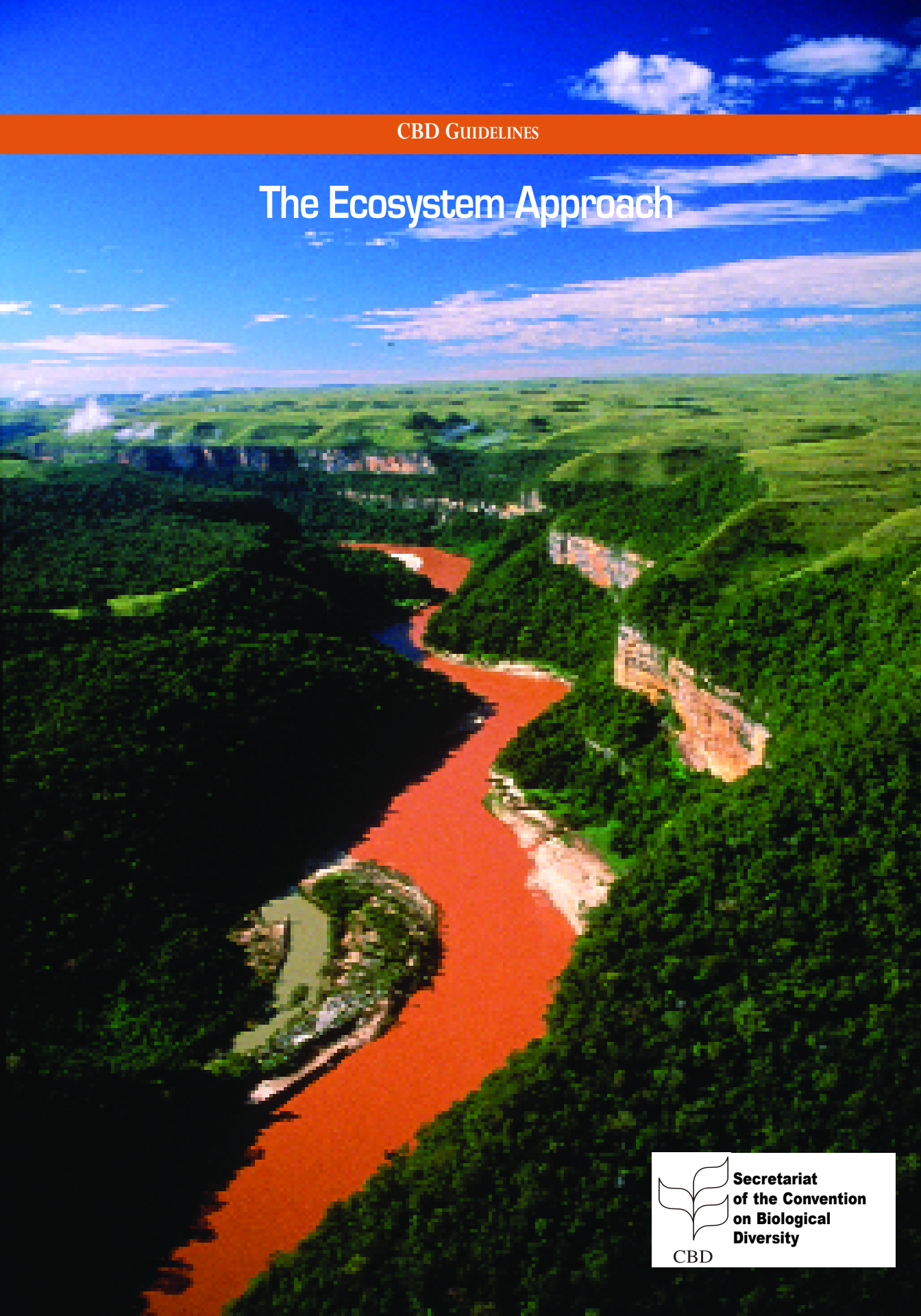
CBD GUIDELINES

The Ecosystem Approach



Secretariat
of the Convention
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Foreword

Biological diversity - the variety of life on Earth and the natural patterns it forms - is increasingly threatened by human activities. Management of the Earth's biodiversity resources with the aim to reach the three objectives of the Convention on Biological Diversity: the conservation and sustainable use of biological diversity, and the equitable sharing of benefits arising from the utilization of genetic resources, presents a formidable challenge for humankind. The processes linking ecosystems and species are complex, and an action taken in one location may have unforeseen consequences elsewhere, often far away and many years later. In this context, the ecosystem approach offers a powerful strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. The ecosystem approach is the primary framework for action under the Convention, and its application will help to reach a balance of the three objectives of the Convention.

The ecosystem approach is based on the application of appropriate scientific methodologies focused on levels of biological organization, which encompass the essential structure, processes, functions and interactions among organisms and their environment. It also recognizes that humans, with their cultural diversity, are an integral component of many ecosystems. The ecosystem approach is essential in guiding action under the various programmes of work of the Convention, and in providing linkages between those programmes of work. After all, all biomes, and thus programmes of work, are interconnected in some way, and management action will likely have limited success if these connections are not taken into account.

The ecosystem approach requires adaptive management to deal with the complex and dynamic nature of ecosystems and the absence of complete knowledge or understanding of their functioning. Ecosystem processes are often non-linear, and the outcome of such processes often shows time-lags. The result is discontinuities, leading to surprise and uncertainty. Management must be adaptive in order to be able to respond to such uncertainties and contain elements of "learning-by-doing" or research feedback. Scientific research aimed at providing understanding of the functioning of the broader ecosystem in terms of its component parts and their connectivity, and oriented towards the information needs of management, will ensure that management decisions are based on best available science in the context of the precautionary approach. Measures may need to be taken even when some cause-and-effect relationships are not yet fully established scientifically.

The ecosystem approach does not preclude other management and conservation approaches, and may in fact be consistent and compatible with such approaches. Some notable approaches include ecosystem based management, sustainable forest management, integrated river-basin management, integrated marine and coastal area management, and responsible fisheries approaches. These approaches may support the implementation of the ecosystem approach in various sectors and biomes. Other related approaches, such as biosphere reserves, protected areas, and single-species conservation programmes, as well as other approaches carried out under existing national policy and legislative frameworks, can be integrated in the context of the ecosystem approach to deal with complex situations. There is no single way to implement the ecosystem approach, as it depends on local, provincial, national, regional or global conditions. Indeed, there are many ways in which ecosystem approaches may be used as the framework for delivering the objectives of the Convention in practice.

The Convention is the first and only international treaty to take a holistic, ecosystem-based approach to biodiversity conservation and sustainable use. It has established itself as one of the pillars supporting international efforts for sustainable development. Together with the precautionary approach, the ecosystem approach constitutes one of the basic concepts guiding our efforts to manage biological resources, and was recognized as such in the Plan of Implementation of the World Summit on Sustainable Development. I therefore urge all concerned to make every effort to apply the ecosystem approach when undertaking activities designed to reach the objectives of the Convention. Please also share with us your experiences and any suggestions you may have to improve our collective efforts.

Hamdallah Zedan
Executive Secretary

Introduction

The ecosystem approach emerged early as a central principle in the implementation of the Convention on Biological Diversity. At its second meeting, held in Jakarta in November 1995, the Conference of the Parties adopted the ecosystem approach as the primary framework for action under the Convention, and subsequently referred to it in the elaboration and implementation of the various thematic and cross-cutting programmes of work, and in the guidelines that were developed as part of these programmes of work. At the present time, each of the Convention's work programmes incorporates the ecosystem approach in its goals and activities, and the central role of the ecosystem approach is also reflected in the Strategic Plan of the Convention.

Even though the ecosystem approach is a central concept to the Convention, it has proven difficult to define in a simple manner. At its fourth meeting, in Bratislava in May 1998, the Conference of the Parties acknowledged the need for a workable description and further elaboration of the ecosystem approach, and requested the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) to develop principles and other guidance on the ecosystem approach.

Based on the work of SBSTTA, which was aimed at operationalizing the ecosystem approach, the fifth meeting of the Conference of the Parties endorsed a description of the ecosystem approach and five points operational guidance. It also recommended the application of the 12 principles of the ecosystem approach. The description, guidance and principles are included in decision V/6 of the Conference of the Parties. They are also reiterated in this document. It was understood that in applying the ecosystem approach, all principles need to be considered, with appropriate weight given to each, in accordance with local conditions.

Although defining the ecosystem approach has not been a simple task, many Governments and organizations are already implementing it. Case studies have proven to be a valuable source of information on the successes and failures of practical applications of the ecosystem approach. Not surprisingly, the Conference of the Parties has placed much emphasis on the collection and analysis of case studies, and those case studies are already available on the Convention's website (http://www.biodiv.org/programmes/cross-cutting/ecosystem/cs.aspx). A web-based sourcebook currently under development at the request of the seventh meeting of the Conference of the Parties will also incorporate searchable case study database as its central component.

We have learned much about applying the ecosystem approach during the past years, and this document includes implementation guidelines and annotations to the rationale that were welcomed by the seventh meeting of the Conference of the Parties (Annex 1 to decision VII/11). The document also includes a consideration of the relationship between sustainable forest management and ecosystem approach, as well as a review of, and development of strategies for, the integration of the ecosystem approach into the programme of work of the Convention (Annex II to decision VII/11). All of this new material is based on the excellent work of an expert group on this topic.

