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Fifth meeting

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Item 4.2.1 of the provisional agenda\*

ECOSYSTEM APPROACH: FURTHER CONCEPTUAL ELABORATION

Note by the Executive Secretary

EXECUTIVE SUMMARY

As decided by the Conference of the Parties, the ecosystem approach is the primary framework for action under the Convention. The present note has been prepared to assist the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) in developing principles and other guidance on the ecosystem approach, as requested by the Conference of the Parties at its fourth meeting. It builds upon the Malawi principles, developed at the Workshop on the Ecosystem Approach held in Lilongwe in January 1998, as well as the experience and conclusions of a number of other workshops and initiatives that have been organized on this matter in recent years.

The ecosystem approach is a strategy for integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. It is based on the application of appropriate scientific methodologies focused on levels of biological organization which encompass the essential processes, functions and interactions among organisms and their environment. It recognizes that humans, with their cultural diversity, are an integral component of ecosystems.

The present note describes 12 principles of the ecosystem approach, and proposes five points as operational guidance for their application.

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\* UNEP/CBD/SBSTTA/5/1.

## SUGGESTED RECOMMENDATIONS

The Subsidiary Body on Scientific, Technical and Technological Advice may wish to recommend that the Conference of the Parties:

1. Endorses the principles and guidance on the ecosystem approach to be contained in an annex to its decision; 1/
2. Calls upon Parties to apply the ecosystem approach, in line with these principles and guidance, in particular, in the context of activities developed within the thematic areas of the Convention; and
3. Invites Parties, other Governments and relevant bodies to identify case-studies and implement pilot projects, and to organize, as appropriate, regional, national and local workshops, and consultations aiming to enhance awareness, share experiences and strengthen regional, national and local capacities on the ecosystem approach.

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1/ The principles and guidance would be based on section II of the present note and forwarded to the Conference of the Parties as an annex to the recommendation that the Subsidiary Body might make.

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## I. INTRODUCTION

1. At its second meeting, held in Jakarta, November 1995, the Conference of the Parties of the Convention on Biological Diversity adopted the ecosystem approach as the primary framework for action under the Convention, and subsequently has referred to the ecosystem approach in the elaboration and implementation of the various thematic and cross-cutting issues work programmes under the Convention. <sup>2/</sup>

2. Recognizing this, 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 ecosystems approach, and requested the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) "to develop principles and other guidance on the ecosystem approach, taking into consideration, *inter alia*, the results of the Malawi workshop, and to report thereon to the Conference of the Parties at its fifth meeting".

3. The present note has been prepared to assist the Subsidiary Body in developing such principles and guidance on the ecosystem approach. It draws upon the experience and conclusions of a number of workshops and other initiatives that have been organized on the ecosystem approach in recent years (annex I below), notably the Malawi/Netherlands-sponsored Workshop on the Ecosystem Approach held in January 1998 in Lilongwe, and the Norway/United Nations Conference on the Ecosystem Approach for the Sustainable Use of Biological Diversity, held in Trondheim in September 1999, as well as a liaison group meeting of experts convened by the Secretariat with the generous support of the Governments of France and the United Kingdom, as well as UNEP, and held at headquarters of the United Nations Educational, Scientific and Cultural Organization (UNESCO), Paris, in September 1999. <sup>3/</sup>

## II. DESCRIPTION, PRINCIPLES AND OTHER GUIDANCE

4. There is increasing awareness of the need to appreciate the interrelationship between living organisms and between complex natural systems. This perspective has often been ignored in the past, where resources have been managed without consideration of the potential effects elsewhere. With regard to biological diversity, it is now generally accepted that there is a need to focus on ecosystems as a whole and that these ecosystems should be defined, not in terms of size or climatic or physical properties, but by the extent to which a particular event can affect the various components. Thus, there is a need to understand the ways in which different organisms and species are interrelated over space and time and how changes in one component can alter the functioning of the ecosystem as a whole and, hence, its ability to provide the required goods and services.

5. In response to this ecological awareness, a number of agencies have developed approaches to ecosystem management (see annex I), and the ecosystem approach within the Convention should be elaborated in light of this experience.

