them.

Key recommendation: Countries should engage in systematic conservation planning and related conservation action, on a continuing basis.

5.1.2. Work on Target 4 should be co-ordinated closely with that on other in situ *targets of the GSPC*

Target 4 will have to be implemented in close co-ordination with Target 5, another major target of the GSPC concerned with identifying and managing areas of natural or semi-natural habitat important for plant conservation. Target 5 reads *'Protection of 50 per cent of the most important areas for plant diversity assured'*. Target 4 is about biological conservation as a whole (botanical aspects being integrated with other concerns), whereas Target 5 is very specifically about plants. Another way of looking at the distinction between these targets is to see Target 4 to be more about conserving representative examples of habitat types at the larger scale, and Target 5 to be more about 'plant hotspots' and the smaller scale.

Probably the most significant of the other *in situ* targets of the GSPC for Target 4, so far as management on the ground is concerned, is Target 13, which reads "*The decline of plant resources, and associated indigenous and local knowledge, innovations and practices that support sustainable livelihoods, local food security and health care, halted*". It is recommended that **work on Target 4 should also be closely co-ordinated with Target 13**. Target 13 is often highly pertinent because, in many parts of the world, areas important for plant conservation also carry plant resources on which local residents strongly depend. Work with local people will be essential to find management systems that strike workable balances between conservation and use, benefits and responsibilities.

Targets 4, 5 and 13 are not the only targets of the GSPC relevant to *in situ* conservation of plant diversity. However, in terms of a 'community of interest' (with respect to particular local communities, NGOs, scientists and government agencies), it is suggested that these three targets form a natural 'cluster', for the purposes of drawing up and implementing plans for management of habitats of special importance for plant diversity. The extent to which it will be appropriate to add additional *in situ* targets of the GSPC to this central cluster will vary with circumstances.

Key recommendation: It will often be useful for national and regional planning processes to consider Targets 4, 5 and 13 together, forming a central *in situ* cluster for the GSPC.

5.1.3. Why and which ecological regions?

The term '**ecological region**' was chosen deliberately for this target, as a neutral expression. When the target was framed, there was no assumption that any particular scheme for the recognition of ecological regions would be recognised officially.

In general, a (terrestrial) ecological region can be considered to be an **area of the world's land surface that carries distinct biological communities**, including indigenous types of plants and other organisms, differing to a substantial degree from those of other ecological regions. Some systems for recognising ecological regions make reference to non-biological characters, especially climate. Geology and soils generally influence biological patterns on a smaller scale than that of the ecological region (i.e. typically more relevant to Target 5), though, exceptionally, areas of limestone may be considered to be sufficiently extensive to contribute to their demarcation. Mountainous areas, with their varied topography and often rapidly changing biological features, can be difficult to divide into ecological regions and may be designated as 'azonal'.

One of the problems in dividing the world into ecological regions is to estimate **'natural' biological patterns** underlying the changes caused by people. This is one of the reasons why climatic parameters are often essential in the recognition of ecological regions and the mapping of the boundaries between them.

Ecological regions are intermediate-level units in terms of the wide range of scales at which biogeographical categories can be recognised. Very large ecological regions, such as biomes and floristic kingdoms, are of little use for the purpose of Target 4. With the exception of the Cape Floristic Kingdom (confined to a single country), they cover extremely extensive areas and there are few possibilities of linking recommendations from planning to practical actions on the ground. At the other end of the scale, an ecological region cannot be defined in terms of every variant of biological communities or 'natural areas' represented on earth. Those consulted for the present report agreed that it is the **meso-scale** that is significant for the purposes of the target. What meso-scale means in practice is not universally agreed, and will anyway vary between parts of the world. As a rough guide, the area of an ecological region will generally fall within the range 10^2-10^7 km^2 (Jepson & Whittaker, 2002).

Ecological regions are useful in the present context because:

- They are of a suitable size for monitoring at the global level (not too few; not too many).
- Their size is such as to be useful for some aspects of systematic conservation planning (e.g. often for analysing the conservation significance of different types and areas of habitat, and how to maintain certain ecological and evolutionary processes).
- They are often of a suitable scale for planning and conservation action at the national level.

Indonesia is an example of a country in which biogeographical divisions (based on the Dasmann-Udvardy system) have been used as the basis for conservation planning and implementation for 20 years, with a considerable degree of success (Jepson & Whittaker, 2002). The National Conservation Plan of 1982 proposed the establishment of a network of reserves based on the following principles (MacKinnon & Artha, 1982): (1) establishment of a major ecosystem reserve within each ecological region to include continuous habitat types and, where possible, the richest examples of those habitats; (2) augmentation with smaller reserves to protect special or unique additional habitat types or to cover regional variations; and (3) small reserves to protect specific sites of special beauty or interest.

There is no agreed international system for ecological regions. Even within-country, more than one system can be in use. According to one of our interviewees, the number of ecological regions proposed for the continental US is variously 21 (Sierra Club, 2003), 25 (Bailey, 1998), 40 (Sale, 1985), 63 (The Nature Conservancy, 1997; The Nature Conservancy, 2001) and 76 (Abell *et al*., 1999).

It is desirable to achieve a **measure of commonality** in how ecological regions are recognised, within countries and between countries and different parts of the world, because:

- Many ecological regions transgress national boundaries (requiring co-operation between countries to monitor the achievement of Target 4).
- Monitoring of progress on the target will be facilitated, especially at regional and global levels.

Some systems proposed for ecological regions at the global level are listed in Annex 4. They are the Dasmann-Udvardy system, associated with IUCN (Dasmann, 1972; Udvardy, 1987), the Bailey-Omernik system, associated with the US Forest Service (Bailey, 1996; Bailey, 1998; Omernik, 1987; Omernik, 1995) and Ecoregions, associated with WWF ((Ricketts *et al*., 1999; Wikramanayake *et al*., 2001). Some features of these systems are described Annex 4 (also of Endemic Bird Areas – which are biodiversity hotspots rather than ecological regions).

In view of competing claims of the usefulness of the various schemes, and, even more so, because some influential conservation groups are advocating adoption of 'their' schemes across the world, it is unfortunate that there has been little analysis of their comparative merits. Perhaps the most incisive analysis to date is that of Jepson and Whittacker (2002) for Indonesia (Annex 5). The authors concluded that the Dasmann-Udvardy system is scientifically the most credible in this instance and, additionally, favour its use because it is already familiar within the country and has been the basis for systematic conservation planning for a number of years. Switching to another scheme could undermine existing programmes and the morale of local conservationists.

Figure 1 shows how two different systems for ecological regions divide up Indonesia in different ways.

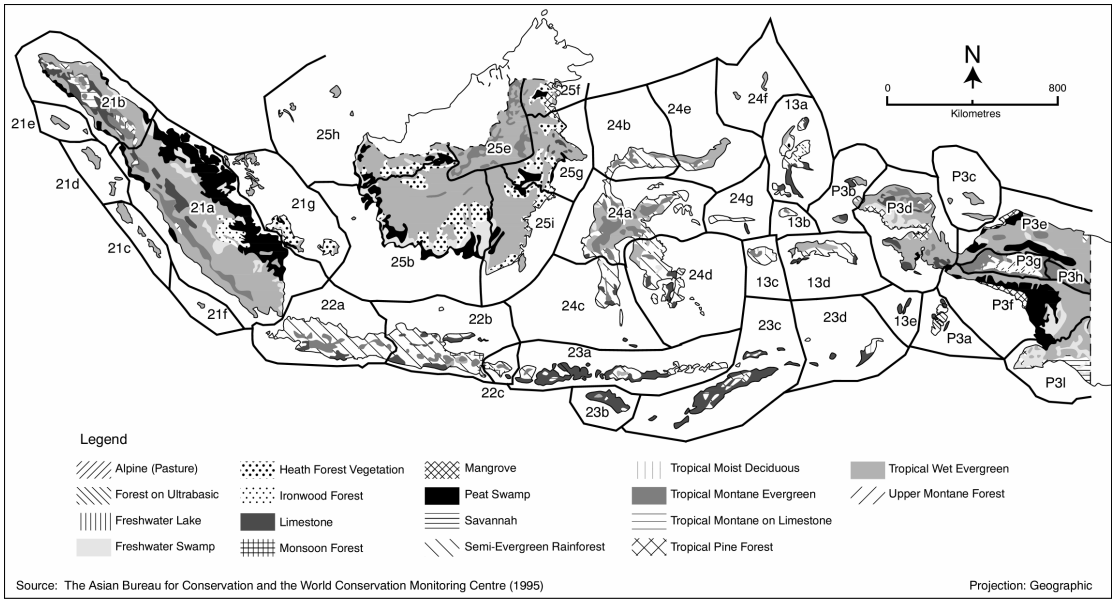

Figure 1a. Map of the Dasmann-Udvardy biogeographic provinces for Indonesia showing the third level 'biounits' added to the system by MacKinnon and Wind (1981), overlain on the natural habitat type boundaries redrawn with permission from MacKinnon (1997); source:Jepson & Whittaker (2002). Key to biogeographic provinces and biounits: 21 Sumatra

(21a Southern Sumatra, 21b North Sumatra, 21c Mentawi Islands, 21d Nias and Batau Island, 21e Simeuleu Islands, 21f Enggano Island, 21g Lingga Archipelago), 22 Java (22a West Java, 22b East Java, 22c Bali Island), 25 Borneo (25 a North Borneo, 25b Southwest Borneo, 25e, Central mts, 25f East Borneo, 25g East Borneo, 25h Northwest Borneo), 24 Sulawesi (24 a Central Sulawesi, 24b North Sulawesi, 24c South Sulawesi, 24d Southeast Sulawesi, 24e Northeast Sulawesi, 24f Sangihe-Talaud Islands), 23 Lesser Sundas (23a North Nusa Tenggara, 23b Sumba Island, 23c Timor and Wetar Islands, 23 d Tanimbar), 13 Moluccas (13a N. Maluku Islands, 13b Obi, 13c Buru, 13d Ceram & Ambon, 13e Kai Islands), P3 New Guinea (P3a Aru Islands, P3b Western Islands, P3c Geevlink Bay islands, P3d Vogelkop, P3e Northwest new Guinea, P3f Southwest New Guinea, P3g Snow Mountains, P3l Trans-Fly).