Perhaps the most important lesson is the realization that the priority at this time is not in developing further definitions or revisions of the principles. Instead, the priority should be in facilitating the implementation of the ecosystem approach as the primary framework for addressing the three objectives of the Convention in a balanced way. The time for action has come if we are to reach the target of achieving by 2010 a significant reduction of the current rate of biodiversity loss. And we cannot reach this target without fully embracing the ecosystem approach in all activities aimed at the conservation and sustainable use of biological diversity.

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Description of the ecosystem approach[1]

1. The ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. Thus, the application of the ecosystem approach will help to reach a balance of the three objectives of the Convention: conservation; sustainable use; and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources.

2. An ecosystem approach is based on the application of appropriate scientific methodologies focused on levels of biological organization, which encompass the essential structure, processes, functions and interactions among organisms and their environment. It recognizes that humans, with their cultural diversity, are an integral component of many ecosystems.

3. This focus on structure, processes, functions and interactions is consistent with the definition of "ecosystem" provided in Article 2 of the Convention on Biological Diversity: "'Ecosystem' means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit." This definition does not specify any particular spatial unit or scale, in contrast to the Convention definition of "habitat". Thus, the term "ecosystem" does not, necessarily, correspond to the terms "biome" or "ecological zone", but can refer to any functioning unit at any scale. Indeed, the scale of analysis and action should be determined by the problem being addressed. It could, for example, be a grain of soil, a pond, a forest, a biome or the entire biosphere.

4. The ecosystem approach requires adaptive management to deal with the complex and dynamic nature of ecosystems and the absence of complete knowledge or understanding of their functioning. Ecosystem processes are often non-linear, and the outcome of such processes often shows time-lags. The result is discontinuities, leading to surprise and uncertainty. Management must be adaptive in order to be able to respond to such uncertainties and contain elements of "learning-by-doing" or research feedback. Measures may need to be taken even when some cause-and-effect relationships are not yet fully established scientifically.

5. The ecosystem approach does not preclude other management and conservation approaches, such as biosphere reserves, protected areas, and single-species conservation programmes, as well as other approaches carried out under existing national policy and legislative frameworks, but could, rather, integrate all these approaches and other methodologies to deal with complex situations. There is no single way to implement the ecosystem approach, as it depends on local, provincial, national, regional or global conditions. Indeed, there are many ways in which ecosystem approaches may be used as the framework for delivering the objectives of the Convention in practice.

1. Extracted from section A of decision V/6, of the Conference of the Parties to the Convention on Biological Diversity. Paragraph numbering as in the original.

The 12 principles of the ecosystem approach and their rationale, suggested annotations to the rationales and implementation guidelines

(table 1 of Decision VII/11 of the Conference of the Parties)

Principle 1: The objectives of management of land, water and living resources are a matter of societal choice.

Rationale:

Different sectors of society view ecosystems in terms of their own economic, cultural and societal needs. Indigenous peoples and other local communities living on the land are important stakeholders and their rights and interests should be recognized. Both cultural and biological diversity are central components of the ecosystem approach, and management should take this into account. Societal choices should be expressed as clearly as possible. Ecosystems should be managed for their intrinsic values and for the tangible or intangible benefits for humans, in a fair and equitable way.

Annotations to the rationale:

The objectives for managing land, water, and living resources is a matter of societal choice, determined through negotiations and trade-offs among stakeholders having different perceptions, interests, and intentions. In this regard it should be noted that:

- Human society is diverse in the kind and manner of relationships that different groups have with the natural world, each viewing the world around them in different ways and emphasising their own economic, cultural, and societal interests and needs.
- All relevant sectors of society need to have their interests equitably treated, which may involve providing for different outcomes in separate locations or at different times.
- It is also necessary to ensure that the needs of future generations and the natural world are adequately represented.
- Given this diversity, good decision-making processes that provide for negotiations and trade-offs are necessary to establish broadly acceptable objectives for the management of particular areas and their living resources.
- Good decision-making processes incorporate the following characteristics:
    - All interested parties (particularly including indigenous and local communities) should be involved in the process,
    - It needs to be a clear how decisions are reached and who the decision-- maker(s) is(are),
    - The decision-makers should be accountable to the appropriate communities of interest,
    - The criteria for decisions should be appropriate and transparent, and
    - Decisions should be based on, and contribute to, inter-sectoral communication and coordination.
- Good decisions depend on those involved having access to accurate and timely information and the capacity to apply this knowledge.

Implementation guidelines

1.1 Involve all stakeholders (interested parties) (including indigenous and local communities) in:

- clearly articulating, defining and agreeing upon the goals of management
- defining problems
- making choices (in principle 12).

1.2 There need to be clearly defined boundaries (in time and space) for the management unit that is the subject of the societal choice process.

1.3 Ensure that those stakeholders that cannot directly represent themselves are adequately represented by someone else.

1.4 Ensure that all stakeholders have an equitable capacity to be effectively involved, including through ensuring equitable access to information, ability to participate in the processes, etc.

1.5 Ensure that the decision-making process compensates for any inequities of power in society, in order to ensure that those who are normally marginalized (e.g. women, the poor, indigenous people) are not excluded or stifled in their participation.

1.6 Determine who the decision-makers are for each decision, how the decisions will be taken (what process will be used), and what are the limits on the discretion of the decision-maker (e.g. what are the criteria for the decision in law, what is the overall policy guidance within which the decision must fit, etc).

1.7 Ensure that the recognition of stakeholder interests occurs within the full range of decisions over time and space and levels. In doing so, however, ensure that "stakeholder fatigue" does not develop, by incorporating known stakeholder views into future decisions, and allowing efficient stakeholder input.

1.8 Where possible, use existing societal mechanisms, or build new mechanisms that are compatible with existing or desired societal conditions.

1.9 Ensure that decision-makers are accountable to the appropriate communities of interest.

1.10 Develop the capacity to broker negotiations and trade-offs, and manage conflicts, among relevant stakeholder groups in reaching decisions about management, use and conservation of biological resources.

1.11 There need to be mechanisms in place to ensure that, once an appropriate societal choice has been made, the decision will be able to be implemented over the long term, i.e. policy, legislative and control structures need to be in place.

1.12 Undertake assessment at the national level to analyse effects of ecosystem management practices on society, with a view to find ways and means to mitigate possible constraints between stakeholders in the implementation phase.

Principle 2: Management should be decentralized to the lowest appropriate level.

Rationale:

Decentralized systems may lead to greater efficiency, effectiveness and equity. Management should involve all stakeholders and balance local interests with the wider public interest. The closer management is to the ecosystem, the greater the responsibility, ownership, accountability, participation, and use of local knowledge.

Annotations to the rationale:

Decisions should be made by those who represent the appropriate communities of interest, while management should be undertaken by those with the capacity to implement the decisions. In this regard it should be noted that:

- There are usually many communities-of-interest in ecosystem management. These can be compatible, complimentary, or contradictory. It is important to ensure that the level of decision-making and management selected maintains an appropriate balance among these interests.

- Often, but not always, the closer the decision-making and management are to the ecosystem, the greater the participation, responsibility, ownership, accountability and use of local knowledge will be, all of which are critical to the success of management.

- Because there are several levels of interests with people who have varying capacities to address different aspects of ecosystem management, there are often multiple decision-makers and managers with different roles for any individual place or resource.

- Decisions made by local resource managers are often affected by, or even subordinate to, environmental, social, economic and political processes that lie outside their sphere of influence, at higher levels of organisation. Therefore there is a need for mechanisms to coordinate decisions and management actions at a number of different organisational levels.

Implementation guidelines

2.1 The multiple communities of interest should be identified, and decisions about particular aspects of management assigned to the body that represents the most appropriate community of interest. If necessary, management functions/decisions should be subdivided. For example, strategic decisions might be taken by central government, operational decisions by a local government or local management agency, and

decisions about allocation of benefits between members of a community by the community itself.

2.2 The potential adverse effects of fragmented decision-making and management responsibilities should be compensated for by:

- ensuring that decisions are appropriately nested and linked
- sharing information and expertise
- ensuring good communication between the different management bodies
- presentation of the overall combination of decisions/management to the community in an understandable and consolidated form so they can effectively interact with the overall system.
- supportive relationships between the levels.

2.3 Good governance arrangements are essential, particularly:

- clear accountabilities
- accountabilities of the necessary authorities
- accountabilities of competent bodies or persons

Note that this is not a complete enough list, and there seems no good reason to particularly identify these.

2.4 Achieving an appropriate level of decentralization requires taking decisions at a higher level to create an enabling and supportive environment, as well as a commitment to devolve those decision-making responsibilities that are currently situated at too high a level.

2.5 In choosing the appropriate level of decentralization, the following are relevant factors that should be taken into account in choosing the appropriate body. .

- whether the body represents the appropriate community of interest
- whether the body has a commitment to the intent of the function
- whether the body has the necessary capacity for management
- efficiency (e.g. by moving the function to a higher level you may have sufficient work to allow maintenance of the necessary level of expertise to do the function efficiently and effectively).
- whether the body has other functions which represent a conflict of interest
- the effect on marginalized members of society (e.g. women, marginalized tribal groups)

In some cases problems could be corrected, such as through capacity-building. If no appropriate body is available at the level, a new body might be created, or an existing body modified, or a different level chosen.

