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Item 6.1 of the provisional agenda*

# DRY AND SUB-HUMID LANDS BIODIVERSITY: MATTERS REQUESTED BY THE CONFERENCE OF THE PARTIES IN PARAGRAPHS 5 AND 6 OF ITS DECISION V/23 AND DECISION VI/4

## *Final report of the Ad Hoc Technical Expert Group on the Biological Diversity of Dry and Sub-Humid Lands*

*Note by the Executive Secretary*

1. The Executive Secretary is circulating herewith, for the information of participants in the eighth meeting of the Subsidiary Body of Scientific, Technical and Technological Advice of the Convention on Biological Diversity, the final report of the Ad Hoc Technical Expert Group on Dry and Sub-Humid Lands, which met twice during the year 2002. The first meeting was held in Montreal from 18 to 22 March 2002. A progress report on the deliberations of the first meeting was presented to the sixth meeting of the Conference of the Parties as an information document (UNEP/CBD/COP/6/INF/39). The AHTEG met for the second time from 23 to 27 September 2002 to complete their inter-sessional work.

2. The report is available in English only. The text has been edited for consistency in layout only, and represents the final report of the AHTEG, endorsed by the Group on 27 September 2002. A summary of the key recommendations has been included in the beginning of the document, under item 3 (Substantive issues) on page 6 below.

3. The participants in the Ad Hoc Technical Expert Group are listed in the annex to the present report, on page 75 below.

* UNEP/CBD/SBSTTA/8/1.

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# FINAL REPORT OF THE AD HOC TECHNICAL EXPERT GROUP ON THE BIOLOGICAL DIVERSITY OF DRY AND SUB-HUMID LANDS

## I. INTRODUCTION

1. In its decision V/23, the Conference of the Parties, decided to establish an Ad Hoc Technical Expert Group on Biological Diversity of Dry and Sub-humid Lands to assist the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) in its work on biological diversity of Dry and Sub-humid Lands. Pursuant to its mandate, the Group carried out the following tasks:

(a) Consolidate and assess information on the status and trends of biodiversity of dry and sub-humid lands, on the possible establishment of an international network of dry and sub-humid areas of particular value for biodiversity, on indicators, on processes affecting biodiversity, on global benefits derived from biodiversity, and on the socio-economic impacts of its loss, including the interrelationship between biodiversity and poverty;

(b) Assess the progress and the effects of the specific measures that have been taken for the conservation and sustainable use of biodiversity, for resource management and for the support of sustainable livelihoods;

(c) Assess international priorities set up at the regional and global levels and made proposals for expected outcomes, further activities, possible actors that may implement them, and timetables for action.

2. At its seventh meeting, held in November 2001, SBSTTA, recognizing the urgency and importance of dealing with threats on the biodiversity of dry and sub-humid lands, urged the convening of the Ad Hoc Technical Expert Group on Dry and Sub-Humid Lands before the sixth meeting of the Conference of the Parties (preamble and paragraph 2 of recommendation VII/3 contained in document UNEP/CBD/COP/6/4). In the same recommendation, SBSTTA requested that, in its work, the Expert Group should take into consideration the views expressed at the seventh meeting of the Subsidiary Body and, in particular, those relating to the importance of:

(a) The value of goods and services of the dry and sub-humid lands, and preparation of case studies on valuation of biodiversity of these environments;

(b) A balanced consideration of conservation, sustainable use and the equitable sharing of benefits in any set of recommendations;

(c) Capacity development, and the needs of some Parties for assistance in seeking resources to develop proposals;

(d) The important complementary role of *ex situ* conservation in implementing the programme of work;

(e) Indicators of biodiversity loss, as well as preventive measures, monitoring, and early warning systems.

3. The members of the Expert Group were selected by the Executive Secretary in consultation with the SBSTTA Bureau from nominations provided by national focal points for the Convention on Biological Diversity and Convention to Combat Desertification (UNCCD), in accordance with the *modus operandi* of SBSTTA (decision IV/16, annex I). The experts were selected based on their competence in

the relevant field of expertise, with due regard to geographical representation and to the special conditions of least developed countries and small island developing States.

4. The Ad Hoc Technical Expert Group held two meetings. The first took place in Montreal, Canada, from 18 to 22 March 2002. Its second meeting was held in Montreal, Canada, from 23 to 27 September 2002. The Group elected Prof. Willem van Cotthem (Belgium) as chair of the full session and Mr. G. V. Sarat Babu (India), as Co-Chair of the first meeting. For the inter-sessional period, the AHTEG decided to establish two working groups under the co-ordination of Prof. Willem Van Cotthem. The inter-sessional working group 1, chaired by Mr. Jeremy Harrison (UNEP-WCMC), looked at the following items on dry and sub-humid lands biodiversity; (a) Status and trends, (b) Indicators, (c) Global networks, and (d) Capacity development. Inter-sessional working group 2, chaired by Mr. Syaka Sadio (FAO), looked at the following items on dry and sub-humid lands biodiversity, (a) Processes, (b) Measures, (c) Global benefits and (d) Socio-economic aspects. During the second meeting eight smaller working groups were formed (see item 2.2. (Organization of work), below).