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<sup>2/</sup> Decision II/8. The thematic and cross-cutting issues concerned include: biological diversity of inland water ecosystems (recommendations III/1 and decision IV/4); marine and coastal biological diversity (decisions II/10 and IV/5); agricultural biological diversity (decisions III/16 and III/11); forest biological diversity (decisions I/8, II/9, III/12 and IV/7); indicators of biological diversity (decision IV/1); incentive measures (decision IV/10 A) and environmental impact assessment (decision IV/10 C), as well as: the Global Taxonomy Initiative (SBSTTA recommendation IV/2); sustainable use, including tourism (recommendation IV/7); alien species that threaten ecosystems, habitats or species (recommendation IV/4 and decision IV/1 C).

<sup>3/</sup> The description (section II A) and the principles (section II B) of the ecosystem approach are based on those developed at the Lilongwe Workshop (UNEP/CBD/SBSTTA/COP/4/Inf.9) and further elaborated by the Liaison Group (Annex 2 gives specific guidance and actions for each principle, as developed by the Liaison Group. Section II B, on operational guidance, draws upon, in particular, the conclusions of Trondheim Conference.

#### A. Description of the ecosystem approach

6. 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.

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

8. This focus on processes, functions and interactions is consistent with the definition of "ecosystem" provided in Article 2 of the Convention:

" '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.

9. 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 show 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". As with the precautionary principle, measures may need to be taken even when some cause- and-effect relationships are not fully established scientifically.

#### B. Principles of the ecosystem approach

10. The following 12 principles are complementary and interlinked, and need to be applied as a whole.

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. Ultimately, all ecosystems should be managed for the benefits of humans - whether that benefit is consumptive or non-consumptive.

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

Rationale: Decentralized systems can lead to greater efficiency, effectiveness and equity. The closer management is to the ecosystem, the greater the responsibility, accountability, participation, and use of local knowledge.

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.

Principle 4: Recognizing potential gains from management, there is a need to understand the ecosystem in an economic context. Any 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: Management interventions in ecosystems often have unknown or unpredictable effects on other ecosystems and therefore need careful consideration and analysis. This may require institutions for decision-making that lead to appropriate compromises and trade-offs.

- Principle 5: A key feature of the ecosystem approach includes conservation of ecosystem structure and functioning.
- 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.
- 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 and functioning. 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.
- Principle 7: The ecosystem approach should be undertaken at the appropriate 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, and scientists. The ecosystem approach is based upon the hierarchical nature of biological diversity characterized by the interaction and integration of genes, species and ecosystems.
- 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.
- Principle 9: Management must recognize that change is inevitable.
- Rationale: Ecosystems change 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. 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 with may foreclose options.
- Principle 10: The ecosystem approach should seek the appropriate balance between 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.
- 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. 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.

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.

### C. Operational guidance for application of the ecosystem approach

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

#### 1. Focus on the functions of biodiversity in ecosystems

12. 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 the roles of the components of biological diversity in ecosystems, is required, especially to understand ecosystem resilience and the effects of biodiversity loss (species and genetic levels) and habitat fragmentation. 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. Promote the fair and equitable sharing of the benefits derived from the functions of biological diversity in ecosystems

13. Benefits that flow from the array of services provided by biological diversity at the ecosystem level provide the basis of human environmental security and sustainability. The ecosystem approach seeks to ensure that these services are distributed equitably to people at local, national, regional, and global scales. In particular, benefits from these services need to be shared with 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, where appropriate, their replacement with local incentives for good management practices.

#### 3. Use adaptive management practices

14. 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 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 to best monitor the results of management and evaluate whether established goals are being attained.



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

15. As noted in section II 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

16. 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 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.

D. Other remarks

17. The ecosystem approach should be applied in each of the thematic and cross-cutting work programmes of the Convention, based upon the 12 principles and using the five points of operational guidance derived therefrom.

18. The application of the ecosystem approach can help to promote delivery to people of the full array of benefits derived from the functions of biological diversity at the ecosystem level. Lessons learned from case-studies on the ecosystem approach that take into account the three objectives of the Convention should be widely promoted.

19. The ecosystem approach does not preclude other management and conservation approaches, such as biosphere reserves, traditional protected areas, single-species conservation programmes, 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.

Annex ISYNOPSIS OF WORKSHOPS AND OTHER INITIATIVES  
RELATED TO THE ECOSYSTEM APPROACH

The ecosystem approach has been discussed in a number of workshops and promoted through a range of initiatives which, together, provide a wide range of technical views and different geographical perspectives. The initiatives described below should be considered together with numerous other efforts being undertaken in this field at both the conceptual and at more practical levels.