2.6 Where functions are to be moved to another level, it is necessary to ensure that the body receiving the responsibility has sufficient capacity to fulfil that responsibility (e.g. resources, systems, authority), and that any risks arising from the transition can be managed. This means doing capacity-building if necessary to allow the decentralization to occur.

Institutional arrangements are the key. If you don't have the institutional structure that supports and coordinates the decision-making authorities then their work is worthless.

Principle 3: Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems.

Rationale:

Management interventions in ecosystems often have unknown or unpredictable effects on other ecosystems; therefore, possible impacts need careful consideration and analysis. This may require new arrangements or ways of organization for institutions involved in decision-making to make, if necessary, appropriate compromises.

Annotations to the rationale:

Ecosystems are not closed systems, but rather open and often connected to other ecosystems. This open structure and connectedness of ecosystems ensures that effects on ecosystem functioning are seldom confined to the point of impact or only to one system. In this regard it should be noted that:

- The effects of management interventions, or decisions not to intervene, are therefore not confined solely to the point of impact.
- The effects between ecosystems are frequently non-linear and will likely have associated time-lags.
- Management systems need to be designed to cope with these issues.
- There is a need for this to reflect the fact that impacts are in both directions - into and out of a particular ecosystem. Not just adjacent and downstream, but those have other connections as well (e.g. systems linked by migratory species).

Implementation guidelines

3.1 Natural resource managers, decision makers and politicians should consider the possible effects that their actions could have on adjacent and downstream ecosystems (river basins and coastal zones) so that effects inside and outside the ecosystem are determined.

3.2 Where impacts of management or use of one ecosystem has or is projected to have effects elsewhere, bring together relevant stakeholders and technical expertise to consider how best to minimize adverse consequences.

3.3 Environmental impact assessment (EIAs), including strategic environmental assessments (SEAs) should be carried out for developments that may have substantial environmental impacts taking into account all the components of biological diversity. These assessments should adequately consider the potential offsite impacts. The results of these assessments, which can also include social impact assessment, should subsequently acted upon. When identifying existing and potential risks or threats to ecosystem, different scales need to be considered.

3.4 Establish and/or maintain national and regional, where applicable, feed-back mechanisms to monitor the effects of management practices across ecosystems.

Principle 4: Recognizing potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context. Any such ecosystem-management programme should:

(a) Reduce those market distortions that adversely affect biological diversity;
(b) Align incentives to promote biodiversity conservation and sustainable use;
(c) Internalize costs and benefits in the given ecosystem to the extent feasible.

Rationale:

The greatest threat to biological diversity lies in its replacement by alternative systems of land use. This often arises through market distortions, which undervalue natural systems and populations and provide perverse incentives and subsidies to favour the conversion of land to less diverse systems. Often those who benefit from conservation do not pay the costs associated with conservation and, similarly, those who generate environmental costs (e.g. pollution) escape responsibility. Alignment of incentives allows those who control the resource to benefit and ensures that those who generate environmental costs will pay.

Annotations to the rationale:

Many ecosystems provide economically valuable goods and services and it is therefore necessary to understand and manage ecosystems in an economic context. Frequently economic systems do not make provision for the many, often, intangible values derived from ecological systems In this regard it should be noted that:

- Ecosystem goods and services are frequently undervalued in economic systems.
- Even when valuation is complete, most environmental goods and services have the characteristic of "public goods" in an economic sense, which are difficult to incorporate into markets.
- It is often difficult to introduce new uses of ecosystems, even where these are less impacting or provide wider benefits to society, because economic and social systems exhibit significant inertia, particularly where strong existing interests are affected by and resist change.
- Many stakeholders with strong interests in the ecosystem, but having limited political and economic influence, may be marginalized from the relevant economic systems.
- Where those who control use of the land do not receive benefits from maintaining natural ecosystems and processes, they are likely to initiate unsustainable land use practices from which they will benefit directly in the short term. To counter this, more equitable sharing of benefits is advised.
- International, national and sub-national policies, laws and regulations, including

subsidies may provide perverse incentives for unsustainable management of ecosystems. Economic systems therefore need to be redesigned to accommodate environmental management objectives.

- Addressing the issue of market distortions that adversely affect biodiversity will require establishing dialogue with other sectors.

Deriving economic benefits is not necessarily inconsistent with attaining biodiversity conservation and improvement of environmental quality.

Implementation guidelines

4.1 Develop an understanding of the social and economic context of the issue to which the ecosystem approach is being applied

4.2 Apply appropriate practical economic valuation methodologies for ecosystem goods and services (direct, indirect and intrinsic values); and for the environmental impacts (effects or externalities).

4.3 Aim to reduce those market distortions that adversely affect biological diversity

4.4 Align economic and social incentives to promote biodiversity conservation and sustainable use.

4.5 Internalize costs and benefits in the given ecosystem to the extent feasible.

4.6 Evaluate the direct as well as indirect economic benefits associated with good ecosystem management including biodiversity conservation and environmental quality.

4.7 Enhance benefits of using biological diversity.

4.8 Ensure equitable sharing of costs and benefits.

Incorporate social and economic values of ecosystem goods and services into National Accounts, policy, planning, education and resource management decisions.

Principle 5: Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach.

Rationale:

Ecosystem functioning and resilience depends on a dynamic relationship within species, among species and between species and their abiotic environment, as well as the physical and chemical interactions within the environment. The conservation and, where appropriate, restoration of these interactions and processes is of greater significance for the long-term maintenance of biological diversity than simply protection of species.

Annotations to the rationale:

Biodiversity conservation and the maintenance of human wellbeing depend on the functioning and resilience of natural ecosystems. In this regard it should be noted that:

- Ecosystem services - the benefits people obtain from ecosystems by way of resources, environmental regulation including, support of biospheric processes, inputs to culture, and the intrinsic values of the systems themselves - depend on maintaining and, where appropriate, restoring particular ecological structures and functions.
- Ecosystem functioning and resilience depend on inter-relationships within and among species, between species and their abiotic environments, and on the physical and chemical interactions within these environments.
- Given this complexity, management must focus on maintaining, and where appropriate restoring, the key structures and ecological processes (e.g., hydrological systems, pollination systems, habitats and food webs) rather than just individual species.
- Given that the loss of genetic diversity predisposes populations and species to local extinction, the conservation of ecosystem composition and structure requires monitoring of population sizes of vulnerable and economically important species.

Management of ecosystem processes has to be carried out despite incomplete knowledge of ecosystem functioning.

Implementation guidelines

5.1 Improve understanding of the interrelationship among ecosystem composition, structure and function with respect to (i) human interaction, needs and values (including cultural aspects), (ii) conservation management of biodiversity, and (iii) environmental quality, integrity and vitality.

5.2 Determine and define conservation, social and economic objectives and goals that can be used to guide policy, management and planning using participatory processes.

5.3 Assess the extent to which ecosystem composition, structure can function contribute to the delivery of goods and services to meet the desired balance of conservation, social and economic outcomes.

5.4 Expand knowledge of the responses of ecosystems, in terms of changes in composition, structure and function, to both internally and externally induced stresses caused by, inter alia, human use, disturbance, pollution, fire, alien species, disease abnormal climatic variations (drought, flood) etc.

5.5 Develop and promote management strategies and practices that enable and ensure conservation of ecosystem service and take account of, or minimize, risks/threats to ecosystem function and structure.

5.6 Apply instruments to maintain and/or restore ecosystem service.

5.7 Where required, develop management strategies and practices to facilitate recovery of ecosystem structure and function (including threatened components) to generate or enhance ecosystem services and biodiversity benefits.

5.8 Develop and apply instruments that contribute to achievement of conservation management goals through a combination of managing protected area networks, ecological networks and areas outside of such networks to meet both short-term and long-term requirements and conservation outcome in accordance with VII/28.

5.9 Monitoring population sizes of vulnerable and important species should be linked to a management plan that identifies appropriate response measures and actions.

Principle 6: Ecosystems must be managed within the limits of their functioning.

Rationale:

In considering the likelihood or ease of attaining the management objectives, attention should be given to the environmental conditions that limit natural productivity, ecosystem structure, functioning and diversity. The limits to ecosystem functioning may be affected to different degrees by temporary, unpredictable or artificially maintained conditions and, accordingly, management should be appropriately cautious

Annotations to the rationale:

There are limits to the level of demand that can be placed on an ecosystem while maintaining its integrity and capacity to continue providing the goods and services that provide the basis for human wellbeing and environmental sustainability. Our current understanding is insufficient to allow these limits to be precisely defined, and therefore a precautionary approach coupled with adaptive management, is advised. In this regard it should be noted that:

- Just as there are limits to the demands (production, off-take, assimilation, detoxification) that can be made on ecosystems, so too there are limits to the amount of disturbance that ecosystems can tolerate, depending on the magnitude, intensity, frequency and kind of disturbance.
- These limits are not static but may vary across sites, through time, and in relation to past circumstances and events.
- Cumulative effects of interventions over time and space should be assessed when considering ecosystem limits.
- If these limits are exceeded, an ecosystem undergoes substantial change in composition, structure and functioning, usually with a loss of biodiversity and a resulting lower productivity and capacity to process wastes and contaminants
- There is considerable lack of knowledge and uncertainty about the actual limits (thresholds for change) in different ecosystems. While further research can reduce these uncertainties, given the dynamic and complex nature of ecosystems we may never have perfect understanding.
- Given the pervasiveness of uncertainties in managing ecosystems, management will need to be adaptive, with a focus on active learning derived from monitoring the outcomes of planned interventions using a sound experimental approach that allow the effects of the intervention to be accurately determined.