5. The report of the first meeting of the Ad Hoc Technical Expert Group was submitted to the Conference of the Parties at its sixth meeting (UNEP/CBD/COP/6/INF/39). The present document contains the procedural report of the second meeting of the Group, together with the Group's final conclusions, which were developed on the basis of the outcome of the first meeting, the inter-sessional work and the Group's second meeting.

## ITEM 1. OPENING OF THE MEETING

6. The second meeting of the Ad Hoc Technical Expert Group on the Biological Diversity of Dry and Sub-Humid Lands was attended by government-nominated experts from Austria, the Bahamas, Belgium, Botswana, Burkina Faso, Lithuania, Mongolia, the Seychelles, Spain, Sri Lanka, Uruguay, a representative of local and indigenous communities in Canada and representatives of the following intergovernmental and non-governmental organizations: the United Nations Secretariat of the Convention to Combat Desertification (UNCCD), the Food and Agriculture Organization of the United Nations (FAO), UNEP-World Conservation Monitoring Centre (WCMC), the Global Environment Facility (GEF), the International Union for Conservation of Nature (IUCN), the International Centre for Agricultural Research in the Dryland Areas (ICARDA) and the SBSTTA Bureau. The full list of participants is included in an addendum to the present document.

7. The meeting was opened by the Head of the Division of Scientific, Technical and Technological Matters of the Convention on Biological Diversity, Jo Mulongoy, at 9 a.m., on Monday 23 September 2002. In his statement, he welcomed the participants and stressed the importance of this second AHTEG meeting to further elaborate the reports produced during the inter-sessional work. He emphasized the need to provide the most relevant information on the requested issues to SBSTTA, to guarantee the successful further shaping and the implementation of the programme of work on dry and sub-humid lands.

8. The chairman of the meeting addressed all participants and invited to a fruitful work session, particularly focusing on the needs of the poor and the support of sustainable livelihoods.

## ITEM 2. ORGANIZATIONAL MATTERS

### *2.1. Adoption of the agenda*

9. The provisional agenda proposed in document UNEP/CBD/AHTEG-Dryland/2/1 was not tabled at the opening, due to the fact that it was essential to modify the agenda and engage in "rolling planning" throughout the work session. However, the suggested components of UNEP/CBD/AHTEG-Dryland/2/1 were retained in the working programme of the meeting and contained the following items:

1. Opening of the meeting
2. Organizational matters
   - 2.1 Adoption of the agenda
   - 2.2 Organization of work
3. Substantive issues
   - 3.1 Consolidation and assessment of information on the following issues
     - 3.1.1 Status and trends of biodiversity of dry and sub-humid lands
     - 3.1.2 Possible establishment of an international network of dry and sub-humid areas of particular value for biodiversity
     - 3.1.3 Indicators of the status and trends of biological diversity; monitoring and early warning systems
     - 3.1.4 Processes affecting biodiversity
     - 3.1.5 Global benefits derived from biodiversity and valuation of biodiversity
     - 3.1.6 Socio-economic impacts of biodiversity loss, including the interrelationship between biodiversity and poverty
   - 3.2 Assessment of the progress and the effects of the specific measures
     - 3.2.1 Measures taken for the conservation and sustainable use of biodiversity (including the role of *ex situ* conservation, resource management and preventive measures)
     - 3.2.2 Measures taken for the support of sustainable livelihoods
     - 3.2.3 Consideration of capacity development, and the need of some Parties for assistance in seeking resources to develop proposals
   - 3.3 Priority setting
     - 3.3.1 Assessment of international priorities set up at the regional and global levels
     - 3.3.2 Proposals for expected outcomes, further activities, possible actors that may implement them, and timetables for action
4. Scoping of gaps and suggestions for further elaboration
5. Other matters

6. Adoption of the report

7. Closure of the meeting

### *2.2. Organization of work*

10. A member of the Secretariat gave a brief presentation recalling the mandate of the group as described in Decision V/23 and complemented by SBSTTA 7 recommendation VII/3 paragraph 3, and the scope of dry and sub-humid lands which includes the arid, semi-arid, Mediterranean, grassland and savannah ecosystems

11. The two co-chairs of the inter-sessional working groups presented the draft reports, which formed the basis for the further refinement of the work programme of the week. The participants contributed by providing comments and additions to the reports, and an exchange of view after each presentation. Additional outlines of support resource material provided by the Secretariat were also presented.

12. The AHTEG agreed to consider all issues within working groups, coordinated by the two co-chairs and the chair, further elaborating the drafted elements and recommendations of the inter-sessional work, on each point in the mandate.

13. Working group 1, chaired by Mr. Fernando Valladares of Spain, addressed issues outlined in 3.1.1 of the meeting agenda, namely the biodiversity status and trends in dry and sub-humid lands.

14. Working group 2, chaired by Mr. Leon Smith of the Bahamas, addressed issues outlined in 3.1.3 of the meeting agenda, namely indicators, monitoring and early warning systems.

15. Working group 3, chaired by Mr. Jeremy Harrison of UNEP-WCMC, considered the agenda issue 3.1.2 on the possible establishment of an international network of dry and sub-humid areas of particular value for biodiversity.