Inter-Agency Ecosystem Management Task Force, United States, June 1995

Representatives from a wide range of United States federal agencies were mandated to adopt "a proactive approach to ensuring a sustainable economy and a sustainable environment through ecosystem management". The working group conducted a number of case-studies in the United States of America to examine experiences, identify barriers to implementing the ecosystem approach and ways of overcoming them. Recommendations were made to improve federal agency involvement in the ecosystem approach through, *inter alia*, improving agency coordination, partnerships with stakeholders, public communication, adaptive management strategies, and supporting the role of science. An outline framework for the ecosystem approach was developed as a guidance tool for agencies interested in adopting the approach.

"The scientific basis of ecosystem management towards the third millennium" Sibthorp seminar, London, United Kingdom, June 1996

The Sibthorp (IUCN) seminar was designed to look critically at the findings of recent ecological research and consider implications for conservation practices. Ten principles for ecosystem management were distilled from the conclusions of the seminar. These were divided into:

(a) Guiding principles: Management objectives are a matter of social choice; ecosystems must be managed in a human context; ecosystems must be managed within natural limits; management must recognize that change is inevitable; management must be undertaken at the appropriate scale and conservation use the full range of protected areas; and

(b) Operational principles: Ecosystem management needs to think globally but act locally; it must seek to maintain or enhance ecosystem structure and functioning; decision-makers should use appropriate tools from science; managers must act with caution; a multidisciplinary approach is needed.

Discussion of the principles at the 1996 World Conservation Congress concluded that for their application they needed, *inter alia*: adaptation to more specific national and local conditions, adaptive management approaches, risk assessment and cost-benefit analysis, good communications to articulate social choices, management scales and time-frames sensitive to ecosystem dynamics, and mechanisms for keeping management options open.

Task Group on Ecosystem Approach and Ecosystem Science, Canada, September 1996

The Task Group highlighted key concepts of an ecosystem approach to management. These included using spatially meaningful frameworks in planning, recognizing that preserving natural systems and their inter-relationships is imperative, and adopting an integrated and holistic approach that also seeks cooperation and collaboration with stakeholders at all stages of the decision making process. In addition, the Task Group defined a four-step approach to management and, through the assessment of case-studies from Canada, summarized the challenges that face the ecosystem approach: community, institutional or organizational, and scientific challenges. It concluded that the approach requires new partnerships with stakeholders, and broadened perspectives of traditional and non-traditional partners. However, a flexible ecosystem approach can permit long-term solutions to complex environmental issues by engaging broadened perspectives of traditional and non-traditional partners.

The Keystone National Policy Dialogue on Ecosystem Management, Keystone Centre, Colorado, United States, October 1996

Participants from resource management and regulatory agencies, tribal organizations, forest management, housing, agriculture, ranching, environment, politics, scientific, research and academia concluded that ecosystem management is "neither a panacea nor a magic solution" "but it can be a significant process capable of sometimes dramatic results that accommodate disparate values and interests". The policy recommendations for facilitating implementation included: use of market-based tools, streamlining government decision-making processes, reforming property tax laws, addressing statutory barriers and strengthening the science base.

Informal meeting at the third meeting of Subsidiary Body on Scientific, Technical and Technological Advice, Montreal, September 1997

The Convention Secretariat organized an informal discussion on the ecosystem approach under the Convention. Participants agreed that a discussion within the process of the Convention was a priority, as there was a broad range of views about the meaning, scope and elements of the approach. Problems that needed further discussion were highlighted: terminology; types of ecosystems (natural versus man-modified); underlying theoretical assumptions; relation between ecosystem approach and ecosystem management; problems of methodology; the need for case-studies; and implications for the implementation of the Convention with special reference to modus operandi and the legal implications.

Workshop on the Ecosystem Approach, Lilongwe, Malawi, January 1998

The Workshop was sponsored by the Governments of the Netherlands and Malawi, and organized under the auspices of the Convention. The participants discussed what an ecosystem approach should be why an ecosystem approach should be taken to implement the Convention and what are the principles of an ecosystem approach. An ecosystem approach was considered as cutting across all the thematic areas of the Convention and could overcome the shortcomings and deficiencies of using classical nature conservation approaches as the sole tool for management of biological diversity. Twelve principles were identified as a basis for discussion of the "ecosystem approach". The workshop concluded that the principles had to be taken now from a conceptual realm and made operational, and that there were many issues involved in establishing management objectives when taking an ecosystem approach. Procedures and methodologies for arriving at balanced trade-offs were identified as urgent needs. The workshop report was submitted to the Conference of the Parties at its fourth meeting as document UNEP/CBD/COP/4/Inf.9.