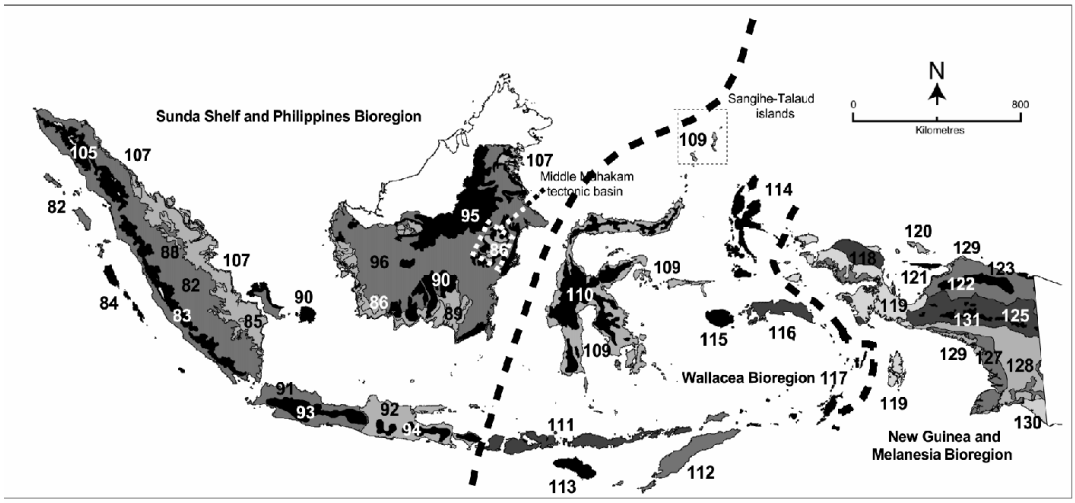

Figure 1b. WWF ecoregions of the Indo-Pacific located in Indonesia redrawn with permission from Wikramanayake et al. (in press); source:Jepson & Whittaker (2002). Key to ecoregions: 82 Sumatran lowland rain forests. 83 Sumatran montane rain forests; 84 Mentawi Islands rain forest; 85 Sumatran peat swamp forests; 86 Bornean peat swamp forests; 88 Sumatran freshwater swamp forests; 89 Southern Borneo freshwater swamp forests; 90 Sundaland heath forests; 93 Western Java rain forests; 94 Eastern Java-Bali montane rain forests; 95 Borneo montane rainforest; 96 Borneo lowland rainforests; 105 Sumatran tropical pine forests; 107 Sunda shelf mangrove; 109 Sulawesi lowland rain forest; 110 Sulawesi montane rain forest; 111 Lesser Sundas deciduous forests; 112 Timor and Wetar deciduous forests; Sumba deciduous forests; 114 Halmahera rain forest, 115 Buru rain forest, 116 Seram rain forest; 117 Banda Sea Islands moist deciduous forests, 118 Vogelkop montane forests; 119 Vogelkop-Aru lowland forests; 120 Biak-Numfoor rain forests; Japen rain forests; 122 Northern New Guinea montane rain forests; 123 Northern New Guinea lowland rain and freshwater swamp forest; 125 Central Range montane rain forests; 127 Southern New Guinea freshwater swamp forests; Southern New Guinea lowland rain forest, 129 New Guinea mangroves.

Conservation planners should take note of analyses of biodiversity 'hotspots', such as Centres of Plant Diversity (WWF & IUCN, 1994-1997), Endemic Bird Areas (Stattersfield *et al.*, 1998), Global 200 Ecoregions, associated with WWF (Olson & Dinerstein, 1998; Olson & Dinerstein, 2002) and 'Biodiversity Hotspots', associated with Conservation International (Myers *et al.*, 2000). These analyses do not, in themselves, constitute systems of classification for ecological regions, because they do not cover all areas of land.

Key recommendations:

1. **Parties should choose schemes for ecological regions that are appropriate to their cases**. Given modern electronic methods of holding and analysing data, many parties should be able to develop the ability to present data on conservation status (as relevant to Target 4) in different forms, including according to different schemes for ecological regions. Comparative analyses, using different schemes, might sometimes throw up some useful insights. However, at the same time parties should note the desirability of striving towards common regional and global standards, including to facilitate regional and global monitoring.

2. The SCBD should encourage international agencies interested in conservation planning **to collaborate towards greater uniformity in the recognition of ecological regions** across the world, and to work with parties (upon request) so that they have the capability of presenting monitoring data according to international standards.

5.2. About the 'at least 10 per cent' figure of Target 4

We take the percentage figure of Target 4 to refer to the **percentage of an ecological region as a whole**, not the percentage of the remaining area of natural and semi-natural habitats in the ecological region. There will sometimes be uncertainties in calculating the figure, due to difficulties in defining the exact boundaries of ecological regions. In many cases, ecological regions merge naturally into one another and boundaries can be obfuscated by human influence.

The way that the 'at least 10%' figure of the target should best be distributed between habitat types within an ecological region will benefit from systematic conservation planning. It is not necessarily desirable for 'at least 10%' of all habitat types (in terms of their original natural areas) to be conserved. In some instances, it will be critical for biodiversity conservation to conserve all remaining examples of certain habitat types, and even try and add to this total through restoration.

Many stakeholders consulted for this report pointed out that the 'at least 10%' figure of Target 4 could backfire in terms of conservation, if interpreted naively. There might be complacency if the feeling develops that, somehow, the global environment will be 'alright' once a 10% figure for protection of an ecological region is reached. This would be even more deleterious if such a view was taken combined with the belief that it does not matter how this 10% is composed in terms of habitat types and particular areas of these.

In this context, it is noted that, since 1982, IUCN has aimed to expand the total area of the world's land surface covered by protected areas to 10%. Five percent was achieved by 1993 (Leach & Fairhead, 2002) and stakeholders consulted for the present report estimated that 10% has now been reached. Although meritorious, **this achievement is of limited value in relation to Target 4**, partly because existing protected areas are unevenly distributed between ecological regions and habitat types, and because there is no certainty that the 10% of the world that is already protected is necessarily the best 10% from the point of view of systematic conservation planning. There are certainly some widely acknowledged examples of deficiencies. For example, lowland habitats are often more poorly represented than montane, related to greater competition from other forms of land-use.

Table 1 shows the percentages of the total extant areas of various types of forest that lie within protected areas (UNEP-WCMC, 2002) (Table 1). Although not strictly relevant to Target 4 (e.g. because of the way in which the percentages were calculated), these figures do

reveal that the different forest types are very differently represented within protected areas. For example, only 1.0% of 'deciduous needleleaf forest' is protected worldwide, while 23.9% of 'broadleaf evergreen forest' is so protected. This contrast is striking, though, as already indicated, the meaning of these figures in relation to Target 4 is not entirely clear.

Forest type	Total forest area (km^2)	Total protected (km^2)	% protected
Evergreen needleleaf forest	8,045,880	1,116,784	13.9
Deciduous needleleaf forest	3,615,991	36,708	1.0
Mixed broadleaf/needleaf forest	2,020,162	195,387	9.7
Broadleaf evergreen forest	345,776	82,796	23.9
Deciduous broadleaf forest	3,873,399	355,865	9.2
Freshwater swamp forest	4706	125,557	7.7
Screrophyllous dry forest	754,497	146,196	19.4

Table 1. Selected global forest types: total areas, total areas within protected areas, and percentages protected. These are the first 7 entries in a table showing the above statistics for forests types of the world, produced by the World Conservation Monitoring Centre (IUCN, 2002b). The original table breaks down the protected area statistics by IUCN categories of protected area.

A **precautionary approach** should be taken to the transformation of natural or semi-natural habitats. This is because it is now known that the global environment is ecologically connected, there are many uncertainties about predicting the effects of human interventions, and people have already deleteriously influenced some environmental systems on the global scale (e.g. climatic change, over-fishing). Rather than emphasising a minimum figure for conservation areas, we suggest that it would be wise for parties to try and **maintain as extensive areas of natural and semi-natural habitats as possible**, subject to meeting other human demands.

A precautionary approach by individual parties is additionally desirable in the case of ecological regions that transgress national borders. This is because the target is global and parties cannot be certain that their neighbours will necessarily give as much effective attention to meeting Target 4 as they do themselves.

Key recommendations:

1. In many cases, a figure of much more than 10% of an ecological region should be conserved.
2. The way that the percentage required by the target is distributed between habitat types and particular sites is a matter for systematic conservation planning and the realities of conservation implementation.