16. Working group 4, chaired by Mr. Edison Wotho of Botswana, worked on the elaboration of agenda item 3.1.4, i.e., processes affecting biodiversity including conservation measures.

17. Working group 5, led by Mr. Lindsay Chong-Seng of the Seychelles addressed two issues of the agenda, i.e. item 3.1.5 on the global benefits derived from biodiversity and valuation of biodiversity; and item 3.1.6 on socio-economic impacts of biodiversity loss, including the interrelationship between biodiversity and poverty.

18. Working group 6, chaired by Mr. Syaka Sadio of FAO considered substantive issues 3.2.1 and 3.2.2, which are measures taken for the conservation and sustainable use of biodiversity, including the role of *ex situ* conservation, resource management and preventive measures; and measures taken for the support of sustainable livelihoods.

19. Working group 7, under the lead of Mr. Ndegwa Ndiang'ui of the UNCCD Secretariat, further substantiated item 3.2.3 of the agenda, namely the consideration of capacity development, and the need of some Parties for assistance in seeking resources to develop proposals.

20. Working group 8, chaired by Mr. Jan Valkoun of ICARDA, assessed international priorities set up at the regional and global levels, and made proposals for expected outcomes, further activities, possible actors, and timetables for action (substantive issues 3.3.1 and 3.3.2).

21. Mr. Ken Goodwill of the Indian Federated College presented a resource paper on the topic of biodiversity and Canada's aboriginal peoples during a plenary session.

22. The following report presents the work of each working group consecutively.

## ITEM 3. SUBSTANTIVE ISSUES

### *Summary of key recommendations*

23. For each working group a maximum of four key recommendations are distilled. The full set of recommendations made by each group is highlighted at the end of each working group report section.

***Working group 1: Biodiversity status and trends in dry and sub-humid lands.***

1. Ask parties of the CBD to provide to COP periodic assessments, e.g. every 8-12 years, of the status and trends of biodiversity in dry and sub-humid lands., paying particular attention to the areas of special interest cited in the General Considerations section. Such assessments will allow the CBD Secretariat to make a global analysis for these areas.

2. Establish guidelines for assessment and monitoring and to provide a report on the global status and trends of biodiversity of dry and sub-humid lands, by compiling and integrating, with the help of international organizations (e.g. UNEP, IUCN, FAO, CGIAR), relevant information, relating specifically to the needs of the CBD on dry and sub-humid lands.

3. Request the Millennium Ecosystem Assessment, GEO, FRA and LADA to pay particular attention to dry and sub-humid land biodiversity assessment.

***Working group 2: Indicators, monitoring and early warning systems.***

1. Ongoing and pending biodiversity indicator initiatives should explicitly address biodiversity indicators for dry and sub-humid lands, for example by extension of the project to include a country and relevant agency for which drylands comprise a significant focal ecosystem.

2. Environmental assessments such as the Millennium Ecosystem Assessment, Global Environment Outlook, and the Dryland Land Degradation Assessment, should make explicit reference to the biodiversity of dry and sub-humid lands in their activities relating to the development of indicators.

3. Countries should apply the Global Strategy for Plant Conservation (GSPC) targets in the development of their indicators, monitoring and national early warning systems, e.g. through integration in their NBSAP.

4. Capacity development is needed for dry and sub-humid ecosystems to help countries, particularly the least developed countries (LDC's), in the selection and monitoring of more functional indicators applicable to their local situation.

***Working group 3: Possible establishment of an international network of dry and sub-humid areas of particular value for biodiversity.***

1. Encourage the World Heritage Centre to commission a thematic study on dry and sub-humid lands in the context of development and implementation of the "global strategy" to improve the representativness of the World Heritage List.

2. Encourage the Ramsar Convention Bureau and the Convention's Scientific and Technical Review Panel to assess the extent to which the sites on the List of Wetlands of International Importance adequately cover all of the key wetlands in dry and sub-humid lands.

3. Encourage the MAB Secretariat and the Biosphere Reserves Advisory Board to review the existing biosphere reserves network to assess the extent to which the sites currently cover dry and sub-humid lands, with the intention of promoting further development of the network as appropriate.

4. With the previous recommendation in mind, convene a liaison group meeting at the next meeting of SBSTTA to address the issue of international site networks in the context of the Programme of Work on dry and sub-humid lands.

***Working group 4: Processes affecting biodiversity including conservation measures.***

1. National Biodiversity Strategies and Action Plan (NBSAPs) should be an integral part of poverty reduction strategies and linked directly to measures aimed at combating desertification (including NAPs) and sustainable development initiatives.

2. An appropriate policy for community-based environmental protection, including valuation of traditional knowledge should be implemented by country Parties.

3. In order to achieve the goals of sustainable livelihoods in dry and sub-humid lands the Maputo principles of sustainable use of biological diversity (UNEP/CBD/SBSTTA/7/INF/9), as applicable in both Conventions (CBD and UNCCD), should be adopted and applied.

***Working group 5: Global benefits derived from biodiversity and valuation of biodiversity; and socio-economic impacts of biodiversity loss, including the interrelationship between biodiversity and poverty.***

1. The application of all valuation tools requires considerable resources. Effective low-cost valuation tools should be developed. It should especially be considered how valuation studies based on benefit function transfer approaches could be adapted to the peculiarities of developing countries.