Workshop on an Ecosystem Approach to the Management of Inland Waters, Global Biodiversity Forum 10, Bratislava, Slovakia, May 1998

The Workshop organized as part of the tenth Global Biodiversity Forum agreed the following summary statement: "Ecosystems adapt and evolve. Applying the ecosystem approach means your management framework should too". The Malawi principles were endorsed by the workshop. Priority issues were identified and included: a need for clear guidelines for the implementation of the ecosystem approach by Parties; the strong role of adaptive management in implementation; the need to practice the precautionary approach in management; the value of collating case-study experience in the implementation of the ecosystem approach; the need to review, revise and implement policy, legal and economic mechanisms to ensure they support the ecosystem approach at national and regional levels; the importance of transparency and involvement of stakeholders in the ecosystem approach; the need for cross-sectoral cooperation and capacity-building to enable Parties implement the ecosystem approach.

"The ecosystem approach - what does it mean for European ecosystems?" workshop, Isle of Vilm, Germany, November 1998.

The workshop discussed the relevance of the Malawi principles and their possible implementation in a European context with a strong emphasis on case-studies relevant to the implementation of the ecosystem approach in Europe. The participants supported the results of the Malawi Workshop and further expressed a need for clarity in terminology and definition surrounding the ecosystem approach; the need for further guidance on implementation of the ecosystem approach; and that the ecosystem approach must be able to cope with the highly diverse environmental and social conditions found in Europe. The participants also proposed a set of priority actions for implementation of the ecosystem approach to key target audiences.

Discussions in the Ecosystem Conservation Group

The Ecosystem Conservation Group, which is convened by UNEP and brings together the Food and Agriculture Organization (FAO), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the United Nations Development Programme (UNDP), the World Bank, IUCN-The World Conservation Union, the World Wide Fund for Nature (WWF) and the World Conservation Monitoring Centre (WCMC) has recently been re-established. It provides an avenue through which science and technology relating to ecosystem conservation can be brought together in the design of policies, strategies and programmes. It has considered, for example, the management of large ecosystems with reference to marine and coastal environments.

Workshop on Integrated Planning At Different Scales: Policy and Practice, Perth, Scotland, April 1999

The workshop focused on ecosystem approaches from different countries and identified generic issues that might be best addressed at the international level. It was concluded that the following was needed in order to make the implementation of the ecosystem approach work: integration of policy across all sectors and all administrative levels; changes in institutional cultures; more creative use of tools and mechanisms; and removal of perverse incentives and market distortions.

"An ecosystem approach under the CBD", IUCN-CEM (Commission on Ecology and Management) technical meeting, Costa Rica, May 1999

The meeting addressed the relevance of the Malawi principles from a regional and global perspective. The participants concluded that when choosing management objectives for the ecosystem approach there is a need for mechanisms to align national and local objectives, clarification of policy at national and local levels and education and capacity building to ensure choices. The participants also stressed the importance of pilot projects in demonstrating the value of the approach and the feedback of scientific research to stakeholders.

Norway/United Nations Conference on the Ecosystem Approach for the Sustainable Use of Biological Diversity, Trondheim, Norway, September 1999

The Trondheim Conference focused on research and development that contributes to an improved understanding of the Malawi principles, with the aim of integrating them in everyday management practices. There was broad consensus at the meeting that given spatial and temporal complexity of biodiversity and the human use of systems, the ecosystem approach including adaptive management is the most appropriate framework to achieve the optimum balance of the Conventions objectives. Key recommendations of the Trondheim conference included, *inter alia*: implementation programmes should be designed to adjust to the unexpected, rather than to act on the basis of a belief in certainties; the development of capacity in the ecosystem approach, adaptive management, monitoring, information, and participatory management is a matter of high priority; as global trade accelerates there needs to be continuing monitoring and discussion on potential adverse impacts on biological diversity and ecosystem properties; cost-effective ways of mitigating adverse impacts need to be developed; ecosystem

management needs to recognize the diversity of social and cultural factors affecting natural resource use; there is a need to develop accepted methodologies for the valuation of biodiversity and ecosystem services; there is a need to integrate the ecosystem approach into agriculture, fisheries, forestry and other production systems that have effects on biodiversity. The report of the Trondheim meeting will be available at the fifth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice.