5.3. About protected areas: their relevance and their types

Pressures to convert natural and semi-natural habitats to other habitat types can be great, and will presumably increase further with growth in the human population and modern demands for economic expansion and development. Because of this, it is helpful, as a first approximation, to **consider Target 4 as the protected area target**. As of 1997, 30,0350 protected areas (IUCN Categories I-VI) were recorded in the WCMC database, covering 13,232,275 km^2 or 8.83% of the global surface area (Green & Paine, 1997). (The figures for terrestrial protected areas, as a percentage of total land area, was around 7.83 or somewhat less, due to disproportionate representation of marine protected areas in the overall figure.) Today, as already mentioned, the figure for terrestrial protected areas is thought to be around 10%.

A protected area may be considered to be a designated part of the world in which conservation of biodiversity is a significant management objective. Two official definitions are: "*a geographically defined area which is designated or regulated and managed to achieve specific conservation objectives*" (Article 2 of the CBD) and "a*n 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*" (IUCN, 1994). Individual protected areas normally serve a variety of functions in addition to biological conservation.

The protected area has become the predominant instrument applied to conservation of biodiversity over recent decades. A great advantage of protected areas for conservation purposes is that they are specific sites at which the (often rather meagre) resources available for conservation can be concentrated. It is often much more difficult for governments or other agencies concerned with conservation to influence human activities in favour of conservation in other parts of the landscape (outside protected areas). Already, in some parts of the world, it is not unusual for protected areas to stand out as 'islands' of relatively rich biodiversity amid landscapes that are relatively impoverished from the wider biodiversity perspective.

There are **many types of protected area**. Globally, over 1388 terms have been applied to categories of protected area (Green & Paine, 1997). Countries have their own schemes: for example, there are 45 named categories in Australia.

There are several **international or regional legal conventions** through which sites can be recognised for their global or regional values for biodiversity (Annex 6). They include Biosphere Reserves and certain types of World Heritage Sites (associated with UNESCO), Ramsar Wetlands, Special Protection Areas (associated with the European Union) and ASEAN Heritage Parks and Reserves (associated with ASEAN). The designation of sites through these instruments does not, in itself, result in strengthened management on the ground. Supportive practical measures are the responsibilities of the states in which the sites lie.

Protected areas can be established under various tenurial regimes. In terms of area of land covered, **by far the most important types of protected area are those established through statutory provision**. Official figures relating to coverage of protected areas commonly refer to such areas. In general, this is reasonable as a first approximation for monitoring progress under Target 4. Community or traditional protected areas (e.g. sacred forests) are very widely found around the world, but are generally very small. Even so, they can contribute significantly to biological conservation. For example, in northern Ethiopia, forests associated with churches and monasteries of the Ethiopian Orthodox Tewahedo Church provide some of the only forested sites in a largely deforested landscape. Private reserves are of growing significance in some countries, such as Colombia, Italy, South Africa and Venezuela. To best guarantee the continuing effectiveness of private reserves, there should be safeguards to avoid their loss in the event of changes of interest on the part of owners or of ownership. The

Valencia Region of Spain is promoting micro-reserves for conservation of scattered narrow-endemic species of plants (common in this area): some of these lie on private land and it is a condition of their establishment that owners agree that the reserves will exist in perpetuity (this example is more relevant to Target 5).

Only in special circumstances should the establishment of a protected area mean the exclusion of people or of some of their productive activities. Indeed, there are habitat types that will only be maintained by continuing human intervention, such as might include (as examples) certain types of agriculture, pastoralism or regimes of burning. Generally speaking, 'strict nature reserves' (i.e. with no human use; only activities permitted those connected with protection and monitoring) are unlikely ever to be extensive, though they will be necessary for plant conservation in some cases. Often, managers of protected areas will be faced with the challenge of finding acceptable balances between protection and use, several forms of which might be possible, according to context. Many biologically-rich areas, including in the tropics and sub-tropics, as well as certain cultural landscapes in temperate lands such as Europe, are also places where local residents have strong livelihood links to local wild plant resources. Thus, a principal challenge of management in such cases will be to **find ways of balancing the interests of local communities with wider conservation objectives**. In some cases, as with ‘indigenous reserves’, statutory protection of areas of natural or semi-natural habitat can closely serve the dual purposes of conservation of biodiversity and culture, especially through limiting the penetration of potentially erosive cultural or economic interests.

There is increasing recognition of the close links that can exist between cultural and biological diversity, as shown, for instance by the addition of 'cultural landscapes' as a category of World Heritage Sites in 1992 (Annex 7).

International standards are needed for categories of protected area, to allow cross-border comparisons and for global monitoring. Individual protected areas, or categories of protected area, as recognised nationally, should be assignable to these categories. The international system, unanimously accepted as being relevant for this purpose by those consulted for the present report, is that of IUCN, which has the following categories (see also Annex 8):

Category Ia	Strict nature reserve/wilderness protection area managed mainly for science or wilderness protection, and available primarily for scientific research and/or environmental monitoring.
Category Ib	Wilderness area, protected and managed to preserve its natural condition.
Category II	National park, managed mainly for ecosystem protection and recreation.
Category III	Natural monument, managed mainly for conservation of specific natural features.
Category IV	Habitat/species management area, managed mainly for conservation through management intervention to meet the needs of specific species.
Category V	Protected landscape/seascape, managed mainly for conservation of a landscape/seascape or for recreation.
Category VI	Managed resource protected area, managed mainly for the sustainable use of natural resources.

All those consulted for this report agreed that **all IUCN categories are relevant to Target 4**. In actuality, there is considerable overlap in the management objectives of the various categories (Table 2).

Management objective	Ia	Ib	II	III	IV	V	VI
Scientific research	1	3	2	2		2	3
Wilderness protection	2	1	2	3	3	-	2
Species/genetic diversity	1	2	1	1	1	2	1
Environmental services	2	1	1	-	1	2	1
Natural/cultural features	-	-	2	1	3	1	3
Tourism & recreation	-	2	1	1	3	1	3
Education	-	-	2	2	2	2	3
Sustainable use	-	3	3	-	2	2	1
Cultural attributes	-	-	-	-	-	1	2
Key: 1 primary objective; 2 secondary objective; 3 potentially not applicable; - not applicable							

Table 2. Matrix of protected area management objectives and IUCN categories (Green & Paine, 1997).

Assignment of categories of protected area, as recognised nationally, to IUCN categories is not always easy to achieve and there can be inconsistencies between countries. For example, there is consistency in the treatment of private protected areas between countries. In Brazil, all private reserves (RPPNs – 'private reserves of the natural patrimony') have been classified under a new national system of protected areas (SNUC – Sistema Nacional de Áreas Protegidas) as 'Sustainable Use Reserves', a close equivalent to IUCN Category VI, even though many of them function, in effect, as Category I or II protected areas.

There was general agreement among those consulted for this report that the IUCN categories should be revised. An illustration of current inadequacies of the present scheme is that reserves that fall under the administration of forestry departments are generally excluded from the IUCN system, even though forest reserves can contain significant biological diversity (Burgess *et al*., 2003) and, in many countries, forestry departments are giving increasing attention to conservation of biodiversity as a management objective (Hamilton *et al*., 2003).

Key recommendations:

1. As part of systematic conservation planning, parties should review their protected areas. For the monitoring of progress towards Target 4, parties will need to assign protected areas to ecological regions and collect various statistics about their properties, for instance relating to the types and areas of habitats that they contain.
2. IUCN should review its classification system for protected areas.

5. 4. About protected areas: management

Target 4 requires that measures taken for conservation are effective and thus the effectiveness of protected area management is a major concern. Similarly to conservation planning, the achievement of effective management will not be a one-off event, but rather a continuing process. Management of protected areas has many dimensions – geographical, biological, ecological, cultural, social and economic – and many uncertainties. In line with the Ecosystem Approach (EA), **management should be adaptive**, that is, capable of modification based on the results of monitoring and research (Figure 2). The principles of adaptive management should be applied at all levels in protected area systems – from the individual protected area to networks of protected areas, and to international elements.

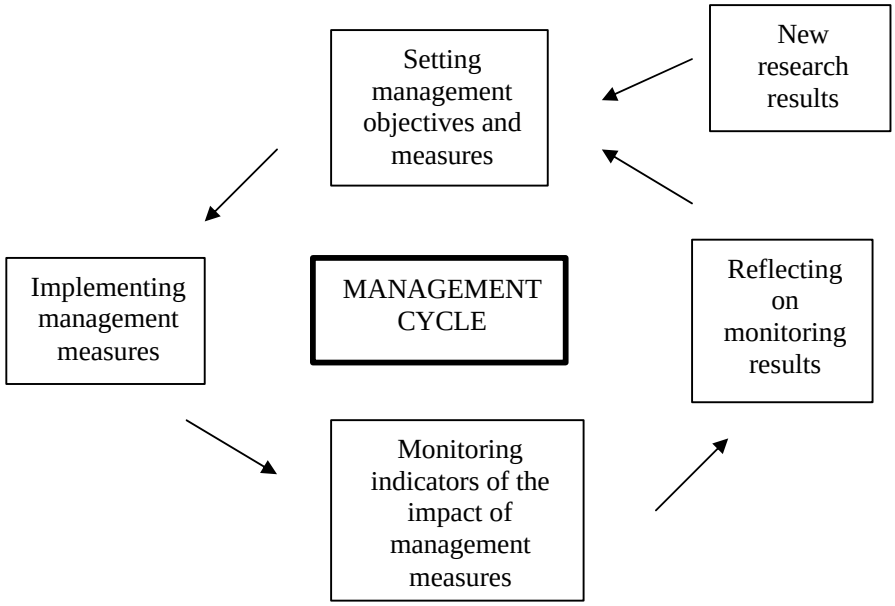

Figure 2. Stages in adaptive management for a protected area.