Management to restore lost capacities or control use should be appropriately cautious and apply an adaptive management approach.

Implementation guidelines

6.1 Identify practices that are not sustainable and develop appropriate mechanisms for improvement involving all stakeholders.

6.2 Given the uncertainty associated with defining the limits to ecosystem functioning under most circumstances, the precautionary approach should be applied.

6.3 Implement an adaptive management approach.

6.4 Develop understanding of the limits of ecosystem functioning and the effects of various human use on the delivery of ecosystem goods and services.

6.5 Where permissible limits to change in specific ecosystem components can be agreed, manage within these but monitor and assess the ecosystem response. Feedback the information at regular intervals to those responsible for setting the off-take or other limits.

6.6 Encourage the use of environmental assessments and monitoring to establish ecosystem responses to disturbance, in order to provide management feedback and develop appropriate responses.

6.7 Develop and promote appropriate management strategies and practices that sustain resources and maintain ecosystems within the limits of their functioning.

6.8 Sustainable use management goals and practices should avoid or minimize adverse impacts on ecosystem services, structure and functions as well as other components of ecosystems.

6.9 Formulate, review and implement regulatory framework, codes of practice and other instruments to avoid using ecosystems beyond their limits.

Principle 7: The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.

Rationale:

The approach should be bounded by spatial and temporal scales that are appropriate to the objectives. Boundaries for management will be defined operationally by users, managers, scientists and indigenous and local peoples. Connectivity between areas should be promoted where necessary. The ecosystem approach is based upon the hierarchical nature of biological diversity characterized by the interaction and integration of genes, species and ecosystems.

Annotations to the rationale:

The driving forces of ecosystems, including those due to human activities, vary spatially and through time, necessitating management at more than one scale to meet management objectives. In this regard it should be noted that:

- Ecosystems are made up of biotic and abiotic components and processes, which function at a range of spatial and temporal scales, within a nested hierarchy.
- The dynamics of human social and economic systems also vary across scales of space, time and quality.
- How components are perceived spatially depends partly on the scale of observation. At one scale, individuals of a species may seem relatively regularly and continuously distributed; at another the distribution may be discontinuous. Likewise with time, for example, at one time scale (e.g., monthly, annually) a component or process may appear predictable; at another, longer or shorter time scale, the temporal dynamics may be unpredictable.
- Management processes and institutions should be designed to match the scales of the aspects of the ecosystem being managed. More importantly, perhaps, given that ecosystem components and processes are linked across scales of both space and time, management interventions need to be planned to transcend these scales.
- Failure to take scale into account can result in mismatches between the spatial and time frames of the management and those of the ecosystem being managed. For example, policy makers and planners sometimes may have to consider shorter time frames than the time frames of major ecosystem processes. The reverse can also be true, for example, where bureaucratic inertia can delay the quick management response needed to address a rapidly changing environmental condition. Spatial mismatches are also common, such as when administrative boundaries and those of ecosystem properties or related human activities that they are designed to regulate do not coincide.

Implementation guidelines

7.1 Enhanced capacity is required to analyse and understand the temporal and spatial scales at which ecosystem processes operate, and the effect of management actions on these processes and the delivery of ecosystem goods and services. Identification of spatial patterns and gaps in connectivity should be included in this analysis.

7.2 Functional mismatches in the administration and management of natural resources should be avoided by readjusting the scale of the institutional response to coincide more closely with spatial and temporal scales of processes in the area under management. This logic underpins the current global trend towards decentralized natural resource management.

7.3 Given that ecosystem components and processes are linked across scales of both time and space, management interventions need to be planned to transcend these scales. Developing a nested hierarchy of spatial scales may be appropriate in some circumstances.

7.4 Managing large areas such as river basins or large marine areas may require development of new institutional mechanisms to engage stakeholders across administrative borders and different levels of administration.

7.5 Attention to spatial and temporal scales is needed in the design of assessment and monitoring efforts.

7.6 Concepts of stewardship, intergenerational equity and sustainable yield need to be applied to considerations of the temporal scale.

7.7 Regional collaboration is necessary to deal with large-scale changes.

Principle 8: Recognizing the varying temporal scales and lag-effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term.

Rationale:

Ecosystem processes are characterized by varying temporal scales and lag-effects. This inherently conflicts with the tendency of humans to favour short-term gains and immediate benefits over future ones.

Annotations to the rationale:

Time needs to be considered explicitly in formulating management plans, and in longer-scale processes need to especially considered and planned for because these are otherwise often neglected. In this regard it should be noted that:

- People find long-term trends more difficult to detect than short term trends, particularly in complex systems.

- Management systems tend to operate at relatively short time scales, often much shorter than the timescales for change in ecosystem processes.

- Where there is a lag between management actions and their outcomes, it is difficult to take reasoned management decisions.

- Long-term ecological processes, which can be very important, are therefore likely to be poorly accommodated in management systems, unless these are explicitly and carefully designed to address long-term issues.

Awareness of long-term processes is important because it is the long-term, spatially, extensive processes that both characterize and determine the broad ecosystem properties.

Implementation guidelines

8.1 Adaptive management processes should include the development of long-term visions, plans and goals that address inter-generational equity, while taking into account immediate and critical needs (e.g., hunger, poverty, shelter).

8.2 Adaptive management should take into account trade-offs between short-term benefits and long-term goals in decision-making processes.

8.3 Adaptive management should take into account the lag between management actions and their outcomes.

8.4 Monitoring systems should be designed to accommodate the time scale for change in the ecosystem variables selected for monitoring. Alternatively, if the monitoring cannot be adjusted, a more appropriately scaled but still relevant variable should be selected to monitor.

8.5 The capacity to monitor and detect long-term, low frequency changes in ecosystem structure and functioning should be strengthened.

8.6 To implement long-term management requires stability of institutions, legal and policy frameworks, monitoring programs, and extension and awareness-raising programs.

Principle 9: Management must recognize that change is inevitable.

Rationale:

Ecosystems change, including species composition and population abundance. Hence, management should adapt to the changes. Apart from their inherent dynamics of change, ecosystems are beset by a complex of uncertainties and potential "surprises" in the human, biological and environmental realms. Traditional disturbance regimes may be important for ecosystem structure and functioning, and may need to be maintained or restored. The ecosystem approach must utilize adaptive management in order to anticipate and cater for such changes and events and should be cautious in making any decision that may foreclose options, but, at the same time, consider mitigating actions to cope with long-term changes such as climate change.

Annotations to the rationale:

Change in ecosystems is both natural and inevitable, and therefore management objectives should not be construed as fixed outcomes but rather the maintenance of natural ecological processes. In this regard it should be noted that:

- Ecosystems change constantly as a result of natural processes. Those changes include shifts in species composition, population abundance, and physical characteristics.
- Such changes are not necessarily constant, variable, dynamic and usually difficult to predict at any point in time.
- It is therefore difficult to select an appropriate outcome or future state of an ecosystem as a static management goal. Instead, in addressing this and Principle 8, management should focus on maintaining the natural processes, which drive those changes.
- This focus on processes requires a management approach that is flexible and adaptive, both as a response to changing circumstances and to take account of new knowledge and understanding. Adaptive management should generate new knowledge and reduce uncertainties, thereby allowing the manager to anticipate and cater for change.
- Ecosystem management must therefore involve a learning process that will help to adapt methods and practices to improve the ways in which these systems are being managed and monitored. Flexibility is also needed in policy-making and implementation. Long-term, inflexible decisions are likely to be ineffective or detrimental.

Implementation guidelines

9.1 Adaptive management is needed to respond to changing social and ecological conditions, and to allow management plans and actions to evolve in light of experience.

9.2 Natural resource managers must recognise that natural and human-induced change is inevitable and take this into account in their management plans.

9.3 Adaptive management should be encouraged when there is a risk degradation or loss of habitats, as it can facilitate taking early actions in response to change.

9.4 Monitoring systems, both socio-economic and ecological, are an integral part of adaptive management, and should not be developed in isolation from the goals and objectives of management activities.

9.5 Adaptive management must identify and take account of risks and uncertainties.

9.6 Where changes occur across national borders, the scale of adaptive management may need to be adjusted.

9.7 While ecosystems are inherently dynamic and resilient, special adaptation and mitigation measures are needed when ecosystems may be pushed beyond the limits of natural variation. Capacity-building efforts are needed to address highly vulnerable areas such as small island states and coastal areas.

9.8 Capacity-building efforts are needed to address highly vulnerable areas such as small island states and coastal areas.

9.9 Traditional knowledge and practice should be used to enable better detection and understanding of ecosystem change, and to develop appropriate adaptation measures.

9.10 Adaptive management should recognize the resilient capacity of ecosystems in response to natural disturbances, and should be aimed at maintaining or restoring this capacity so as to reduce the risk of adverse social and economic consequences of natural variability in ecosystems.

9.11 Awareness-raising measures are needed to enhance public knowledge that ecosystem change is a natural phenomenon, and to build support and capacity for adaptive management.