Annex IIELABORATION OF GUIDANCE AND ACTIONS FOR EACH OF THE  
MALAWI PRINCIPLES BY THE LIAISON GROUP

The liaison group suggested that the twelve principles developed by the Malawi Workshop on the Ecosystem Approach, held in Lilongwe in January 1998 (UNEP/CBD/COP/4/Inf.9) should form the core of the ecosystem approach, while relevant findings of other initiatives should also be taken into account, as appropriate. The liaison group developed proposed actions aimed at implementing each principle and other guidance on such an approach.

The liaison group proposed that, although some principles might have precedence over others, they need to be read as a whole and in conjunction with each other, as they are all complementary and interlinked. Together they characterize the ecosystem approach. The liaison group was aware further of the variation in country circumstances which may impede implementation and necessitate specific operational requirements.

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

Guidance notes

- State or local government should decide at which level and by whom (villages, non-governmental organizations, lobbies, church, etc.) the identification of the elements contained in the actions below should take place.
- Develop framework laws and policies to create an enabling environment for society to implement choices.

Actions

- Identify the boundaries for application of the ecosystem approach through iterative processes which might include the following:
  - (i) Identify different sectors of society relevant to process;
  - (ii) Identify objectives of different sectors;
  - (iii) Identify problems as pointed out by sectors;
  - (iv) Identify strong and weak linkages;
  - (v) Identify stakeholders and actors and differentiate them according to practical actions;
  - (vi) Identify how socio-economic needs rely on ecosystem processes.
- Define and use effective and transparent mechanisms, and devote the necessary time, financial resources and institutional capacity, to identify, inform, consult and involve all elements of society in choosing management objectives, according to local conditions, on: how to find the best balance between the three objectives of the Convention. The balance point will vary according to local circumstances. The process will be promoted through the implementation of communications and capacity-building programmes at all levels and scales.
- Promote broad understanding of the connection between people and the environment and how each influences the other.
- In the context of ecological education and research, emphasize people as integral components of an ecosystem.
- Establish conflict resolution mechanisms.
- Promote information-sharing, as stipulated in principles 11 and 12.
- Take account of risk assessment and cost-benefit analysis.

- Build capacity (human resources and/or financial) at various levels within the civil society, non-governmental organizations and/or local communities.
- Identify the necessary resources; if resources are lacking, develop proposals for funding from, e.g., the Global Environment Facility.

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

#### Guidance notes

- Identify those specific areas and/or bioregions, e.g. specific watersheds, coastal zones etc., that need priority action.
- In identifying areas for management, priority should be given to ecological parameters using scientific means, but considering also social and economic issues that can help to define issue areas in which to apply the ecosystem approach (examples are procedures of state Governments (e.g. New South Wales in Australia and devolved authority for wildlife management in Zimbabwe).
- Use local knowledge to the greatest extent possible and as appropriate.

#### Actions

- Define appropriate level based on results/actions of principle 1.
- Develop appropriate legal framework and policy to delegate and receive authority, if lacking.
- Adopt new institutional arrangements that recognize the preconditions of the ecosystem approach.
- Establish a clear accountability framework/structure/procedure.
- Develop appropriate measures to ensure implementation.
- Central government, within its legislative framework and policy, to delegate authority and pass responsibility to the lowest and most appropriate level with necessary means and resources.
- Establish or improve coordination mechanisms within and between governments at implementation level.
- Create an enabling environment for the development of stakeholder committees to develop management strategies for ecosystems or bioregions at the appropriate level and with appropriate technical support.
- Develop a planning framework commonly agreed by all stakeholders.
- Mandate committees of stakeholders to develop management plans with technical advice from groups of people with relevant expertise.
- Identify and provide necessary resources at the appropriate level.
- Train personnel and promote learning by action/in service.

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

#### Guidance notes

- Institutions can be village councils, provincial councils, networks, intergovernmental organizations, non-governmental organizations, depending on the scale of the issues to be resolved.
- All people involved in management activities can be considered ecosystem managers.
- If impacts are going to affect ecosystems out of the management unit, a higher hierarchical level should be included in the decision making process.
- Use appropriate instruments described in the Convention to consult and agree with others on management objectives for a given ecosystem thematic area or cross-cutting issue.