2. In assessing the socio-economic implications of biodiversity degradation, it is not sufficient to consider only the actual losses. The loss of opportunities that could be realized under changed policy frameworks, e.g. through the improvement of market access, should be considered.

3. It has to be recognized that most environmental degradation is not caused by the poor. It is a fallacy that poor people are primarily responsible for degradation of the environment, including biological diversity. Most environmental degradation is caused by the non-poor as a result of their production and consumption levels, which are much higher than those of the poor. (DFID et. al, 2002)

4. The poor often rely directly on the environment including biological diversity for their livelihoods. Biological diversity resources can therefore provide substantial opportunities to livelihood improvements and poverty alleviation. The poor are a valuable human resource themselves, responsible and capable for taking their own development into their hands. Efforts have to be directed to create a conducive and supportive environment, including enabling poor people to capitalize their traditional knowledge by identifying possible biodiversity products, developing them in high and marketable quality and marketing them successfully. (DFID et. al, 2002)

***Working group 6: Review of measures taken for the conservation and sustainable use of biodiversity, including the role of ex situ conservation, resource management and preventive measures; and measures taken for the support of sustainable livelihoods.***

1. A more comprehensive and systematic review of the success of measures taken should potentially be undertaken, e.g. in form of the collection of case studies. Country parties and collaborating organisations should be encouraged to submit such case studies. Incentive systems and/or mechanisms to facilitate the successful collection of case studies should be developed.

2. Explicit evaluation of the impact of measures taken should be carried out. The success criteria for such an evaluation should take set targets into consideration. Targets for the implementation of the programme of work, should take into account the Global Strategy for Plant Conservation, the Strategic Plan of the Convention as well as the WSSD Plan of Implementation.

3. Activities 7 to 9 of the programme of work are "targeted actions". These should be of high priority in the implementation of the programme of work as specified in the table of working group 8.

***Working group 7: Consideration of capacity development, and the need of some Parties for assistance in seeking resources to develop proposals***.

1. Needy countries in dry and sub-humid lands should be supported to raise the project development and management skills, the lack of which currently inhibit their ability to access the available and necessary financial support for their work on behalf of both the CBD and UNCCD. An on-going UNCCD initiative, in collaboration with other partners, to assist countries build their capacity for developing proposals for submission to funding agencies, such as GEF, could be expanded.

2. Recognizing national sovereignty, country Parties should realise their capacity needs and develop plans of action of how to address these in future. The National Capacity Self-Assessment (NCSA) exercise could be a useful vehicle for addressing these issues, as well at the NBSAP and NAP.

3. Capacity building, particularly at the national and local levels, as well as investments in the development and promotion of sustainable livelihoods, including alternative livelihoods and conservation measures, through participatory and bottom-up processes, with funding from bilateral sources, and catalytic support from international organizations, should take place.

***Working group 8:International priorities set up at the regional and global levels, and proposals for expected outcomes, further activities, possible actors, and timetables for action***

1. Success stories and best practices should be widely publicized and tested globally in relevant situations in joint collaboration between CBD and UNCCD and other Conventions/programme.

2. The synthesis table of expected outcomes and timeframes, potential actors, and indicators of progress in the implementation of the programme of work could be a useful vehicle for addressing international priorities, and should be adopted.

### *3.1. Working group 1: Consolidation and assessment of the status and trends of biodiversity of dry and sub-humid lands*

**Contents**



*Scope and context*

24. Decision V/23 of the Conference of the Parties directs the AHTEG to, *inter alia*, "consolidate and assess information on the status and trends of biodiversity of dry and sub-humid lands... [and] on indicators". Within the programme of work already agreed by the CBD Conference of Parties, and annexed to Decision V/23:

(a) Part A (paragraphs 5-7) deals with "assessments";

(b) The operational objective to which the listed activities respond is "*to assemble and analyse information on the status of the biological diversity of dry and sub-humid lands and the pressures on it, to disseminate existing knowledge and best practices, and to fill knowledge gaps, in order to determine adequate activities*";

(c) The directly relevant activities in the programme of work to status, trends and indicators are Activity 1, Activity 2 and Activity 3.

*Summary of the status and trends of biodiversity of dry and sub-humid lands*

*General considerations*

25. Dry and sub-humid lands comprise a very wide range of natural habitats, ranging from barren deserts and semi-desert with xerophytic plants, to grasslands and savannah, and many different kinds of scrubland, woodlands and forests. Dry and sub-humid land biodiversity is unique in its adaptation to survive and thrive in a highly variable climate of low rainfall and prolonged dry periods. The precipitation to evapo-transpiration ratio spans from less than 0.05 in hyperarid lands where it may not rain for periods of several years, to 0.50-0.65 in sub-humid lands with highly seasonal rainfall regimes but with little variation between years.

26. Two billion people (one third of the human population) rely on the resilience of dry and sub-humid land biodiversity to provide their daily needs. These people are particularly vulnerable to climatic fluctuations and biodiversity loss. Major uses of dry and sub-humid land biodiversity include existing crops and livestock and their wild relatives, potential new crops (e.g. salt tolerant species), wild foods, medicinal, aromatics and stimulants, ornamentals, pastoralism, soil stabilisation, and wildlife tourism.