In most cases, local people should be involved in the management of protected areas (ref. especially Principles 1,2 and 11 of the EA). How this is best achieved under different circumstances is one of the major challenges in biodiversity conservation (Aumeeruddy-Thomas *et al*., 1999; Cunningham, 2001; Tuxill & Nabhan, 2001). There is a great need to document experiences and identify more effective management practices. This will often be a priority area for capacity-building under the cross-cutting targets of the GSPC.

There is a need to relate local ways of assessing the effectiveness of management of protected areas to **international standards**. Such standards can refer either to individual protected areas and/or to protected area networks. There are a number of relevant initiatives using or developing such standards (Annex 9). As an example, WWF is working with 20 governments to assess the usefulness of its 'Rapid Assessment and Prioritisation of Protected Area Management' (RAPPAM) methodology. Most of the protected areas which are being assessed under this exercise fall into IUCN Categories I-VI, though some community management schemes falling outside the IUCN system have also been included, such as some in Oaxaca, Mexico.

We have seen no evidence relating to the comparative effectiveness of systems proposed for assessing management effectiveness. In general, this appears to be an under-developed area of conservation.

Questions surrounding the monitoring and evaluation of protected areas will be discussed at the World Parks Congress, Durban, in September 2003 (IUCN 2003). Aspects to be covered will include (*inter alia*): monitoring and evaluation models; management effectiveness indicators; maintaining ecological integrity; threatening processes such as invasive species and wildlife trade; evaluating the effectiveness of the IUCN Protected Area Categories; exploring certification for protected areas; and applying evaluation approaches at different scales.

Key recommendations:

1. Countries should evaluate gaps in their management systems for protected areas, identify key fields for improvement and instigate relevant capacity-building measures.
2. SCBD should convene international agencies interested in evaluating and monitoring the effectiveness of protected areas to promote the development of international standards.

5.5. About conservation of ecological regions outside protected areas

Protected areas are not the only tools useful for conservation of ecological regions. A **landscape approach** has long been used by some governments for planning agricultural and other productive development, and is becoming increasingly fashionable in conservation circles. Most stakeholders, consulted for the present report, viewed protected areas as essential for biological conservation, but many have come to more consciously conceive protected areas as lying within mosaics of land with other forms of designation and use, within which biological conservation should also be pursued.

Landscape planning, in the sense of designation of areas of land (**zones**) for different purposes, has been a principal tool of management of protected areas since the late 1980s. UNESCO, in its Man and the Biosphere Programme, has adopted a model for Biosphere Reserves, with typically one or more totally protected ‘core’ zones and other zones designated for other purposes. ‘Other purposes’ might include low intensity extraction of wild produce or small-scale agriculture. The concepts of ‘buffer' and 'support' zones have been developed with reference to these relatively peripheral areas. According to legislation, and sometimes the particular site, buffer zones may lie inside or outside protected areas.

There are many **reasons for conserving habitats of conservation interest outside protected areas**. Apart from the general desirability of maintaining more natural habitat types wherever possible (following the precautionary principle), the presence of patches and corridors of habitat can ease the movement of species between protected areas. Such abilities to move can be essential for the retention of ecological integrity (e.g. to maintain genetically viable populations, allow movement of pollinators and seed-dispersers) and may be essential for the survival of many species at this time of rapid climatic change.

The extent to which habitats can be effectively conserved outside protected areas will vary widely, according to habitat type, the extent and nature of human influence, and the effectiveness of government. Generally, governments will find it much easier to regulate human activities in favour of conservation inside (as opposed to outside) protected areas, partly because management efforts can be concentrated.

The planning of the use of land and biotic resources away from protected areas is possible on **various scales**. The presence of GIS today in many parts of the world has greatly assisted such planning, but the implementation of plans is quite another matter. There can be many obstacles, given the many conflicting interests, relating to land use and resource exploitation, that can be involved.

A wide **range of instruments** is potentially available to governments to achieve conservation of ecological regions in the wider landscape (outside protected areas), including:

- Economic incentives, for example to encourage certain forms of resource use and discourage others.
- Planning regulations, such as restrictions on certain types of development in certain areas.

- Prohibitions or restrictions on certain activities, such as the transformation of natural forest to agriculture, or relating to the collection, harvest, transport, sale or export of certain categories of plants or plant products.
- Awareness-raising and educational programmes.

Community-based conservation has an important role to play in landscape-level conservation. More traditional communities commonly display a range of beliefs and practices that are favourable to conservation. These can include the protection of certain: (1) individual specimens of plants; (2) species; (3) areas of vegetation of relatively restricted extent (e.g. many sacred forests); and (4), occasionally, larger parts of the landscape (e.g. holy mountains). Although traditional conservation beliefs and practices have often been weakened through cultural transformation and modern socio-economic forces, nevertheless they often form useful foundations on which to build modern conservation efforts.

Key recommendations:

1. The planning of landscape-level conservation, including conservation of habitats outside protected areas, should be an integral part of systematic conservation planning.
2. Conservation implementation will often require the involvement of a wide range of stakeholders. There is much need for capacity-building for effective interdisciplinary work.

5.6. About plans and actions: how, where and by whom

As parties to the CBD, states have primary responsibility for the attainment of Target 4, working in partnership with the SCBD, and contributing and drawing on the resources of UN and related international conservation groups. There is a diversity of institutions, social groups and individuals within countries, whose commitment to the cause will be critical for success. Relevant organisations range from departments of government, such as park and forestry departments, to village-level NGOs and individual conservationists. United by a shared broad conservation vision, there are many ways in which groups and individuals can contribute to the target, motivated by a diversity of ideas and operating on many scales. In this context, important tasks for states (as signatories of the CBD) will include trying to ensure that individual energies and enthusiasms contribute to the wider good, including through the learning of lessons from their successes and failures, and in co-ordinating the activities of major governmental agencies responsible for the management of land and its biological resources.

6. Recommended activities under the cross-cutting targets of the GSPC (Targets 3, 14-16)

Target 3 (*Development of models with protocols for plant conservation and sustainable use, based on research and practical experience*):

This concerns the **development of more effective ways of doing things**. There will always be uncertainties about how conservation can best be achieved, with reference to Target 4, and consequently a need for continual learning (Figure 3). Although more purely academic research is needed, the predominant mode through which research should be undertaken should be through 'action-research', meaning that research should be closely linked to the realities of natural resource use and management on the ground, and there should be close links with local stakeholders. Most research should be collaborative exercises between researchers and local stakeholders (Cunningham, 2001; Tuxill & Nabhan, 2001).

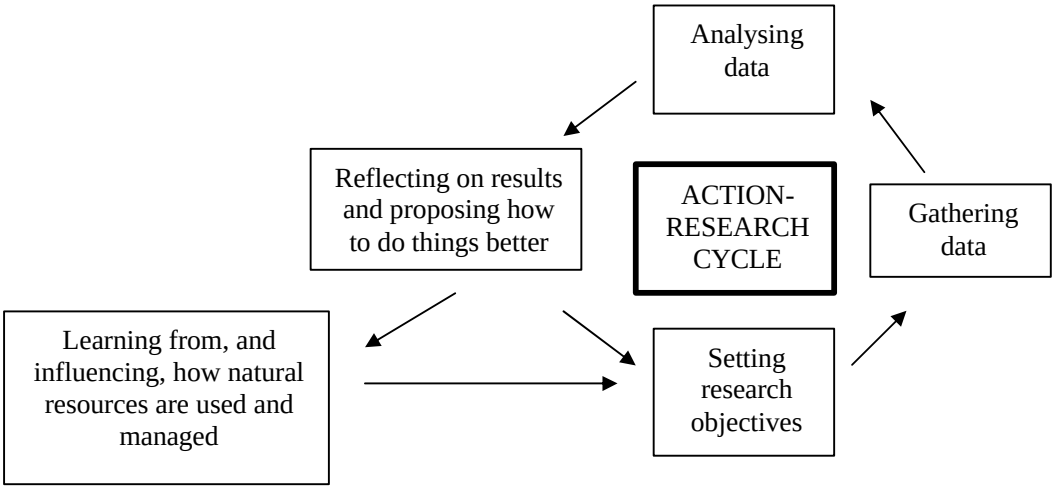

Figure 3. Stages in action-research to develop models and protocols ('better ways to do things'). This cycle should be linked to management cycles (Figure 2).

There are many aspects of Target 4 in which action-research may be needed. They refer to all levels of socio-ecological systems (Box 1).

Box 1. Some fields in which action-research may be needed to achieve Target 4.

– at local habitat management level:

- Management prescriptions and selection of indicators for monitoring.
- The training of local managers and resource-users.

– at national level:

- Methods of systematic conservation planning.
- Management prescriptions and selection of indicators for monitoring for networks of protected areas (and variants for different conditions).
- The training of conservation professionals, including some able to work with local stakeholders to achieve workable balances between conservation and use.