Principle 10: The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity.

Rationale:

Biological diversity is critical both for its intrinsic value and because of the key role it plays in providing the ecosystem and other services upon which we all ultimately depend. There has been a tendency in the past to manage components of biological diversity either as protected or non-protected. There is a need for a shift to more flexible situations, where conservation and use are seen in context and the full range of measures is applied in a continuum from strictly protected to human-made ecosystems

Annotations to the rationale:

Biological resources play a role in providing the ecosystem goods and services on which humans ultimately depend. In this regard it should be noted that:

- The ecosystem approach is designed to support the conservation of biodiversity, the sustainable use of its components, and the equitable sharing of benefits derived from the use of biodiversity.

- Sustainable use and management depends on also achieving conservation objectives.

- Management for conservation and sustainable use are not inherently incompatible, and can be integrated.

- Integration can be achieved at various scales and in various ways including both spatial and temporal separation across the landscape as well as through integration within a site.

Implementation guidelines

10.1 Develop integrated natural resource management systems and practices to ensure the appropriate balance between, and integration of, the conservation and use of biological diversity, taking into account long- and short-term, direct and indirect, benefits of protection and sustainable use as well as management scale.

10.2 Develop policy, legal, institutional and economic measures that enable the appropriate balance and integration of conservation and use of ecosystems components to be determined.

10.3 Promote participatory integrated planning, ensuring that the full range of possible values and use options are considered and evaluated.

10.4 Seek innovative mechanisms and develop suitable instruments for achieving balance appropriate to the particular problem and local circumstances.

10.5 Manage areas and landscapes in a way that optimises delivery of ecosystem goods and services to meet human requirements, conservation management and environmental quality.

10.6 Determine and define sustainable use objectives that can be used to guide policy, management, and planning, with broad stakeholder participation.

Identify solutions which relieve sectoral pressure on existing resources

Principle 11: The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices.

Rationale:

Information from all sources is critical to arriving at effective ecosystem management strategies. A much better knowledge of ecosystem functions and the impact of human use is desirable. All relevant information from any concerned area should be shared with all stakeholders and actors, taking into account, inter alia, any decision to be taken under Article 8(j) of the Convention on Biological Diversity. Assumptions behind proposed management decisions should be made explicit and checked against available knowledge and views of stakeholders.

Annotations to the rationale:

Ecosystems can be viewed at various scales and from different perspectives, each yielding unique information and insights. Good management should therefore consider all relevant information. In this regard it should be noted that:

- The ecosystem approach is designed to accommodate a range of values and associated goals, and the information and perspectives of the communities that hold those values are therefore important in designing and implementing management.
- There is no single level of organisation at which one can understand and optimize management of ecosystem functioning. Different information sources will address issues at different levels, providing complementary perspectives to support integrated management.

Implementation guidelines

11.1 Relevant information should be shared with other stakeholders and actors and technical and scientific information be made available in an accessible way (indigenous and local knowledge should be treated with full respect of Article 8(j) and further decisions of the CBD).

11.2 Assumptions behind proposed management decisions should be made explicit based on the best available expertise, explicitly regard scenarios of future change and include the knowledge and views of stakeholders.

11.3 Appropriate mechanisms should be developed to document and make more widely available the information from all relevant disciplines (including natural and social sciences) and from relevant knowledge systems, particularly those based on local and traditional practices. This guideline should be implemented consistent with any decision to be taken under Article 8(j) of the CBD.

11.4 The implications for ecosystem management of different "world views" based on different knowledge systems should be evaluated.

11.5 Good management depends upon improving the information base and scientific understanding of ecosystems through the promotion, implementation and application of research and integrating this information into decision-making.

Principle 12: The ecosystem approach should involve all relevant sectors of society and scientific disciplines.

Rationale:

Most problems of biological-diversity management are complex, with many interactions, side-effects and implications, and therefore should involve the necessary expertise and stakeholders at the local, national, regional and international level, as appropriate.

Annotations to the rationale:

The complexity of ecosystem management for sustained use and conservation requires integrating the activities and actions of many different stakeholders. In this regard it should be noted that:

- The activities of all sectors affect biological diversity, and can contribute to, or detract from, the achievement of the objectives of the Convention.

- The management of biodiversity, because of its complexity, and the significance of human impacts, requires a wide range of scientific and management skills, including those located in sectors that have not traditionally been involved in biodiversity conservation or management.

For these reasons the ecosystem approach should provide a framework for fostering greater involvement of all relevant stakeholders and technical expertise in planning and carrying out coordinated activities, sharing management resources, or simply exchanging information.

Implementation guidelines

12.1 The integrated management of land, water and living resources requires increased communication and cooperation, (i) between sectors, (ii) at various levels of government (national, provincial, local), and (iii) among governments, civil society and private sector stakeholders. Increased communication among international and regional organisations also.

12.2 Further incorporation of the ecosystem approach as an integral part of planning in, among others, the agriculture, fisheries, forestry and other natural resources management sectors potentially affecting biodiversity and ecosystem functioning, should be encouraged, following the example, for instance, of the Code of Conduct for Responsible Fisheries, Sustainable Forest Management or others. Sectors other than the primary production sectors may also have major effects but are often less recognized in this respect.. These include sectors such as the judicial sector, which affects governance, as well as those such as energy and transport, which are managing or affecting resources either directly or indirectly.

12.3 Procedures and mechanisms should be established to ensure effective participation of all relevant stakeholders and actors during the consultation processes, decision making on management goals and actions, and, where appropriate, in implementing the ecosystem approach.

12.4 The effective implementation of the ecosystem approach may require involving multidisciplinary professional and scientific expertise, including such disciplines as economic, social and natural sciences.

12.5 When assessing the costs and benefits of conserving, maintaining, using and restoring ecosystems, the interests of all relevant sectors should be taken into account for equitable sharing of the benefits according to national law.

Annex I

Operational guidance for application of the ecosystem approach [2]

In applying the 12 principles of the ecosystem approach, the following five points are proposed as operational guidance.

1. Focus on the functional relationships and processes within ecosystems

The many components of biodiversity control the stores and flows of energy, water and nutrients within ecosystems, and provide resistance to major perturbations. A much better knowledge of ecosystem functions and structure, and the roles of the components of biological diversity in ecosystems, is required, especially to understand: (i) ecosystem resilience and the effects of biodiversity loss (species and genetic levels) and habitat fragmentation; (ii) underlying causes of biodiversity loss; and (iii) determinants of local biological diversity in management decisions. Functional biodiversity in ecosystems provides many goods and services of economic and social importance. While there is a need to accelerate efforts to gain new knowledge about functional biodiversity, ecosystem management has to be carried out even in the absence of such knowledge. The ecosystem approach can facilitate practical management by ecosystem managers (whether local communities or national policy makers).

2. Enhance benefit-sharing

Benefits that flow from the array of functions provided by biological diversity at the ecosystem level provide the basis of human environmental security and sustainability. The ecosystem approach seeks that the benefits derived from these functions are maintained or restored. In particular, these functions should benefit the stakeholders responsible for their production and management. This requires, inter alia: capacity-building, especially at the level of local communities managing biological diversity in ecosystems; the proper valuation of ecosystem goods and services; the removal of perverse incentives that devalue ecosystem goods and services; and, consistent with the provisions of the Convention on Biological Diversity, where appropriate, their replacement with local incentives for good management practices. 3. Use adaptive management practices

3. Use Adaptive Management Practices

Ecosystem processes and functions are complex and variable. Their level of uncertainty is increased by the interaction with social constructs, which need to be better understood. Therefore, ecosystem management must involve a learning

2. Extracted from section C of decision V/6

process, which helps to adapt methodologies and practices to the ways in which these systems are being managed and monitored. Implementation programmes should be designed to adjust to the unexpected, rather than to act on the basis of a belief in certainties. Ecosystem management needs to recognize the diversity of social and cultural factors affecting natural-resource use. Similarly, there is a need for flexibility in policy-making and implementation. Long-term, inflexible decisions are likely to be inadequate or even destructive. Ecosystem management should be envisaged as a long-term experiment that builds on its results as it progresses. This "learning-by-doing" will also serve as an important source of information to gain knowledge of how best to monitor the results of management and evaluate whether established goals are being attained. In this respect, it would be desirable to establish or strengthen capacities of Parties for monitoring.

4. Carry out management actions at the scale appropriate for the issue being addressed, with decentralization to lowest level, as appropriate

As noted in section A above, an ecosystem is a functioning unit that can operate at any scale, depending upon the problem or issue being addressed. This understanding should define the appropriate level for management decisions and actions. Often, this approach will imply decentralization to the level of local communities. Effective decentralization requires proper empowerment, which implies that the stakeholder both has the opportunity to assume responsibility and the capacity to carry out the appropriate action, and needs to be supported by enabling policy and legislative frameworks. Where common property resources are involved, the most appropriate scale for management decisions and actions would necessarily be large enough to encompass the effects of practices by all the relevant stakeholders. Appropriate institutions would be required for such decision-making and, where necessary, for conflict resolution. Some problems and issues may require action at still higher levels, through, for example, transboundary cooperation, or even cooperation at global levels.