Farming and pastoral systems in the harsh and stressful environments, particularly those in mountain areas, still mostly depend on a diversity of traditional crops, farmers' varieties (landraces) and local breeds. Therefore, significant genetic diversity of cultivated plants and domestic animals has been conserved by farmer and herder communities *in situ* and future conservation programs can be based on the local community efforts.

27. Biological diversity assessed in terms of species number tends to be moderate in semi-arid areas and to decline to low or very low levels as aridity increases. In contrast to this general rule, diversity in some groups such as scorpions and other predatory arthropods, tenebrionid beetles, ants, termites, snakes and lizards, and annual plants, tends at first to increase as aridity increases but to decrease at extreme desert conditions. Diversity at the genetic level in dry and sub-humid land species has been sampled very unevenly, but is well marked in some groups, particularly so in some desert plants where different forms of the same species may vary in karyotype or carbon metabolism. Important centres of crop origins and primary genetic diversity are found within semi-arid and sub-humid lands.

28. At present data is insufficient to determine whether species in dry and sub-humid lands are relatively more or less prone to extinction than elsewhere. However, in general dry and sub-humid land mammals tend to be relatively wide ranging but to occur at low population densities. Summary analysis of the habitat distribution of globally threatened mammals and birds shows that dry and sub-humid lands, scrublands and grasslands make up the second most important group of threatened species of mammals, and a high percentage of continental species believed or known to have become extinct since 1600 occurred in dry land ecosystems. Some critically endangered dry and sub-humid land species are listed in the *Global Biodiversity Outlook*.

29. From the five drivers leading to biodiversity degradation and loss identified by Sala et al (2000), two of them are particularly relevant for dry and sub-humid lands: climate change and changes of land use. Increasing water demand for an expanding urban population and for use in more intensive agro-industrial farming is predicted to lower water tables in arid regions, leading to increased desertification and biodiversity loss. Management malpractices, *inter alia* inflexible management under highly variable environmental conditions and reduction of the natural range of variability of abiotic and biotic factors, have led to important levels of biodiversity degradation and habitat loss. Biodiversity has been further reduced in many areas by the voluntary and involuntary introduction of alien invasive species.

30. Areas of special interest are rangelands, desert margins, species 'hot spots', protected areas, parklands/croplands, dry and sub-humid land forests, wetlands and oases, and mountains.

*Brief outline of status in the main ecosystems*

31. The distinction of four main types of ecosystems for this brief outline of the status of biodiversity in dry and sub-humid lands is due to the way in which most of the available information is conveyed.

32. ***Desert and semi-desert ecosystems:*** they are found in areas under hyper-arid to semi-arid climates. Evolution of considerable biodiversity and unique adaptations has taken place, including the evolution of highly adapted, endemic and gene pool rich organisms. Diversity of organisms depends on prevailing environmental gradients, and highly local influences may constrain species richness more directly than any larger-scale geographic factor. High spatial and temporal variability in occurrence of desert organisms makes it difficult to design meaningful studies of status of biodiversity and inventories, especially for purposes of comparison among sites. The lack of protection of many desert biota persist despite a growing recognition of extremely high diversity and relative endangerment of certain groups.

33. ***Mediterranean-type ecosystems:*** they are found in areas under arid to sub-humid climates. Mediterranean-climate regions have an unusual number of biomes and biome boundaries. Species

richness and endemism in Mediterranean ecosystems is particularly high, with countries around the Mediterranean basin holding some 25,000 vascular plants (10 % of the known vascular plants) of which around 60% are endemic. Biodiversity is threatened by a combination of factors including: small geographic extension, fragmentation of natural ecosystems, high population density, abandonment of traditional practices, and development of tourism-related infrastructures and activities. Many endemic and rare species from these ecosystems have very localized distributions, and are now localized in parks and preserves, or in fragments of relatively undisturbed habitat surrounded by degraded or altered landscapes, leaving little place for migration in response to climate change.

34. ***Savannas (with main focus on tropical savannas):*** they are found in areas under semi-arid to sub-humid climates. Savannas host very distinctive plant and animal communities where diversity tends to increase towards the tropics. The savannah communities of East Africa, for example, are typified by large herds of ungulate herbivores including more than 70 species of antelope and other medium to large sized bovids. All these systems hold an array of native herbivores and these in turn support a number of high profile mammals and avian predators. In Africa, India and south Asia remarkable primary land conversion changes have taken place over the past centuries, and the intensity of dry and sub-humid land use is likely to increase in the future. However, there are few potentially arable areas left that have not already been converted to agriculture or are used extensively as rangelands. In South America and Australia the majority of the savannas is under extensive forms of use, predominantly in form of extensive livestock husbandry. Knowledge of species in the savanna biome as a whole is poor, and there is no good estimate for total species numbers. However, diversity is very high in all cases because of the multiple life form structure of savannas and their variable climate.