- If actions in a given area are impacting others, the decisions should be reconsidered - flexibility is a key approach.
- Consider all relevant information, according to principles 11 and 12.
- Use principle 8 to define time-scales for impacts and take into account different time-scales affecting ecosystems.

#### Actions

- Build institutional mechanisms for decision-making that lead to appropriate compromises and trade-offs, taking into account different valuation systems.
- In order to ensure fairness and equitability in the trade-off process, governments or other institutions can take a mediatory role.
- Differentiate priorities among ecosystem managers.
- Develop protocols or mechanisms by which the different institutions involved can solve conflicts.
- Where impacts occur in adjacent or other ecosystems, establish a mechanism to bring together the relevant ecosystem management mechanisms with technical advice from groups with relevant expertise and mediation services.
- Build constituencies, enabling local communities to analyse decisions and generate modification of decisions.
- Implement capacity-building programmes at the ecosystem level.
- Carry out environmental impact assessment, in accordance with Article 14 of the Convention.
- In accordance with Article 7 of the Convention, implement regional and/or national monitoring systems to measure the effects of management measures in adjacent and other ecosystems.
- Analyse linkages and impacts of activities like: inland waters versus coastal fisheries; mountains and agro-ecosystems versus inland waters; forestry and desertification.
- Develop specific measures to deal with transboundary issues in the case of shared ecosystems between countries.
- Develop and apply legislative tools.

- Principle 4: Recognizing potential gains from management there is a need to understand the ecosystem in an economic context. Any 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.

#### Guidance notes

- Economics at all levels must be seen in a broad sense to include not only monetary and marketable values but also resource and ecosystem-service values.
- Build institutional mechanisms for decision-making that lead to appropriate compromises and trade-offs.
- In order to ensure fairness and equitability in the trade-off process, government or other institutions can take a mediatory role.
- Consider international funding mechanisms and trends.
- Influence international and intergovernmental organizations that may have conflicting priorities so that application of principle 4 will be promoted.



### Actions

- Develop mechanisms for appropriate valuation of ecosystem goods and services and reflect it in National Accounts.
- Review, revise and implement policy, legal and economic mechanisms to ensure they support an ecosystem approach at national and regional levels.
- Identify and resolve conflicting cross-sectoral and transboundary policies, legal and economic mechanisms.
- Carry out technical analyses of current market distortions, incentives and ecosystem costs/benefits.
- Adjust perverse incentives/subsidies and market distortions in such a way that they are no longer detrimental to biological diversity, and develop legal and economic instruments which recognize liability for loss of or damage to biological diversity.
- Create an enabling environment for activities 4 (a), (b) and (c).
- Parties and international funding agencies should promote an ecosystem approach to management in development programmes.
- Incorporate into policy-making mechanisms for the economic valuation of biological resources/biodiversity and ecological processes/services.

Principle 5: A key feature of the ecosystem approach includes conservation of ecosystem structure and functioning.

### Guidance notes

- Principles 6 and 8 are strongly related to principle 5, so actions here will impinge on principles 6 and 8.
- Traditional conservation approaches are complementary to the ecosystem approach and should not be excluded.
- Knowledge sharing is important (see principle 11).

### Actions

- In planning conservation or development programmes or projects, ensure that, using the ecosystem approach, the structure and functioning of ecosystems is maintained and/or enhanced.
- Ensure that pursuant to Article 7, research into ecosystem structure and functioning, as well as how ecosystems respond to management will be strengthened and intensified.
- Ensure capacity-building at the appropriate level for the study of structure and ecosystem functioning.
- Improve knowledge on ecosystem functioning, structure and dynamics (i.e. response to something), including through biodiversity assessments and inventories, collection of baseline information, and biodiversity monitoring by means of indicators and criteria;
- Examine how traditional conservation approaches can be optimized as part of the ecosystem approach;
- Develop mechanisms to further enhance validation of information (see also principle 11).
- Translate complicated concepts, jargon and knowledge into understandable and practical guidance.
- Formulate recommendations and guidelines for management options and restoring functions, and for scenario development, so that ecosystem managers can make informed decisions.

- Mobilize financial resources, develop the necessary capacities and collect baseline information.

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

Guidance notes

- Limits to functions will depend on societal preferences, as already illustrated by principle 1.
- One should not rely on single-species models to set maximum sustainable yield or other limits.