– at regional level:

- Commonalities in the ways ecological regions, transgressing national borders, are recognised and managed.
- Regional professional training schemes.

– at international level:

- Systematic conservation planning.
- International standards for the identification of ecological regions, categorisation of protected areas, and for the effectiveness of protected area management.

Identification of key fields for professional training internationally, and the development of related programmes in these fields.

Progress with developing improved models with protocols is absolutely critical at the local habitat management level if Target 4 is to be achieved. Among other aspects, there is a great need to develop monitoring systems that are of real practical value for management purposes, and within the capacities of the responsible institutions (Sheil 2003).

Target 14 (*The importance of plant diversity and the need for its conservation incorporated into communication, educational and public-awareness programmes*):

Little advice was received on this target during the consultation.

Target 15 (*The number of trained people working with appropriate facilities in plant conservation increased, according to national needs, to achieve the targets of the strategy*):

Training requirements should be evaluated by parties, and regional and international agencies. Some areas in which extra capacity will frequently be required are those listed in Box 1. We particularly emphasise the need to build professional capacity for work with local residents on issues relating to conservation and sustainable use, including in relation to protected areas. This will require inter-disciplinary skills. Given the fact that many sites of high biodiversity value have botanical resources of great cultural and economic significance to local residents, we particularly recommend that attention is given to development of professional capacity in applied ethnobotany (Cunningham, 2001; Hamilton *et al.*, 2003; Tuxill & Nabhan, 2001).

Target 16 (*Networks for plant conservation activities established or strengthened at national, regional and international levels*): .

Networks form the basis for co-operation between people and agencies. There is an urgent need to develop networks further, that allow the dissemination of more effective ways of doing things (Target 3) and that promote the development of professional capacity (Target 15).

The importance of **networking among local stakeholders**, especially communities, is noted, and also among researchers working with them to achieve conservation and sustainable use. There is much to gain from the sharing of experiences and joint analysis of the effectiveness of current practices. Experience gained at this fundamental level is essential for devising realistic higher-level policies, for example, with respect to the evolution of robust management schemes that satisfactorily combine the interests of wider biodiversity conservation with the meeting of local resource needs.

Networking can be very useful for Target 4 at the level of neighbouring countries, given that nature, and many aspects of cultures and economies, lack respect for political borders. **Transboundary conservation** is a significant field requiring development. At present, there are at least 169 complexes of two or more adjoining protected areas which are divided by international boundaries, involving 666 protected areas and 113 countries. Within these complexes there are varying levels of co-operation and formalisation of agreements to co-operate in management. Many are already designated officially as Transboundary Protected Areas (TBPAs), whilst others have the potential to become so. IUCN is addressing TBPAs under its Programme for Protected Areas (Sandwith *et al*., 2001). A notable example of bioregional planning across national frontiers is the Meso-American Biological Corridor,

which was agreed to in principle by the Presidents of the countries concerned at their annual Summit Meeting in 1997 (IUCN, 2000).

There appears to be a growing willingness to co-operate among some of the major international agencies concerned with Target 4. For instance, it is noted that the UN Forum on Forests (UNFF) is working with the SCBD on integrating National Forest Programmes (NFPs) with National Biodiversity Strategies and Action Plans (NBSAPs), the purpose being to stop the loss of forest biodiversity (UNEP/CBD/COP/6/INF/7). The SCBD and UNFF have declared that the 'ecosystem approach' (a term used in the CBD) and 'sustainable forest management' (a term used by the UNFF) are "*mutually supportive rather than contradictory concepts, with sustainable forest management encompassing the principles of the ecosystem approach*" (FAO 2003).

Similar harmony seems to be developing between some of the major international conservation NGOs, as indicated by the following statement issued by CI, IUCN, TNC, WRI and WWF at COP5 in 2000 (WWF, 2000): "*Over the past several years our organisations have dramatically changed the way we think about, and seek to implement, conservation. Several terms have been developed for these new approaches, including the ecosystem approach (Convention on Biological Diversity), ecosystem-based management (IUCN), ecosystem conservation (CI), bioregional planning (WRI, IUCN), and ecoregion-based conservation (TNC, WWF). Although there are differences in methodology and application reflecting the distinctions in our organisational missions and strategies, the overall guiding principles are in each case the same. These principles represent a shared vision and goals that we believe should point the way forward for conservation in the 21st century.*"

Of special importance for Target 4 is the current development of a **collaborative programme of work on protected areas by the World Commission on Protected Areas** (WCPA), one of the six IUCN commissions (IUCN, 2002a). Following its Strategic Plan (2002-2012), WCPA is developing (or intending to develop) partnerships with a wide range of key international and national bodies, including:

- IUCN Global and Regional Programmes, and IUCN Commissions.
- UNEP-WCMC, in particular to enhance its global database on protected areas, including the UN List.
- UNESCO, notably in relation to World Heritage Sites, and Man and the Biosphere Reserves.
- WWF, CI, TNC and BirdLife International.
- The UN Foundation.
- Protected area agencies at all levels (special attention is being given to working with leaders in national agencies, particularly through the World Protected Areas Leadership Forum – WPALF).
- Other networks working on protected area issues, both internationally (e.g. The International Ranger Federation) and regionally (e.g. EUROPARC).
- Regional organisations and processes, including UNEP/SPAW, CCAD and SPREP.

Themes of the programme will include:

- Supporting the World Heritage and Biological Diversity Conventions.
- Adapting to, and taking advantage of, global change.
- Building a comprehensive global system of protected areas.
- Improving the effectiveness of protected area management.
- Ensuring that local communities, indigenous and traditional peoples and other key stakeholders are effectively involved in the planning and management of protected areas, and that benefits are equitably shared with local communities.

- Building management capacity.
- Sustainable financing for protected areas.

Potentially, **this collaborative programme of WCPA will be extremely important for Target 4**. The network could rapidly advance work on international standards needed for its successful monitoring (Box 1) and also could ensure that data relevant to Target 4 are widely available.

Considering the advantages of association, **agencies responsible for protected areas should consider becoming members of the WCPA network**. To do so, they should contact their regional or thematic WCPA Vice-Chairs. Individuals will be invited to become members on the basis of relevant expertise and a willingness to become involved in the activities of WCPA on a voluntary basis. Agencies or individuals belonging to the network will be able to access and contribute to the information available, be able to share experiences, and transmit their concerns to the international stage.

The WCPA web-site is http://wcpa.iucn.org. The address is: WCPA, Programme on Protected Areas, IUCN, Rue Mauverney 28, 1196 Gland, Switzerland.

Key recommendations:

1. Work under (at least) three of the cross-cutting targets of the GSPC (Targets 3, 15 and 16) will be essential to the achievement of Target 4. Assessments of priorities for these targets should be made and programmes instigated.
2. Targets 3, 15 and 16 need to be addressed at all levels – from that of the individual site, to the state, region and the world as a whole.
3. Capacity-building at local level is particularly essential for Target 4, because this will give realism to capacity-building at higher levels.

7. Development of base-line data

The most detailed data relevant to Target 4 will often be held relatively locally, including in the hands of individual scientists, research institutes and government departments. However, in the case of some developing countries especially, much relevant data are unavailable, in practice, within-country. Foreign researchers should ensure that their findings are made available to relevant agencies and other social groups within host countries, and also that other benefits are received for conservation and sustainable development, as appropriate to particular cases (Laird, 2002).

Some international agencies hold significant data relevant to Target 4 and some also have significant capacities for the development of international standards in data collection and analysis. Areas in which the further development of international standards is needed include: definition of ecological regions; definition of habitat types; methods of mapping the spatial distribution of habitat types and habitats (including in relation to protected areas); categorisation of protected areas; and methods of assessing protected area effectiveness.

There is a central point of contact for parties and concerned scientists to access data held by international agencies relevant to Target 4. This is the World Conservation Monitoring Centre of the United Nations Environment Programme (**UNEP-WCMC**), the web-site of which may be found at www.unep-wcmc.org. The address is: UNEP-WCMC, 219 Huntingdon Road, Cambridge, CB3 0DL, UK.

Key recommendation:

Both parties and international agencies have roles to play for the development of data for ecological regions, including in relation to making existing data available to those with direct conservation responsibilities, and in the development of standards for data collection and analysis.

8. Sub-targets, milestones and indicators

8.1. Recommended sub-targets for parties

In general, parties should co-ordinate the setting of sub-targets for Target 4 with those for Targets 5 and 13 of the GSPC. This is because of close links between these three core *in situ* conservation action targets. The following are proposed as sub-targets that parties might find useful:

– conservation planning

Parties need to **establish base-line information and undertake analyses**, including to:

- Update the classifications of their territories into ecological regions.
- Determine habitat types present and their geographical distributions.
- Assess the conservation values of habitat types and particular areas of habitat.
- Determine the coverage of existing protected areas, in relation to their positioning within ecological regions and the habitats represented within them, and assess the need for new protected areas.
- Assess the effectiveness of protected area management and new measures needed.
- Assess whether certain habitat types or areas of habitat can be adequately protected outside protected areas, and new measures needed.

– implementing conservation

- Undertake conservation action.