35. ***Grasslands (with main focus on temperate grasslands)****:* they are found in areas under semi-arid to sub-humid climates. In many areas, grasslands occur in areas that were formerly forested and that have been cleared for agricultural purposes over the past centuries. Temperate grasslands have been and will continue being prime locations for agriculture. A large fraction of grasslands has consequently been transformed into croplands, which is an activity that brought along many alien plant species and their associated animals. Biodiversity patterns within the grassland biome vary enormously, with many native types of grassland having levels of diversity as high as those characteristics of tropical forests. At very fine spatial scales, natural grasslands are among the most species-rich habitats on Earth. Up to 80 plant species have been identified in a square metre in the Central Asian steppe, and 42 plant species in a quarter of a square metre in pine savannah on the United States Atlantic Coastal Plain. It is prognosed that the total area of grasslands will remain fairly constant, although with significant losses and gains. The losses represent native grasslands that are converted into urban or agricultural land. The gains come from agricultural land that has been abandoned and forests that are being cut down. It is envisaged that in the Northern USA land will revert to the natural states, whereas in South America will be converted into agricultural lands. It is noted that loss of biodiversity in one part of the world, due to conversion of grasslands into agriculture, are not compensated by abandoned fields in another part of the world because of the differences in biota being lost or gained.

*Limitations for the assessment of trends of biodiversity in dry and sub-humid lands*

36. One important limitation in the estimation of trends of biodiversity in dry and sub-humid lands is the scale, since trends and scenarios estimated at the global scale mask specific differences among ecosystems. And the same applies at the ecosystem level: while some areas of a given ecosystem are being abandoned (e.g. agricultural lands in Mediterranean-type ecosystems, temperate grasslands in North America) so biodiversity is recovering, other areas of the very same ecosystem (e.g. coastal lands in Mediterranean-type of ecosystem, temperate grasslands in South America) are severely affected by human activities (e.g. tourist-related development and intensive agriculture respectively). In general, there is a remarkable lack of reliable information to establish trends in biodiversity, which is evidenced by the lack of publications with species-area curves for desert and arid regions. This is due not only to the limited funding available for research, assessment and monitoring of biodiversity in these areas, but also

to the impact of the high temporal variation on sampling, which has been shown in the few long-term ecological research programmes existing for dry and sub-humid lands (e.g. in northern Chihuahuan desert of New Mexico). Trends estimated from a single sampling season are totally different from those estimated for data accumulated over several years.

*Monitoring and periodic assessments of status and trends*

*Needs for and means of implementation*

37. The AHTEG agreed on the need of a periodic dry and sub-humid lands assessment to be carried out in an analogous way to the FRA of Food and Agriculture Organization, or other already existing global environmental assessments, although adapted to the specific case of biodiversity of dry and sub-humid lands. In general, comprehensive information on the biodiversity of dry and sub-humid lands is severely lacking, due at least in part to the fragmented nature of these lands.

38. A periodic dry and sub-humid land assessment could be achieved by:

(a) Strengthening Global Land Degradation Assessment to include greater specific reference to biodiversity

(b) Development of the FRA to strengthen its focus on biodiversity (a process which is already underway, but will only provide information on biodiversity associated with forest ecosystems)

(c) Strengthen the Global Enviornment Outlook process, for example to include national reporting rather than purely regional assessments as at present; this might require a change to UNEP's mandate

(d) Strengthening of the Millennium Ecosystem Assessment in relation to its coverage of biodiversity of dry and sub-humid lands, and ideally including increased emphasis on primary data collection (which would require a change to the MA's current focus)

(e) Creation of an entirely new assessment process (unlikely to be welcomed by the donor community)

39. Admitting that these periodic assessments can deliver important information, there is still a need for continuous monitoring and evaluation of trends as a more cost-effective measure.

40. During continuous monitoring, it will be possible to refine pilot projects and research priorities, such as to develop appropriate data bases at the national level to allow for regional and global assessments, and to identify criteria and indicators for the evaluation of biodiversity in dry and sub-humid lands.

*Review of existing assessments*

41. Global Terrestrial Observing System (GTOS) is a programme for observations, modelling and analysis of terrestrial ecosystems, acting as a network, facilitating access to information, in particular from networks of long-term monitoring and research. GTOS would encourage the use of their programme to address particular issues relevant to dry and sub-humid land monitoring and assessment.

42. The UNCCD has established Thematic Programme Networks (TPNs) with the objective of supporting the implementation of the Regional Action Programmes to Combat Desertification. On the thematic area of assessment of status and trends of natural resources, in Africa there is a TPN on ecological monitoring, natural resources mapping, remotes sensing and early warning systems, whereas in Asia the TPN on Desertification Monitoring and Assessment is responsible for the same activities. The

TPNs work within the areas under the jurisdiction of the UNCCD, and therefore the biodiversity of dry and sub-humid lands is clearly within their mandate.

43. The IUCN Red List Programme in general and particular assessments, such as the global reptile assessment to be launched in 2003, are useful sources of information for the assessment of status and trends of biodiversity in dry and sub-humid lands.

44. Twelve Global Environmental Assessments (GEAs) have been selected for a detailed review, on the basis that they have a global coverage and a primary focus on assessment of the natural environment in relation to human development needs. The GEAs covered in this report, which covers most of the global initiatives with strong UN involvement, are listed on Table 1.