Actions

- Given the level of uncertainties, apply the precautionary principle. To achieve this it is necessary for activities to be phased, monitored, and only allowed to proceed if effects are negligible or benign.
- Undertake environmental assessments.
- Advisors need to be properly trained in the use of non-linear thinking, and integrated technical approaches, and be warned about extrapolation of trends that in reality show thresholds, changes and other non-linear behaviour that characterize the complicated nature of ecosystems.
- Strengthen advisory institutes so that this type of knowledge on ecosystem structure and functioning incorporated into advice on policies which address the underlying causes of biodiversity loss. (Expertise may come from professional communities not normally thought of in the context of ecosystem management, e.g. weather information, insurance companies, actuaries).

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

Guidance notes

- Scale is determined by statement of problem and a shared vision of the outcome.
- The boundaries of the management unit should be defined according to the specific management objectives/needs.
- Consider the most appropriate time frame (short-term versus long-term goals) and spatial scales (in relation to local versus provincial versus national versus global goals).
- Linkage to principles 4 and 6.

Actions

- Conflict-resolution analysis at the appropriate scale.
- Consider suitable framework for implementation of the ecosystem approach.
- Develop pilot projects and case-studies and distil lessons learned.
- Other actions as under principle 1.

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

Guidance notes

- Objectives for ecosystem management, including monitoring and research, should be set in the context of ecosystem and species recovery and renewal periods.

Actions

- Governments should take a mediatory role regarding trade-offs between short-term and long-term costs/benefits.
- While taking into account immediate and critical needs (e.g. hunger, poverty, shelter), Governments should develop long-term planning and long-term goals independently from annual (short-term) funding and other natural cycles, so that ecosystem managers can take into account in their decision-making trade-offs between short-term benefits and long-term goals.
- Establish monitoring mechanisms to detect long-term change, e.g., success or failure.
- The Convention Secretariat should facilitate exchange of experiences among Governments, for example through the clearing-house mechanism.

Principle 9: Management must recognize that change is inevitable.

Guidance notes

- Change can be generated internally within the system, as well as externally.
- Management should include restoration of degraded ecosystems.
- New emerging opportunities should be integrated in increasing awareness at different levels of society.

Actions

- Appropriate management models as well as reliable contingency plans are of particular importance for dealing with uncertainty and change.
- Periodic monitoring of socio-economic, ecological and environmental processes, inter alia, to detect changes in ecosystems at an early stage. Such monitoring should be based upon reference points (targets, limits, thresholds) and take into account the limits of ecosystem functioning.
- On the basis of such monitoring, rapid response mechanisms to ecosystem change should be developed.
- Adaptive management could assist in preventing degradation or loss of habitats by taking early actions in response to the changes in ecosystems. The use of such management in applying the ecosystem approach at every level should be encouraged and developed, in particular within an appropriate framework, and include feedback mechanisms.
- Baseline information on the effect of change on ecosystem functioning and research on ecosystem dynamics should be developed and supported.

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

Guidance notes

- The term "use" should be understood as including non-extractive components, such as spiritual, cultural, tourism, genetic treasure-house and research uses.

Actions

- Balance should reflect long- and short-term, direct and indirect benefits of conservation and sustainable use of biological diversity.
- Policy, legal, institutional and economic mechanisms should be reviewed, revised and implemented to ensure that an ecosystem approach is integrated at national and regional levels.

- Cross-sectoral and transboundary policies, as well as legal and economic mechanisms that could create conflict should be identified and resolved as far as possible.
- Research in integrated land-use planning and formulation of best management practices to better understand the application of the full range of measures *vis-à-vis* ecosystem production, biological diversity conservation and equitable benefit-sharing should be advanced.
- Knowledge regarding the emergence of possible general features regarding various and multiple use of ecosystem in a spatial context (for example, land planning, biosphere reserve concept) should be developed.

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

#### Actions

- Appropriate mechanisms should be developed in order to gather information from different knowledge and information systems in view of, *inter alia*, facilitating their utilization by decision-makers as well as by all relevant stakeholders and actors.
- Relevant knowledge from proper disciplines and expertise should be disseminated and made easily available for all interested people through appropriate mechanisms that take into account, when appropriate, user-friendly ways and relevant media.
- Education, training and awareness at all levels based on, *inter alia*, appropriate teaching mechanisms, should be promoted in particular in view of better using relevant and correct information on the ecosystem approach and when appropriate, in relation to people's own experience and conditions.
- Knowledge and participation of indigenous and local communities are of paramount importance. Therefore, institutional arrangements that will allow collecting [all] indigenous and local communities information should be promoted.
- Demonstration projects should be promoted, in particular, those that could contribute to change damaging human behaviour.
- Relevant cases-studies, in particular those that demonstrate the economic, social as well as ecological benefits from, or that identify constraints in, the implementation of the ecosystem approach should be developed and made available for use by others.
- Adapt the clearing-house mechanism so that it could be used for this purpose.