5. Ensure intersectoral cooperation

As the primary framework of action to be taken under the Convention, the ecosystem approach should be fully taken into account in developing and reviewing national biodiversity strategies and action plans. There is also a need to integrate the ecosystem approach into agriculture, fisheries, forestry and other production systems that have an effect on biodiversity. Management of natural resources, according to the ecosystem approach, calls for increased intersectoral communication and cooperation at a range of levels (government ministries, management agencies, etc.). This might be promoted through, for example, the formation of inter-ministerial bodies within the Government or the creation of networks for sharing information and experience

Annex II*

A. Further guidance on the implementation of the ecosystem approach principles

1. The ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. The application of the ecosystem approach will help to reach a balance of the three objectives of the Convention: conservation; sustainable use; and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources. In addition the ecosystem approach has been recognized by the World Summit on Sustainable Development as an important instrument for enhancing sustainable development and poverty alleviation.

2. The ecosystem approach is based on the application of appropriate scientific methodologies focused on levels of biological organisation, which encompass the essential structure, processes, functions and interactions among organisms and their environment. It recognizes that humans, with their cultural diversity, are an integral component of many ecosystems.

3. The ecosystem approach provides an integrating framework for implementation of objectives of the Convention on Biological Diversity. The approach incorporates three important considerations:

   (a) Management of living components is considered alongside economic and social considerations at the ecosystem level of organisation, not simply a focus on managing species and habitats;
   (b) If management of land, water, and living resources in equitable ways is to be sustainable, it must be integrated and work within the natural limits and utilize the natural functioning of ecosystems;
   (c) Ecosystem management is a social process. There are many interested communities, which must be involved through the development of efficient and effective structures and processes for decision-making and management.

4. The approach is an overall methodological framework for supporting decisions in policy-making and planning, within which those implementing the Convention can develop more specific approaches appropriate to their particular circumstances. The ecosystem approach is a tool that contributes to the implementation of various issues addressed under the Convention, including the work on, inter alia, protected areas and ecological networks[3].

*. Extracted from sections A and B of decision VII/11. Paragraph numbering as in original

3. Generic term used in some countries and regions, as appropriate, to encompass the application of the ecosystem approach that integrates protected areas into the broader land- and/or seascapes for effective conservation of biodiversity and sustainable use

There is no single correct way to achieve the ecosystem approach to management of land, water, and living resources. The underlying principles can be translated flexibly to address management issues in different social contexts. Already, there are sectors and governments that have developed sets of guidelines that are partially consistent, complementary or even equivalent to the ecosystem approach (e.g. the Code for Responsible Fisheries, the Sustainable Forest Management approach, adaptive forest management).

5. There are a number of options for implementing the ecosystem approach. One is the incorporation of the principles into the design and implementation of national biodiversity strategies and action plans and regional strategies. Others include incorporation of the ecosystem approach principles into policy instruments, mainstreaming in planning processes, and sectoral plans (e.g., in forest, fisheries, agriculture). In addition, Parties and the various bodies of the Convention on Biological Diversity should be encouraged to work to achieve synergies at the national level between the ecosystem approach and the various programmes of work of the Convention on Biological Diversity, as well as promoting linkages with other international initiatives. To implement the ecosystem approach, countries should incorporate its principles or identify pre-existing, consistent or equivalent guidelines, in the appropriate institutional, legal and budgetary channels. Work by Convention bodies and other relevant organizations should be focused on supporting local and regional efforts as a contribution to achieving the Millennium Development Goals.

6. It should be stressed that in applying the ecosystem approach, all its principles need to be considered in a holistic way, and appropriate weight given to each, according to local circumstances.

7. Notwithstanding the need for implementation to be designed to fit with the particular circumstances of the relevant problems, there is strong potential for shared experiences and expertise between ecosystems and countries. The clearing-house mechanism established under Article 18 should be the primary focus for facilitating that cooperation. A solid and broad understanding of the principles, their intentions and their consequences, is an essential condition for their application. A communication strategy for promoting the ecosystem approach to relevant target groups, within and outside the conservation sector, can be a useful tool.

8. The donor community, like governments, while noting the value of the ecosystem approach in fostering better ecosystem stewardship, should also be encouraged to be flexible in promoting its application in setting priorities and funding decisions, to allow for other perspectives, and different capacities to respond to the principles.

9. After assessing the experience of Parties in implementing the ecosystem approach decisions of the Conference of the Parties, it was noted that while the principles were not always precisely worded expressions of the concepts they incorporated, they nevertheless reflected the meaning of important concepts. The experience of Parties did not suggest a need for change to the decisions of the Conference of the Parties, but simply for the provision of additional advice and elaboration to overcome any problems of clarity and interpretation.

10. With this in mind, the following text and table 1 provide some suggestions on approaches for implementation and implementation support. These include annotations to the rationale, implementation guidelines for each principle and clarification of crosscutting aspects of the ecosystem approach.

B. Additional explanatory notes on cross-cutting issues related to operational guidance

11. In applying the operational guidance of the ecosystem approach ecosystem approach, the following cross-cutting issues need to be considered.

Initiating the approach

12. When initiating the ecosystem approach, the first task is to define the problem that is being addressed. In doing so the scope of the problem and the task to be undertaken has to be well specified. The strategy to be followed to promote the ecosystem approach has to be clearly defined with contingencies for unforeseen situations incorporated into the strategy. The approach should consider all principles as a package but depending upon the task at hand emphasis on particular principles may be warranted. A collective ownership for the vision, strategy and parameters for the ecosystem approach relevant to the task has to be developed, communicated, and facilitated among partners and sponsors. Collectively developing the overarching goals, objectives, targets for the exercise is important before applying the ecosystem approach.

Capacity-building and collegiate will

13. To apply the ecosystem approach successfully it is critical to investigate what resources and sponsorship are required to undertake the exercise. This can be in the form of capacity-building and fostering collegiate will.

14. Collegiate will can be in terms of community partnerships, stakeholder engagement, political and institutional will, and the commitment of donors or sponsors. An important consideration is the length of time such collegiate will is required; that is, it may be required in the initiation phase, assessment phase or the phase associated with implementation of outcomes. Examples of where the ecosystem approach has been compromised can be from a loss of allegiance from one or more of the community, other stakeholders, the political establishment and institutions, or sponsors and donors.

15. Capacity-building is also important for the success of the ecosystem approach. Adequate financial support and appropriate infrastructure support are important requirements to the success of an approach. So too is access to suitable expertise and the sharing of knowledge and experience. In undertaking the ecosystem approach it is useful to build from lessons learnt from other undertakings applying the ecosystem approach. Technology, including decision support tools and inventory systems, which have been developed in other applications of the ecosystem approach, may be transferable or can be adapted.

Information, research and development

16. The collection of resource, biophysical, social, and economic information is important to the successful completion of the ecosystem approach. Research and development is needed to target strategic gaps in knowledge that are important for addressing the exercise at hand. Knowledge derived from research and information from other sources has to be integrated and packaged into information products (including decision-support systems) that allow and provide for interpretation, and which facilitate their use in applying the ecosystem approach. Information products are necessary for communicating with stakeholders, planners, managers and decision makers. Consideration should be given to enhancing the access of stakeholders to information because the more transparent the decision-making is, based on information at hand, the better the ownership of the resultant decisions between partners, stakeholders and sponsors. Priorities for research and development are likely to be clearer once the ecosystem approach begins to be applied and implementing actions are put in place.

Monitoring and review

17. Monitoring and review are crucial components in implementing the ecosystem approach. They allow a responsive and adaptive management capability to be developed. Monitoring and review are also useful in reporting per-

formance and the resultant outcomes of the approach. Indicators of performance should be defined, developed and implemented. Appropriate monitoring and auditing systems need to be implemented to support reporting on indicators of performance. Periodic reviews of these indicators need to be undertaken to assess performance and whether adaptive management needs to be applied. Strategies, practices and processes may need to be modified depending upon the findings from monitoring and auditing.

Good governance

18. Good governance is essential for successful application of the ecosystem approach. Good governance includes sound environmental, resource and economic policies and administrative institutions that are responsive to the needs of the people. Robust and sound resource management systems and practices are required to support these policies and institutions. Decision-making should account for societal choices, be transparent and accountable and involve society. Accountability for making decisions has to be placed at the appropriate level that reflects that community of interest. For example strategic land use planning and management might be taken by central government, operational decisions taken by local government or management agency, whereas decisions associated with the sharing of benefits could be taken by a community organization.

19. Good governance at all levels is fundamental for achieving sustainable use and conservation of biodiversity. It is important to ensure intersectoral cooperation. There is a need to integrate the ecosystem approach into agriculture, fisheries, forestry and other production systems that have an effect on biodiversity. Management of natural resources, according to the ecosystem approach, calls for increased intersectoral communication and cooperation at a range of levels (government ministries, management agencies).