**Table 1.** *List of Global Environmental Assessments*

| ***Assessment name*** | ***Lead organiza-tion*** | ***Scope*** | ***Scale*** | ***Timetable*** | ***Website*** |
|---|---|---|---|---|---|
| Dryland Land Degradation Assessment (LADA) | FAO | Drylands | Global, regional | In development from 2001. | http://www.fao.org/ag/agl/agll/lada/default.stm |
| Forest Resources Assessment (FRA) | FAO | Forests | Global, regional, national<br>Global, regional, national | FRA 2000 Every 10 years.<br>Bi-annual reports. | http://www.fao.org/forestry/fo/fra/index.jsp |
| Global International Waters Assessment (GIWA) | UNEP | International (transboundary) waters | Global, regional | 1999 - 2002 | http://www.giwa.net/ |
| Global Environment Outlook (GEO) | UNEP | Environment | Global, regional | GEO-3 report 2002, bi-annual | http://www.unep.org/GEO/index.htm |
| Intergovernmental Panel on Climate Change (IPCC) | IPCC | Climate Change | Global, regional | 3rd report 2001 | http://www.ipcc.ch/ |
| Millennium Ecosystem Assessment (MA) | UNEP | Ecosystems – Goods & Services | Global, regional, national, local | 2001 – 2005 | http://www.millenniumassessment.org/ |
| World Resources Report (WRR) | WRI | Environment (themes) | Global, regional | Bi-annual | http://www.wri.org/wr2000/ |
| World Water Assessment Programme (WWAP) | UNESCO | Freshwater | Global, regional, basins | 2000, 1st Report 2003 | http://www.unesco.org/water/wwap/ |
| State of the world's plant genetic resources I and II | FAO | Plant genetic resources | Global, regional, national | 1996 (I)<br>2007 (II) | http:/www. |
| State of the world's animal genetic resources | FAO | Animal genetic resources | Global, regional, national | 2005, country report 2003 | |

| *Assessment name* | *Lead organiza-tion* | *Scope* | *Scale* | *Timetable* | *Website* |
|---|---|---|---|---|---|
| Comprehensive assessment of the status and trends of the agricultural biodiversity | SCBD, FAO, MA | Agricultural biodiversity | Global, regional national | 2007, Preliminary assessment 2003, Draft full assessment 2005 | |
| State of the world's traditional knowledge on biodiversity | CBD – Article 8 (j) process | Indigenous knowledge on biodiversity | Global | 2003 | |

45. The amount of information available concerning these assessments is influenced by the different stages of development of the GEAs.

46. Differences between GEAs exist with respect to scope and timing (Table 1).

47. It is important to note that none of the GEAs considered here were explicitly designed for assessment of biodiversity in dry or sub-humid lands. Their relevance to this theme depends on their breadth of coverage, illustrated on Table 2. From this comparison it may be noted that most of the assessments provide little or no information about biodiversity and its conservation, and none of these assessments has an explicit focus on dry and sub-humid lands, with the exception of LADA.

***Table 2***. *Coverage of global environmental assessments*

| *Assessment* | *Biodiversity levels and components* | *Conservation actions and threats* |
|---|---|---|
| Millennium Ecosystem Assessment (MA) | Primarily ecosystems, but will probably also address species diversity | Comprehensive assessment of pressures and response options |
| Global International Waters Assessment (GIWA) | Primarily ecosystems | Overview provided of relevant action relating to international waters; little focus on threats |
| Global Environmental Outlook (GEO) | Primarily ecosystems | Some threats considered in detail particularly in regional reports; comprehensive overview of threats at global scale; limited coverage of actions |
| Forest Resources Assessment (FRA)<br><br>State of the World Forests | Primarily ecosystems | Limited coverage of threats; detailed coverage of some response measures |
| World Water Assessment Programme (WWAP) | Ecosystems | Will include some reference to pressures on inland water ecosystems; also framework for action |
| Intergovernmental Panel on Climate Change (IPCC) | Primarily ecosystems and species | Explicit focus on climate change impacts and responses |
| Dryland Land Degradation Assessment (LADA) | Ecosystems | Explicit focus on causes of degradation |
| World Resources Report (WRR) | Ecosystems | Overview of threats provided; some reference to action |
| State of the world's plant genetic resources | Species and genetic diversity | Overview of the threats provided, Global Plan of Action developed and approved in |

| *Assessment* | *Biodiversity levels and components* | *Conservation actions and threats* |
|---|---|---|
| | | Leipzig Conference in 1996 |
| State of the world's animal genetic resources | Species and genetic diversity | Overview of threats provided |
| Comprehensive assessment of the status and trends of the agricultural biodiversity | Species and genetic diversity | Overview of threats and trends provided |
| State of the world's traditional knowledge on biodiversity | Ecosystems and species | |

48. In conclusion, the MA would appear to be the GEA with greatest value as a potential source of information about status and trends in biodiversity of dry or sub-humid lands. It is not yet clear the extent to which information relating to dry and sub-humid land biodiversity will be provided by the Millennium Ecosystem Assessment, particularly with respect to biodiversity components other than ecosystems.

49. Extraction of relevant information will require thorough inspection of outputs provided by the GEAs, and recompilation of relevant information, as at present, the information is typically organized under a variety of different themes. A provisional overview of information availability presented in table 3.