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

#### Guidance notes

- In implementing principle 12, all the other principles have to be taken into account.

#### Actions

- Effective participation of all stakeholders and actors in decision making and as appropriate in implementation of ecosystem management and, in particular, in national consultation processes, should be developed and ensured.

Annex III

## DRAFT GLOSSARY

**Note.** This is a working glossary and is not intended to provide formal definitions, unless stated otherwise (sources are indicated in parenthesis).

**Adaptive management:** Adaptive management is based upon the premises that managed ecosystems are complex and inherently unpredictable. The adaptive approach embraces the uncertainties of system responses and attempts to structure management actions as "weak" experiments from which learning is a critical product.

**Biome:** A major portion of the living environment of a particular region (such as a fir forest or grassland) characterized by its distinctive vegetation and maintained by local climatic conditions. (World Resources Institute)

**Bioregion/ecoregion:** A land/water unit defined by biogeographical parameters rather than socio-political boundaries.

**Biosphere:** The part of the Earth and its atmosphere in which living organisms exist or that is capable of supporting life. (National Resources Defense Council (NRDC))

**Biosphere Reserve:** A part of an international network of preserved areas designated by the United Nations Educational, Scientific and Cultural Organization (UNESCO). Biosphere Reserves are vital centres of biodiversity, where research and monitoring activities are conducted, with the participation of local communities, to protect and preserve healthy natural systems threatened by development. The global systems currently includes 324 Reserves in 83 countries. (NRDC).

**Capacity-building:** The process of equipping individuals with the understanding, skills and access to information, knowledge and training that enables them to perform effectively. The elaboration of management structures, processes and procedures, not only within organizations but also the management of relationships between the different organizations and sectors.

**Cost-benefit analysis:** Cost-benefit analysis (CBA) is an appraisal of the advantages and disadvantages of a proposal, valuing as many as possible of these in monetary terms.

**Cultural diversity:** The diversity of peoples and their total of inherited ideas, beliefs, values, knowledge, and artistic and social pursuits.

**Ecosystem:** Dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit. (Definition in the Convention on Biological Diversity)

**Ecosystem functions:** Ecosystem functions are activities or actions that occur naturally as a result of the interactions between ecosystem structure and processes. Function includes diverse actions such as nutrient retention, food web support and floodwater control.

**Ecosystem management:** Ecosystem management is the manipulation of the physical, chemical and biological processes that link organisms with their abiotic environment and the regulation of human actions to produce a desired ecosystem state.

**Ecosystem managers:** Persons involved in the management of their environment.

**Ecosystem services:** The full range of benefits provided to society by ecosystems and their constituent biodiversity, encompassing more than just the capital value of its constituent parts.

**Ecosystem structure:** Ecosystem structure refers to the way in which abiotic and biotic components are organised. Such components include soils, sediments, water, and flora and fauna.

Environmental impact assessment (EIA): An attempt to identify and predict the impact on the biogeophysical environment and on human health and well-being of proposed industrial developments, projects, or legislation. EIA also aims to devise easily comprehended, universally applicable schemes for communicating the results of the assessment. (Oxford Dictionary of Ecology)

Habitat: The place or type of site where an organism or population naturally occurs. (Definition in the Convention on Biological Diversity)

Perverse incentives and market distortions: Subsidies that have adverse effects on the environment as well as on the overall efficiency of the economy.

Precautionary principle/approach: In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation. (Principle 15 of the Rio Declaration on Environment and Development).

Protected area: A geographically defined area that is designated or regulated and managed to achieve specific conservation objectives. (Definition in the Convention on Biological Diversity)

Risk assessment: The measures to estimate what harm might be caused, how likely it would be to occur and the scale of the estimated damage. (UNEP International Technical Guidelines for Safety in Biotechnology)

Stakeholders/actors: Members of society that encompass the benefits and costs of a particular resource.

Sustainable use: The use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations. (Definition in the Convention on Biological Diversity)

Traditional conservation approaches: The multitude of conservation methodologies that aim to maximize benefits to species and habitats.

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