Annex III[4]

CONSIDERATION OF THE RELATIONSHIP BETWEEN SUSTAINABLE FOREST MANAGEMENT AND ECOSYSTEM APPROACH, AND REVIEW OF, AND DEVELOPMENT OF STRATEGIES FOR, THE INTEGRATION OF THE ECOSYSTEM APPROACH INTO THE PROGRAMMES OF WORK OF THE CONVENTION

A. Sustainable forest management

1. Conceptual basis of the ecosystem approach in relation to sustainable forest management

1. In 1992, the Non-legally Binding Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of All Types of Forest of the United Nations Conference on Environment and Development (UNCED), also referred to as "Forest Principles", defined a new paradigm for forest management, through a set of 15 principles in support to the overall objective of contributing to the management, conservation and sustainable development of forests and their multiple functions and uses. In this regard, the concept of sustainable forest management (SFM) anticipated the ecosystem approach, both of which are based on the tenet of sustainability. SFM incorporates the following key sustainability concepts: (i) stewardship; (ii) enabling environment; (iii) continuous flow of goods and services without undermining the resource base; (iv) maintenance of ecosystem functioning and biodiversity; (v) maintenance of economic, social, and cultural functions; (vi) benefit-sharing; and (vii) stakeholder participation in decision-making.

2. SFM can be considered as a means of applying the ecosystem approach to forests. Although the concept of SFM and the ecosystem approach are not identical, the two are similar in many respects. Both need to be applied as an integrated whole. Both are also rapidly evolving. Both have a non-legally binding nature, allowing for flexibility and experimentation. SFM and the ecosystem approach are overarching frameworks--both with due consideration to societal, ecological, and governance issues--although the former has undergone substantial refinement over the last decade, being pri-

4. Extracted from decision VII/11, Annex II. Paragraph numbering as in original

marily an outcome-based approach. The ecosystem approach is still in need of further elaboration to be translated into good operational practice in a particular situation. As far as challenges are concerned, both SFM and the ecosystem approach need to deal with complex issues such as law enforcement, land tenure rights, and the rights of indigenous and local communities. In this regard, implementation of both approaches requires political will, including that of institutions and communities.

3. The broad overlap between the concepts of SFM and the ecosystem approach is encouraging, but there are yet significant opportunities for mutual learning. Lessons learned should flow both ways. Country-level meetings to examine the relationship between SFM and the ecosystem approach would be useful, and should be commended to Parties to the Convention. These meetings should emphasize mutual learning opportunities.

4. As stated above, SFM is relatively more mature than the ecosystem approach in the sense of being more refined from an operational standpoint; thus it can feed on some aspects of the ecosystem approach to this end. Specifically, there is a clear need for the ecosystem approach to adopt processes that are based upon clear statements of visions, objectives, and goals for defined regions or issues, thereby becoming more outcome-oriented. Conceptual development of the ecosystem approach to date has emphasized a description of the content of the principles. Moving from a content-driven approach to an outcome-driven approach would be beneficial. Tools and approaches developed to implement SFM, which are discussed below, may be useful in other productive sectors as they explore ways to apply the ecosystem approach.

2. Proposals for integration of the ecosystem approach and sustainable forest management

5. Even though the ecosystem approach and sustainable forest management are broadly overlapping concepts, more could be done to ensure their integration. Sustainable forest management could gain insights from the ecosystem approach concepts as cross-sectoral integration is largely missing from SFM, reflecting restricted legal mandates mostly within forest sector institutions. Mechanisms for inter-sectoral collaboration could be strengthened within SFM. Agro-forestry integrates the forest and agriculture sectors but other linkages between the forest sector and the agriculture sector (and other sectors such as water management, transport, and conservation) need to be strengthened.

6. Although there is no pre-defined scale, the ecosystem approach can be applicable over large areas (landscape level), while SFM has historically emphasized forest management-unit levels of work at typically small spatial scales. Although the Forest Principles do not indicate that forest management should be integrated with management of adjacent areas, and some larger-scale applications (e.g. landscape restoration initiatives and model forests) have been developed within the last decade, greater emphasis could be placed on SFM within a broader spatial context, including protected areas, taking into consideration conservation issues in general, and developing stronger links to adjacent land uses and/or complementary approaches, such as extraction of non-timber forest resources, agriculture, watershed management, and ecological restoration.

7. There are areas where further conceptual development is needed in both SFM and the ecosystem approach. Both approaches, for example, should explicitly incorporate a principle of sustainability. The inter-generational obligation to sustain the provision of ecosystem goods and services to future generations should be clearly stated. Another area warranting further work is to incorporate issues, in both SFM and the ecosystem approach, of consideration of risks and threats. Global climate change creates risks and uncertainties for all sectors involved in applying the ecosystem approach. Concerns in the forest sector include insecure land tenure, increased forest fire incidence, and the spread of forest pests and diseases into higher latitudes.

8. As stated in the previous section, there is a need for the ecosystem approach to adopt a more outcome-based approach. As such, lessons learned from implementation of SFM through the application of criteria and indicators would be particularly beneficial. In addition, the experiences of applying the ecosystem approach through Global Environmental Facility projects should be taken into account.

9. In general, tools and approaches developed to implement SFM may be useful in other productive sectors as they explore ways to implement the ecosystem approach. The processes of developing and using criteria and indicators for sustainable forest management (including local-level indicators), designing and setting up model forests and demonstration forests, and drawing up national forest programs, action-oriented forest management plans, environmental management systems, and codes of conduct and practice, are all tools with broader potential relevance. For example, codes of practice for sustainable agricultural systems are not as advanced as for SFM. Approaches and tools developed for community forestry and social forestry to achieve broader stakeholder engagement, also have considerable

potential for application in other sectors.

10. In particular, the use of criteria and indicators is considered a key tool for implementing and monitoring SFM, and the approach is being applied both nationally and at the forest management unit level. Criteria and indicators can be used for setting goals, assessing management outcomes and policy effectiveness, orienting forest certification systems, and for communicating progress to policy makers. Although nine regional and international processes to develop and implement criteria and indicators for sustainable forest management have largely developed independently, to date, 149 countries, encompassing 95% of the world's forests, are in the process of applying the criteria and indicators approach. Criteria and indicators for sustainable forest management represent a detailed expression of the elements of SFM when taken as a integrated whole, and bear many points of similarity to the ecosystem approach. Criteria and indicators can be adapted towards on-the-ground action, as illustrated by the development of local-level indicators applicable at the forest management unit level by ITTO.

11. Local-level indicator work is one of the most interesting developments in the criteria and indicators approach. This work helps engage stakeholders in developing a longer-term vision and objectives for defined management areas, generating indicators that are meaningful to local needs. Their goal is to provide useful feedback to management, rather than to fulfil national monitoring and reporting requirements. Monitoring systems that can provide on-the-ground feedback and verify sustainability are essential for implementing adaptive management, a central concept within the ecosystem approach. These monitoring systems support the management-feedback process and allow it to evolve through time. Model forests and demonstration forests (such as the work undertaken by ITTO) are providing further valuable opportunities to test adaptive management concepts and to promote their wider application.

12. While existing efforts in SFM/criteria and indicators are currently focused on the national level and the forest-management unit level, some recent efforts (such as work undertaken by IUCN) are focusing at the landscape level. The development of criteria and indicators for the landscape level should be further pursued. In this context, it is worth noting that restoration actions are starting to be undertaken at the landscape level, and that the ITTO Guidelines for the Restoration, Management and Rehabilitation of Degraded Secondary Tropical Forests have been developed for guiding policy makers on forest restoration at this spatial scale. The assessment through criteria and indicators tools could be used to determine flows of specific ecosystem services (e.g. carbon capture in plantations).

13. In this regard, the potential for application of forest criteria and indicators to the ecosystem approach is high, particularly in regions where forests are an integral part of the resource base being used. In a recent effort at summarizing the state of knowledge of the contribution of criteria and indicators for sustainable forest management, seven thematic areas were identified in which the development of criteria and indicators can suit specific management needs; these areas can easily be applied to many principles of the ecosystem approach.[5]

14. Forest certification is another rapidly evolving approach that involves the use of criteria and indicators as primary tools. Globally, about 120 million hectares of forest have been certified. Certification is more limited in scope than SFM as it tends to focus on production forests only, to the exclusion of protected areas and landscape-level considerations as mentioned earlier. However, some certified forests currently exist in protected areas, and some certification schemes require, in turn, that a proportion of the managed forest be set aside for protection. Therefore the potential of forest certification to link with protected areas is high.[6] In this context, forest certification programmes could benefit from moving in the direction of the ecosystem approach being broader in scope.

15. Nevertheless, certification systems have found limited application in some developing countries, notably in the tropics, where enabling conditions to implement these systems are generally lacking. There are various barriers to tropical forest certification, such as limited institutional and technical capacity, and poor development of markets for certified wood. Efforts to overcome these barriers could be a priority for the ecosystem approach. ITTO's efforts to develop a phased approach to tropical forest certification should be noted in this context.

16. In addition, and of direct relevance for the integration of the ecosystem approach with SFM, ITTO has also developed policy guidelines for sustainable forest management. The guidelines contain a set of principles and recommended actions and relate to sustainable natural and planted tropical forests; conservation of biological diversity in tropical production forests; fire management in tropical forests; and restoration, management and rehabilitation of degraded secondary tropical forests. ITTO has also been promoting demonstration sites and demonstration watersheds.

5. International Conference on the Contribution of criteria and indicators for sustainable forest management: the way forward. , 3-7 February 2003. The common thematic areas are: (1) extent of forest resources; (2) biological diversity; (3) forest health and vitality; (4) productive functions of forest resources; (5) protective functions of forest resources; (6) socio-economic functions; (7) legal, policy and institutional framework.

6. Certification of good forest management and its relationship to protected areas. IUCN forest case-study number 3. April 2003.