Some will be possible immediately. There is no need to wait for the results of new planning exercises before embarking on conservation action. Planning and implementation should be seen as interrelated processes, as illustrated by diagrams given here for adaptive management and action-research (Figures 2 and 3). Indeed, it is recommended that **planning should be viewed as being embedded within implementation**, rather than the other way round (Cowling, 1999).

– building conservation capacity

- Assess capacity-building needs under Targets 3, 15 and 16, with regular subsequent reviews.
- Implement capacity-building measures.

– collaborating with neighbouring parties

- Undertake collaborative conservation planning, share information and collaborate in capacity-building programmes, especially where countries share the same ecological regions.

– *collaborating with international conservation agencies*

These include various UN bodies and also private conservation agencies. Some parties have historic relationships with some of the latter, continuation of which will often be useful for achieving the target.

- Exchange information with UN agencies, and also with private international conservation agencies (as appropriate) to improve the quality of data and raise international standards.
- Collaborate with international agencies on specific projects, as appropriate.

8.2. Recommended sub-targets for international conservation agencies

- Ensure that information and expertise are available to the parties.
- Work together, and with parties, to improve international standards.
- Collaborate with parties on specific initiatives.

8.3. Recommended sub-targets for the SCBD

- Instigate a meeting of relevant international agencies to further the development of international standards relevant to Target 4, and to ensure that there is good communication with and between parties.
- Propose regional workshops to catalyse action on this target. Workshops for Target 4 should generally also cover Targets 5 and 13, and, perhaps in some cases, also other *in situ* targets of the GSPC.

8.4. Proposed milestones and indicators

Timetable	Milestones	Indicators
End-2005	Base-line analyses for Target 4 completed by parties (these should normally be undertaken together with similar analyses for Targets 5 and 13)	Identification of priorities for conservation action, including fields for capacity-building
End-2005	Meeting on the development of international standards and information flows completed, instigated by the SCBD	Agreements on how standards will be further developed and on how information will be made available to those interested in achieving Target 4
End-2006	Regional workshops, instigated by the SCBD, on Target 4 completed	Agreement on regional co-operation, for instance regarding recognition of ecological regions and capacity-building programmes

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Annex 1. Questionnaire used to obtain information for the consultation.

Ecological regions

1.1 How is an ecological region best defined for purposes of the target (and why)?
- In terms of scale?
- In terms of characters used for its definition (e.g. taxonomic, structural)?
- In relation to its naturalness?
- In relation to future environmental change?
- In relation to accommodating current definitions used in regions/countries?

1.2. In relation to the above, is a uniform definition of an ecological region possible or desirable?

1.3. Can you offer examples of the application of ecological regions to conservation planning? (We are considering as case-studies: (1) Africa/South Africa/fynbos and (2) Pakistan, so information on these is welcome in particular.)

1.4. Do you know the names of institutions holding information on ecological regions, and which ones are interested in co-operation with parties (countries) to help them achieve the target.

Definition of effectiveness for conservation

.1 How would you define effectiveness in terms of the state of an ecological region?

Protected areas

Assuming a protected area approach to achieving the target:

3.1 What types of protected areas are relevant for global plant conservation?

3.2 Do you have information on the cover of protected areas per ecological region? (Apart from a general global coverage, we are considering case-studies on: (1) Africa/South Africa/fynbos and (2) Pakistan – so information on these in particular is welcome.)

3.3 Do you have information indicating the current effectiveness of protected area management?

3.4 What steps are needed to improve protected areas management, including in relation to:
- The development of models with protocols.
- Education and awareness-raising programmes.
- Training (what types?).
- Network development.

3.5 Do you know the names of institutions holding information on protected areas, and which ones are interested in co-operation with parties (countries) to help them achieve the target?

4. Conservation outside protected areas

4.1. Do you have information on the extent to which ecological regions can be effectively conserved outside protected areas? (If possible, give details of which types of protected areas, and the percentages of the ecological region that can be so conserved.)

4.2. What steps are needed to improve management for conservation outside protected areas, including in relation to:

- The development of models with protocols.
- Education and awareness-raising programmes.
- Training (what types?).
- Network development.

4.3. Do you know the names of institutions holding information on conservation outside protected areas, and which ones are interested in co-operation with parties (countries) to help them achieve the target?

The 'at least 10%' figure

5.1. Is the 'at least 10%' figure always useful and, if not, when and why?

Next steps

6.1. What do you think the next steps should be on the part of:

- Parties (countries)?
- International organisations with statutory responsibilities for conservation?
- International NGOs?
- Those engaged in regional plant conservation initiatives?

6.2. When should these activities be undertaken/completed?

6.3. What indicators do you propose to judge whether the above activities have been successfully undertaken.

7. The ecosystem approach (required of all work undertaken under the CBD)

(NOTE: Twelve principles developed during workshop in Malawi in 1998 form the core of the ecosystem approach (UNEP/CBD/COP/4/Inf.9). Some of the most significant in the present context can be summarised as follows: (1) humans, with their cultural diversity, form an integral component of biodiversity; (2) the delimitation of ecosystems for conservation action needs to be defined conceptually on scales appropriate to the problems being addressed; (3) work can involve all 3 objectives of the Convention (conservation; sustainable use; fair and equitable benefit sharing in relation to access to genetic resources), requiring the striking of a balance between them; (4) there are uncertainties in managing ecosystems and, consequently, a need for conservation measures to contain elements of 'learning-by-doing' or feedback from research; (5) benefits need to accrue to those responsible for producing and managing the benefits derived from ecosystems, with a special emphasis on local communities; and (6) networks are needed for the sharing of experiences and information.)

In view of the above:

7.1. How important is it to balance conservation, sustainable use, and access and benefit-sharing to achieve the target? Do you have some practical suggestions?

7.2. How will local communities benefit from the achievement of the target?

7.3. How can adaptive management be practically applied to achievement of the target?

Annex 2. Organisations and individuals approached for the consultation.

Organisation	Person approached	Response
Botanic Gardens Conservation International	Peter Wyse Jackson	Advice and discussion
CBD Secretariat	Michelle Gauthier	Advice
Conservation International (Center for Conservation Governance)	Rebecca Livermore	Responded to questionnaire via email
Conservation International (Conservation Synthesis Department, Center for Applied Biodiversity Science)	Thomas Brooks	Responded to questionnaire via email
English Nature	Steve Preston	Interview
IUCN	Jeff McNeely (Chief Scientist)	Interviewed with questionnaire
IUCN	Martha Chouchena-Rojas (Head, Policy, Biodiversity and International Agreements Unit)	Interviewed with questionnaire
IUCN	Wendy Strahm (Plants Officer, Species Programme)	General email contact
IUCN	David Sheppard (Head, Programme on Protected Areas; Secretary General, 2003 World Parks Congress)	Interviewed with questionnaire
WCMC	Mary Cordiner	Information
WCMC	Harriet Gillett (CITES, CMS and Species Programme, WCMC)	Interview
WCMC	Timothy Johnson (Director of Programmes)	Interviewed with questionnaire
WWF-International	Alexander Belokurov (Protected Forests Inititiative, Forests For Life)	Interviewed with questionnaire
WWF-International	Jill Bowling (Forests for Life)	Interviewed with questionnaire
WWF-International	Jamison Ervin (consultant to WWF)	Email response to questionnaire, advice and information
WWF-International	Biksham Gujja (Global Water Issues)	Interviewed with questionnaire
WWF-International	Liza Higgins-Zogib (Protected Areas Initiative)	Information
WWF-International	Leonardo Lacerda (Protected Areas Initiative)	Interviewed with questionnaire
WWF-International	Isabelle Louis (Asia-Pacific Programme)	Interviewed with questionnaire
WWF-International	Gordon Shepherd (Policy Officer)	Interviewed with questionnaire
WWF-International	P.J. Stephenson (Africa &	Interviewed with

	Madagascar Programme)	questionnaire
WWF-Pakistan	Ashiq Ahmad Khan	Provided information
WWF-US	Neil Burgess	Interviewed with questionnaire
Independent consultant	Tony Cunningham (People and Plants Initiative)	Interviewed with questionnaire
Independent consultant	Paul Jepson	Interviewed with questionnaire; information
Independent consultant	Sarah Laird	Advice

Organisations approached but failed to respond include Ramsar (Secretariat), the Nature Conservancy, the Smithsonian National Museum of Natural History and the Southern African Botanical Diversity Network (SABONET), The Nature Conservancy and UNESCO.

Annex 3. Principles of the Ecosystem Approach, as adopted by the Convention on Biological Diversity, and some implications for Target 4.

	PRINCIPLE	SUMMARY RATIONALE GIVEN IN THE CONVENTION ON BIOLOGICAL DIVERSITY	SOME PARTICULAR ASPECTS RELEVANT TO TARGET 4
1	The objectives of management of land, water and living resources are a matter of societal choice.	To ensure recognition of the rights and interests of indigenous peoples and other local communities, and to manage ecosystems for their intrinsic values and for their tangible and intangible benefits to humans.	General encouragement to promote acceptance of the intrinsic value of conserving ecosystems and to take account of the rights and interests of different groups interested in plant conservation and use, especially indigenous peoples and other local communities.
2	Management should be decentralised to the lowest appropriate level.	To promote greater efficiency, effectiveness and equity, involve all stakeholders, balance local interest with the wider public interest, and increase local responsibility, ownership, accountability, participation and use of local knowledge.	Stresses the need for the involvement of local people in conservation and sustainable use of biodiversity.
3	Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems.	To ensure attention is given to actual or potential effects on other ecosystems, including some that may presently be unknown or which are unpredictable.	Attention needs to be paid to the impacts of measures for conservation and sustainable use on other ecosystems.
4	There is usually a need to understand and manage the ecosystem in an economic context. Management should reduce market distortions that adversely affect biological diversity, align incentives to promote biodiversity conservation and sustainable use, and internalise as feasible costs and benefits in the given ecosystem.	To reduce market distortions which, for example, favour land conversion and promote the costs of conservation to be borne by those who benefit from it.	Economic benefits for conservation and use need to flow back to the source areas of raw materials.