17. If SFM were to explicitly examine tools and approaches that could be applied to other sectors - such as criteria and indicators, certification, and Model Forests - it would promote cross-fertilization, and help strengthen cross-sectoral integration. Developing institutional mechanisms to get people from different sectors around the table on an ongoing basis is a challenge in all countries. In addition to wider dissemination of useful tools, cross-sectoral meetings on SFM and the ecosystem approach would help demystify concepts and support mutual recognition, allowing people to use their own vocabulary.

18. The FAO is actively developing tools relevant to implementing SFM and the ecosystem approach. The FAO and World Bank have a support programme for facilitating stakeholder participation in the development of national forest programmes. Increased knowledge sharing is a major focus of FAO's efforts. The FAO Model Code of Forest Harvesting Practices has led to development of regional codes and country codes. The non-legally binding nature of these codes is a key to wider acceptance. Codes for integrated pest management, fire management, and integrated watershed management should also be noted. In addition, the recent FAO initiative, "In Search of Excellence in Forest Management", with its call for nominations of well-managed forests, has generated an excellent response. Multiple use, stakeholder participation, good information and monitoring systems, and good governance are recurring themes in well-managed forests, and they are as well key issues for the ecosystem approach.

19. In summary, in order to achieve greater harmonization of the SFM and ecosystem approach concepts, there is a need for SFM to strengthen cross-sectoral integration, which can be undertaken at least in part through application of SFM tools into other sectors. Developing and implementing biodiversity indicators would also help strengthen the contribution of SFM to biodiversity conservation. The development of criteria and indicators as well as certification programmes within SFM at the landscape level should also be pursued.

20. The ecosystem approach, should, in turn, consider lessons learned from application of SFM tools and approaches, such as criteria and indicators, certification systems, and model and demonstration forests in its effort to move towards an outcome-oriented approach. In addition, both approaches should explicitly incorporate the principle of sustainability.

B. Integration of ecosystem approach into sectors and biomes corresponding to the thematic programmes of work of the Convention

1. Introduction

21. There has been considerable progress in the development of sector-specific approaches incorporating many elements of the ecosystem approach. In particular, relevant tools have been developed in forestry, fisheries management, and watershed management - sectors associated with the Convention's programmes of work on forest biological diversity, marine and coastal areas, and inland water ecosystems, respectively. These sectors have recognized principles that are consistent with the ecosystem approach, and are moving to develop goal- or target-oriented approaches that include stakeholder participation, adaptive management, and monitoring/feedback systems. These sectors also deal with resources that tend to be under communal or public management rather than private management. This may help facilitate the development and implementation of sector-specific tools. The progress to date should be acknowledged, and further elaboration of the ecosystem approach in individual sectors should be encouraged.

2. Marine and coastal biological diversity

22. The 1995 Code of Conduct for Responsible Fisheries includes principles that anticipate many of those in the ecosystem approach. In addition, there has been a movement towards the ecosystem approach in marine fisheries. The World Summit on Sustainable Development referred to the need to incorporate the ecosystem approach in responsible fisheries management, setting a target of 2010 for its achievement. The 2001 Reykjavik Declaration called for "guidelines for best practices with regard to introducing ecosystem considerations into fisheries management". This led FAO in 2003 to update and revise its 1995 Code in the form of a new manual called "Fisheries management: the ecosystem approach to fisheries." The World Wide Fund for Nature (WWF) has also developed a guide to ecosystem-based management for fisheries, and helped launch an effort to develop a certification program for marine fisheries under the Marine Stewardship Council. The Global Environment Facility (GEF) has provided financial support to 15 Large Marine Ecosystem (LME) projects involving more than 100 countries around the world. The LME projects build on an ecosystem approach in developing capacity and infrastructure for integrated management of marine and coastal environment and resources. Marine and coastal protected areas (MCPAs) are another significant cross-

cutting approach in the context of marine and coastal areas. A CBD ad-hoc technical expert group prepared detailed guidance, in line with the ecosystem approach, on this topic that was discussed at the eighth meeting of SBSTTA (recommendation VIII/3). This guidance reflects the spirit of the ecosystem approach, and is available in document UNEP/CBD/SBSTTA/8/INF/11. Current thinking emphasizes a need to combine integrated marine and coastal area management (IMCAM) with a core network of highly protected areas, which act as baselines and an insurance policy. SBSTTA accepted this notion at its eight meeting, while indicating that the balance between highly protected zones and other areas where extractive uses are allowed is a choice for individual countries. The concept of IMCAM covers both marine areas and coastal portions of the land. These approaches are area-based, and are explained by detailed sets of guidelines such as those developed by Ramsar and FAO, and those under development within the framework of the Convention on Biological Diversity. UNEP is trying to bring together ocean management and river basin management in the project on integrated watershed and coastal area management (IWCAM) in small island developing States of the Caribbean.

3. Inland water ecosystems biological diversity

23. The concepts of integrated watershed management and river basin management present multidisciplinary approaches to the management of biophysical, social, and economic issues affecting water resources and their uses, and as such are consistent with the ecosystem approach. The River Basin Initiative operates under the framework of the joint work plan between the Convention on Biological Diversity and the Ramsar Convention, to support implementation of convention decisions related to better management of inland water ecosystems and associated biodiversity, water resources and wetlands. The Ramsar Convention, as the lead partner of the Convention on Biological Diversity in the implementation of activities under the Convention on inland water ecosystems, has developed a tool kit that includes practical guidance for integrated planning and management of river basins and coastal zones. In addition, the Ramsar Convention has developed guidelines for Global Action on Peatlands, and for "allocation and management of water for maintaining the ecological functions of wetlands".[7] These guidelines make connections between ecological functions, hydrology, economic demands and institutional responses.

7. Turkey notes that the goal of Ramsar Convention is not the management and allocation of water

4. Agricultural biological diversity

24. The programme of work on agricultural biodiversity recognizes the ecosystem approach and addresses many of the twelve principles individually. However, there is a potential deficiency in that the agricultural biodiversity programme of work does not apply the ecosystem approach in an integrated way. Furthermore, there has been less progress in development of relevant tools within the agricultural sector than in other sectors. This may partly reflect the fact that agriculture is practiced largely on lands under private ownership. Participants at the expert meeting suggested that the issue of integrating the ecosystem approach within the agricultural sector be addressed in a comprehensive manner the next time that the programme of work in agricultural biodiversity is reviewed. Consideration might also be given to developing an addendum to the existing programme of work on use of the ecosystem approach.

25. Examples of initiatives and tools include efforts by FAO to codify "good agricultural practices", and development of a manual on integrated production and protection (IPP) crop management, with specific IPP guidelines for various crops. An information document prepared for the fifth meeting of the Conference of the Parties to the Convention on Biological Diversity entitled "The ecosystem approach: toward its application to agricultural biodiversity" (UNEP/CBD/COP/5/INF/11) discussed approaches or tools that can contribute to ecosystem approach objectives, with a focus on integrated pest management and farmer field schools. An integrated natural resource management (INRM) approach has been adopted throughout the Consultative Group on International Agricultural Research (CGIAR) system. INRM has been conceptually defined as "the responsible and broad-based management of the land, water, forest and biological resource base-including genes-needed to sustain agricultural productivity and avert degradation of potential productivity." Research and applications development are under way related to adaptive management, multiple scales and stakeholders, and measurable outcomes. Certification schemes, such as those for organic agriculture, are evolving in directions consistent with the ecosystem approach.

5. Dry and sub-humid lands biological diversity

26. The programme of work on dry and sub-humid lands explicitly addresses the twelve principles of the ecosystem approach in an integrated way. An important consideration is the interaction between the Convention on Biological Diversity and the Convention to Combat Desertification (CCD). The CCD does not use the term "ecosystem approach", but embraces many of the principles, especially participatory aspects. There may be opportunities to bring ecosystem approach concepts into certain CCD-specific initiatives such as those in drought resistance and early warning systems. Considerations related to developing alternative livelihoods, which are conceptually similar to the ecosystem approach, are central to work in drylands. Maintenance of a multi-biome perspective is also important, and therefore existing tools such as integrated river basin management are broadly applicable. A major reason for applying the ecosystem approach is to break down sectoral and institutional barriers.

Biological diversity - the variety of life on Earth and the natural patterns it forms - is increasingly threatened by human activities. Management of the Earth's biodiversity resources with the aim to reach the three objectives of the Convention on Biological Diversity: the conservation and sustainable use of biological diversity, and the equitable sharing of benefits arising from the utilization of genetic resources, presents a formidable challenge for humankind. The processes linking ecosystems and species are complex, and an action taken in one location may have unforeseen consequences elsewhere, often far away and many years later.

In this context, the ecosystem approach offers a powerful strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. The ecosystem approach is the primary framework for action under the Convention, and its application will help to reach a balance of the three objectives of the Convention.

The ecosystem approach is based on the application of appropriate scientific methodologies focused on levels of biological organization, which encompass the essential structure, processes, functions and interactions among organisms and their environment. It also recognizes that humans, with their cultural diversity, are an integral component of many ecosystems. The ecosystem approach is essential in guiding action under the various programmes of work of the Convention, and in providing linkages between those programmes of work. After all, all biomes, and thus programmes of work, are interconnected in some way, and management action will likely have limited success if these connections are not taken into account.

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