5	Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach.	To ensure the longer term maintenance or restoration of ecosystem services, in addition to simple protection of species.	Management systems should be evaluated according to the capabilities of ecosystems to maintain vital services.
6	Ecosystems must be managed within the limits of their functioning.	To focus attention on factors which limit maintenance of ecosystems, including taking a precautionary approach in the light of uncertainties.	As above, but promoting a precautionary approach.
7	The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.	To ensure that the boundaries for management are set according to appropriate spatial and temporal scales, and highlight connections between components.	Interventions for conservation should take account of the realities of relevant systems.
8	Objectives for ecosystem management should be set for the longer term.	To compensate for the tendency of humans to seek immediate benefits over future ones.	As 5 and 6, again emphasising the need to be cautious.
9	Management must recognise that change is inevitable.	To promote adaptive management to respond to change which is inevitable.	Promotes adaptive management, including through adoption of appropriate methods of monitoring, and adjustments to management interventions, if these are deemed to be needed.
10	The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity.	To provide flexibility, seeing conservation and use in context with a range of associated measures from strictly protected areas to human-made ecosystems	Balances need to be struck between protection and use, including through the zonation of land for different purposes.
11	The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices.	To ensure that all available information is shared with all stakeholders and actors, taking into account *inter alia* Article 8(j) of the CBD, and the full participation of stakeholders.	Encouragement to promote the sharing of knowledge and information relevant to conservation.
12	The ecosystems approach should involve all relevant sectors of society and scientific disciplines.	To ensure the involvement of necessary expertise and stakeholders at local and international levels, as appropriate.	All parties interested in conservation within ecological regions need to be involved.

Source: www.biodiv.org/cross-cutting/ecosystem

Annex 4. Comparative analysis of four spatial conservation planning frameworks (Jepson & Whittaker, 2002)[1].

	Biogeographic province	*Endemic Bird Areas (EBAs)*[1]	*Ecoregions*	*WWF Ecoregions*
Developing agency	World Conservation Union	BirdLife International	US Forest Service	World Wildlife Fund – US
Lead authors	R.F. Dasmann, M.D.F. Udvardy	C.J. Bibby, A.J. Stattersfield, M.J. Crosby	R.G. Bailey, C. Omernik	D.M. Olson, E. Dinerstein
General goal	Conserve global habitat and species diversity	Identify areas richest in unique kinds of organism for priority assignment of conservation action	Optimal management of land, defined as ensuring that all land uses coincidentally sustain resource productivity and maintain ecosystem process and function	Promote conservation of terrestrial freshwater, and marine ecosystems harbouring globally important biodiversity and ecological processes
Operational purpose	Guide establishment of worldwide network of natural reserves	Designate and/or strengthen management of protected areas in EBAs	Bailey: assist land managers to meet this goal; Omernik: effective management of water quality	Support 2-pronged strategy of establishing protected areas and achieving sustainable management in the non-reserve matrix
Key design consideration	Give equal stress to structural and taxonomic differences of ecosystems	Select a meaningful scale	Develop a system that classifies land as an integrated entity but is still suitable for multipurpose applications	Move away from organising conservation work on the basis of geopolitical boundaries to planning within ecologically derived areas
Date of development	1970-1975	1989-1992	1985-1996	1991-present
Approach[2]				
Global (Level I) $>10^7$ km^2	Biogeographical realm (region) climatic and taxonomic: biomes (Clements & Shelford, 1939) subdivided by faunal regions		Domain (Bailey) climatic: 4 zones generated by overlaying isotherm patterns (James, 1959) and moisture	Biogeographical zone and major ecosystem type taxonomic and ecoclimatic: major ecosystem type

[1] The table (from the original publication) includes Endemic Bird Areas, which are not ecological regions in the sense of Target 4.
[2] Summary of terminology, hierarchical determinators, and foundation studies at 3 spatial scales.

	(Wallace, 1876)		limits (Schott, in (James, 1959))	(Dinerstein *et al*., 1995) dispensed with in subsequent schemes; no classification cited by biogeographic zones listed for Latin and North America (Dinerstein *et al*., 1995; Ricketts *et al*., 1999); equivalent to (Wallace, 1876)
Macro ecosystem (Level II) 10^6 (10^4-10^8) km^2	Biogeographical (biotic) province (7 divisions) ecoclimatic and taxonomic: climax vegetation (Weaver & Clements, 1938) subdivided by percent faunal similarity (Hagmeier & Stults, 1964)		Ecoregion divisions and provinces (Bailey), Level II ecoregions (Omernik) climatic, following (Köppen, 1931) and (Trewartha, 1968) climate classification systems and dominant potential vegetation (Küchler, 1964; Küchler, 1970)	Major habitat type (9 divisions) climatic, modified by other biophysical characteristics: in Latin America follows various preliminary schemes (Dinerstein *et al*., 1995), in North America follows (Küchler, 1975), in Indonesia follows (Whitmore, 1984) based on (van Steenis, 1957)
Meso ecosystem (Level III) 10^3 (10^2-10^7) km^2	Biogeographical unit (biounit) (40 divisions) taxonomic: same percent faunal similarity algorithm applied by (MacKinnon & Wind, 1981) to smaller geographical units	EBA (24 units) taxonomic: overlay distributions of bird species with ranges of <50,000 km^2 (Terborgh & Winter, 1983)	Landscape mosaic (Bailey), Level III ecoregion (Omernik) landform (geology and topography) informed by Hammond's landform classification scheme (Hammond, 1954; Hammond, 1964); Omernik divisions also informed by land-use pattern (Anderson, 1970) and various soils maps	Ecoregion (35-40 divisions) in North America adopts Omernik with some modifications; in Latin America adopts various national schemes; in Indonesia Whitmore divisions and biounits merged and modified by EBA boundaries
Explicitness	Excellent: defined purpose, easy to understand methodology with simple algorithm based on species number data, but analysis confined to bird and mammal data	Good: defined purpose, methods easy to understand but based on arbitrary 50,000 km^2 range criterion and assumes meso-scale	Adequate: defined purpose but difficult to measure; methods difficult to understand; robust classifications combined, but	Limited: purpose all-embracing; in regions with no existing scheme (i.e. outside North America) conducts gestalt synthesis of

		congruence with other taxa	decisions on divisions based on subjective grounds	various schemes and criteria

Annex 5. Efficacy of four spatial conservation planning frameworks in Indonesia (Jepson & Whittaker, 2002).

Criteria	*Biogeographic province*	*Endemic Bird Areas (EBAs)*	*Ecoregions*	*WWF Ecoregions*
Policy and development credentials	Established framework for government and donor conservation strategy and policy documents	Well-known among specialist biodiversity planners and in local planning authorities of Maluku and East Nusa Tenggara	Similar concepts and classifications used in delineation of physiographical types and land suitability for development (see (RePPProt, 1991))	Term gaining recognition, but few understand its meaning or utility
Scientific credentials	Basic framework for teaching macro-level ecological variation in schools and universities	Well known among the few scientific ornithologists and specialist conservation planners	Resource-management disciplines familiar with climatic, vegetation, and landform variables	None yet
Public awareness	7 provinces well-known among Indonesians and related to the major island and hence cultural groups	At an operational level the message of unique birds in EBAs is proving a powerful means of generating popular interest in conservation	Limited understanding	None yet
Tangible conservation outcomes	National conservation plan enshrined the representation principle in national policy; government policy to establish a 'minimum set' of 80 major ecosystem reserves; nearly 200 new reserves covering 20 million ha added to the existing reserves system; desire to support and participate in the above programme led to 5 major international conservation NGOs establishing programmes in Indonesia	Created a policy awareness of the conservation importance of the small island regions of Lesser Sundas and Maluku; main factor in location and/or designation of several new reserves and in promoting field research to fill distributional lacunae strengthened local pride and sense of place on islands where EBAs are part of conservation planning framework	Not applicable	None yet of any substance; has introduced new generation of conservationists from social or economic backgrounds to notions of ecological representation; instrumental in extending spatial prioritisation approach to the marine realm

Overall assessment	Achieved purpose to a remarkable extent	Achieving purpose and providing useful adjunct to the biogeographic province approach	Not applicable	Appears to add nothing new and could compromise goals by undermining the established approaches already advanced in meeting comparable goals
Assessment of future value	Principle of representation, conservation's joint concerns for preservation of ecosystem types and species variation, and creation of reserves to meet these concerns is expected to stand the test of time; Dasmann-Udvardy system a good hierarchical system for conservation planning down to the meso-ecosystem scale	Knowledge of location of meso- or micro-ecosystem centres of endemism is likely to increase in value in line with increasing landscape change and human population growth; hotspot approaches such as EBAs are essential supplements to 'representative' approaches for macro-scale conservation planning and strategizing	Lack of consideration given to species variation means this system is unsuitable for biodiversity conservation planning at global level to meso-scale; focus on landform below the meso-scale offers opportunity to combine concerns relating to social justice and ecological integrity with traditional habitat and species-preservation concerns in conservation; landform form a fourth-level determinator in the Dasmann-Udvardy system	May be beneficial in areas of the world lacking detailed pre-existing schemes, but we question the merit of promoting this approach over existing schemes in Indonesia

Annex 6. Number and extent of internationally designated protected areas (Green & Paine, 1997).

Instrument/programme	Date	Internationally designated protected areas	
		No. sites	Extent (km^2)
Global			
Ramsar Convention – Ramsar Wetlands	September 1997	891	628,474
UNESCO MAB Programme – Biosphere Reserves	November 1997	352	>2.2 million
World Heritage Convention – Natural – Mixed natural/cultural sites	December 1997	114 20	1,297,776 (included in above total)
Regional – Europe			
EU Birds Directive – Special Protection Areas	December 1996	1,470	82,953
EU Habitats Directive – Special Areas for Conservation	December 1997	Pending	0
Helsinki Convention – Baltic Sea Protected Area	December 1997	3[1]	891
Barcelona Convention – Mediterranean Sea especially Protected Areas	December 1997	212	10,677
Council of Europe – Biogenetic Reserves	December 1997	341	38,322
Regional – elsewhere			
ASEAN Agreement – ASEAN Heritage Parks & Reserves	December 1997	11	57,494
Antarctic Treaty[2] – Specially Protected Areas	December 1996	20	184
Source: Green & Paine 1997, Table 7.			

1. A total of 63 Baltic Sea Protected Areas have been established, but currently only 3 of these have been officially recognised at national levels.
2. The entire continent and its dependent marine ecosystems have recently been designated as a natural reserve under the Environmental Protocol of this Treaty.

Annex 7. World Heritage Natural Sites.

The World Heritage Convention was established in 1972 for the protection of the cultural and natural heritage of mankind (Posey, 1996). It has been ratified by 160 countries. Sites considered for 'natural heritage' status (Article 2) include:

- Natural features consisting of physical and biological formations or groups of such formations, which are of outstanding universal value from the aesthetic or scientific point of view.
- Geological and physiographical formations and precisely delineated areas which constitute the habitat of threatened species of animals and plants of outstanding universal value from the point of view of science or conservation.
- Natural sites or precisely delineated natural areas of outstanding universal value from the point of view of science, conservation or natural beauty.

In 1992 the World Heritage Convention additionally recognised 'cultural landscapes' as a category of World Heritage Sites. They are 'combined work(s) of nature and of man' (definition of cultural heritage given under Article 1 of the Convention). There are three main categories:

(i) Clearly defined landscapes designed and created intentionally by man, such as, for example, gardens and parks.
(ii) Organically evolved landscapes resulting from successive social and economic imperatives and in response to the natural environment.
(iii) Associative cultural landscapes, which have 'powerful religious, artistic or cultural associations of the natural element rather than material cultural evidence, which may be insignificant or even absent'.

Category (iii) has two sub-categories:

(iiia) Relict (or fossil) landscapes in which an evolutionary process came to an end in the past.
(iiib) Relict or continuing landscapes 'which retain an active social role in contemporary society closely associated with the traditional way of life'.

Financial assistance and management support is provided to help host countries maintain the integrity of designated World Heritage Sites.

Inscription as a Natural Site under the World Heritage Convention is the ultimate accolade for a protected area. It is also claimed to be the most effective guarantor so far devised that the park's integrity will be defended. To achieve this inscription sites have to be declared to be of 'outstanding universal value' and to be protected effectively. UNESCO maintains the World Heritage List, on which 33 tropical forest sites – covering more than 26 million hectares – have been included.

By October 2000 only 128 natural sites had been inscribed, many less than on the cultural list. The World Heritage Committee has traditionally taken a tough position of insisting that each site inscribed is not only of World Heritage quality but also is truly protected effectively.

World Heritage Sites are ideal places to use as models on how to manage areas of great value, usually of very high biological diversity and often of fragile ecosystems, in harmony with the

other needs of society. The UN Foundation has developed a programme to support World Heritage Sites.

Annex 8. IUCN categories of protected area.

(Adopted at the IUCN General Assembly, 1994)

Category Ia **Strict nature reserve/wilderness protection 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 **Wilderness area** – 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 **National park** – 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 **Natural monument** – 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 **Habitat/species management area** – protected area managed mainly for conservation through management intervention; area of land and/or sea subject to active intervention for management purposes in order to ensure the maintenance of habitats to meet the requirements of specific species.

Category V **Protected landscape/seascape** – 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 **Managed resource protected area** – protected area managed mainly for the 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.

Annex 9. Examples of initiatives to measure and monitor the effectiveness of protected areas.

1. WWF Rapid Assessment and Prioritisation of Protected Area Management (RAPPAM) (Ervin, 2003)

The most thorough and effective approach to implementing this methodology is for the implementing agency to hold an interactive workshop or series of workshops in which protected area managers, policy makers, and other stakeholders participate fully in evaluating the protected areas, analysing the results, and identifying subsequent next steps and priorities.

Five steps:
(1) **Determining the scope of the assessment** – achieved by examining 8 simple questions and deciding whether to include all protected areas in the country/region under assessment, or a representative number where there are many protected areas.
(2) **Assessing existing information** using, for example, aerial photos, academic research, analyses of threats, internal programmes and field reports, external independent reports, legal and policy reviews.
(3) **Administering the rapid assessment questionnaire**, most easily via participatory workshops with interested parties.
(4) **Analysing the findings** under the headings – pressures and threats, biological and socio-economic importance and vulnerability, and management effectiveness.
(5) **Identifying next steps and recommendations**, working with policy makers and protected area administrators in analysing the findings to identify recommendations and create a plan of action.

Further information. Protected Areas Initiative, Forests for Life, WWF International, Avenue du Mont Blanc, 1196 Gland, Switzerland. Website: www.panda.org/parkassessment/

2. WCPA Framework for Assessment (Hockings *et al.*, 2000)

The WCPA Management Effectiveness Task Force assesses the management effectiveness of both individual protected areas and protected area systems. It provides guidance to managers and others, and helps to harmonise assessment around the world.

The Task Force has developed a 'framework for assessment' based on the idea that protected area management follows a process with six distinct stages, or elements:

Summary of the WCPA Framework (World Bank & WWF, 2003)

Elements of evaluation	Explanation	Criteria that are assessed	Focus of evaluation
Context	***Where are we now?*** Assessment of importance, threats & policy environment	Significance; threats; vulnerability; national context; partners	Status
Planning	***Where do we want to be?*** Assessment of protected area design & planning	Protected area legislation & policy; protected area system design; reserve design; management planning	Appropriateness
Inputs	***What do we need?*** Assessment of resources	Resourcing of agency; resourcing of site	Resources

	needed to carry out management		
Processes	***How do we go about it?*** Assessment of the way in which management is conducted	Suitability of management processes	Efficiency & appropriateness
Outputs	***What were the results?*** Assessment of the implementation of management programmes and actions; delivery of products and services	Results of management actions; services and products	Effectiveness
Outcomes	***What did we achieve?*** Assessment of the outcomes & the extent to which they achieved objectives	Impacts – effects of management in relation to objectives	Effectiveness & appropriateness

Further information. WCPA website at: www.wcpa.iucn.org, or contact WCPA at wcpa@hq.iucn.org

3. The World Bank/WWF Management Effectiveness Tracking Tool (World Bank & WWF, 2003)

The World Bank/WWF Alliance for Forest Conservation and Sustainable Use has set a target relating to management effectiveness of protected areas: '*50 m ha of existing but highly threatened forest protected areas to be secured under effective management by the year 2005*'.

It has developed a simple site-level Tracking Tool that can be used by the protected area manager or other relevant site staff to facilitate reporting on management effectiveness of protected areas within WWF and World Bank Projects. It should only be used to provide a quick overview of management up to and including outputs as it has strict limitations in terms of allowing comparison between sites, and is too limited to allow a detailed evaluation of outcomes.

The Tracking Tool is in the form of a questionnaire in two sections: a datasheet that details key information on the site, its characteristics and management objectives, and an overview of WWF/World Bank involvement; and, an assessment form with three sections (questions and scores, comments, next steps).

Further information. WWF International, Forests for Life Programme, Avenue du Mont-Blanc, 1196 Gland, Switzerland. Email: forests4life@wwfint.org Web: www.panda.org/forests4life

4. Biodiversity Indicators for Monitoring Global Environment Facility (GEF) Programme Implementation and Impacts (Jenkins & Kapos, 2000)

Biodiversity Indicators for Monitoring GEF Programme Implementation and Impacts were prepared for the GEF Monitoring and Evaluation Team by the World Conservation Monitoring Centre (WCMC). Various categories of indicators are distinguished, including some relevant to pressures on biodiversity and others to biodiversity status. Because GEF needs to report in a variety of contexts on the extent and impact of those of its activities that address biological

diversity, it has developed a portfolio of indicators that can be used individually or collectively to address individual issues raised in the articles of the CBD and in the decisions of the COP.

Further information. UNEP-WCMC, 219 Huntingdon Road, Cambridge, CB3 0DL, UK. Web: www.unep-wcmc.org