50. In addition to the global assessments listed in the tables 1 and 2, centres of the CGIAR system have conducted several global assessments, specific to segments of agricultural biodiversity using CGIAR databases, such as SINGER (System-wide Information Network on Genetic Resources) and Global Databases on Wheat Wild Relatives and Mediterranean Forage and Pasture Legumes developed by IPGRI and ICARDA.

***Table 3***. *Data availability of global environmental assessments*

| *Assessment* | *Extent to which dry and sub-humid land-relevant information can be extracted* |
|---|---|
| Millennium Ecosystem Assessment (MA) | No outputs yet produced; scheduled for 2003 / 2004. Specific chapters relating to dry and sub-humid lands will probably be included in 'Condition and trends' report |
| Global International Waters Assessment (GIWA) | Assessments of 66 international waters; information available regionally via website; some of these regions encompass dry and sub-humid lands |
| Global Environmental Outlook (GEO) | GEO-3 report and supporting internet resource launched in early 2002. Issues relevant to dry and sub-humid lands are divided among several chapters of the main report. |
| Forest Resources Assessment (FRA)<br><br>State of the World Forests | Global FRA report launched in 2001, with supporting internet resource. Forest data available grouped by ecological zone, which includes dry and sub-humid land zones |
| World Water Assessment Programme (WWAP) | 3rd World Water Development Report currently under preparation. Unclear at the present time how dry and sub-humid land-specific information will be made available |
| IPCC – Third Assessment Report | No specific output relating to dry and sub-humid lands but relevant information included in many of the IPCC reports |
| Dryland Land Degradation Assessment (LADA) | All information to be generated will be dry and sub-humid land-relevant; no outputs delivered so far |

| *Assessment* | *Extent to which dry and sub-humid land-relevant information can be extracted* |
|---|---|
| World Resources Report | Report currently under preparation; structure unknown; previous report did not have a specific section relating to dry and sub-humid lands but included information relevant to dry and sub-humid lands within a number of sections |
| State of the world's plant genetic resources | Considered and partially underway under the programme of work on agrobiodiversity, in collaboration with FAO; includes dry and sub-humid lands aspects |
| State of the world's animal genetic resources | Considered and partially underway under the programme of work on agrobiodiversity, in collaboration with FAO; includes dry and sub-humid lands aspects |
| Comprehensive assessment of the status and trends of the agricultural biodiversity | Considered and partially underway under the programme of work on agrobiodiversity, in collaboration with FAO; includes dry and sub-humid lands aspects |
| State of the world's traditional knowledge on biodiversity | |

*Identification of main gaps*

51. Gaps would be easier to identify if the compilation of information from existing assessments were complete. However, based on the preliminary assessment provided here, gaps in existing assessments could include:

(a) No comprehensive assessment is available of patterns of species diversity at the national level in countries of dry and sub-humid lands

(b) No assessment is available of which dry and sub-humid land areas or ecosystem types are particularly vulnerable to environmental change

(c) Little or no reference to genetic diversity is available in current assessments

(d) Little reference is available of the value of ecosystems as habitat for species (eg habitat fragmentation, vegetation cover etc.)

(e) There is no comprehensive assessment of threats / pressures of particular relevance to dry and sub-humid lands (for example, fire, grazing intensity, fuelwood extraction etc.).

(f) There are no spatial data on key response measures such as protected areas, restoration / rehabilitation initiatives.

(g) No assessment is being made of the potentials or priorities for ecological restoration or rehabilitation of dry and sub-humid lands.

*Conclusions*

52. Dry and sub-humid lands sustain one third of the human population, and the population in these areas is rapidly expanding, which increases water demands dramatically. There is scientific evidence to support that land use changes coupled with climate change will have profound repercussions in the ecosystems of these areas, posing important threats to their biodiversity.

53. Current assessments and monitoring activities are not enough for scientifically sound management practices towards a sustainable development of most dry and sub-humid lands, and the current knowledge required for estimating trends is even more scant.

54. Differences in the environmental and land use conditions among the different dry and sub-humid land ecosystems plus the high local levels of environmental heterogeneity strengthen the need for regional assessment and monitoring of biodiversity.

*Recommendations*

1. To look for ways and means to collect information on assessment possibilities at regional and national levels.

2. To ask Parties to the CBD to provide to COP periodic assessments, e.g. every 8-12 years, of the status and trends of biodiversity in dry and sub-humid lands, paying particular attention to the areas of special interest cited in the General Considerations section. Such assessments will allow the CBD Secretariat to make a global analysis for these areas.

3. To include, in it's programme of work, priorities for ecological restoration or rehabilitation of dry and sub-humid lands (case studies on integrated ecosystem management and ecological restoration, leading to identification of best practices).

4. To establish guidelines for assessment and monitoring and to provide a report on the global status and trends of biodiversity of dry and sub-humid lands, by compiling and integrating, with the help of international organizations (e.g. UNEP, IUCN, FAO, CGIAR), relevant information, relating specifically to the needs of the CBD on dry and sub-humid lands.

5. To encourage countries to undertake continued monitoring in addition to periodic assessment as a way to unambiguously establish trends.

6. To request the Millennium Ecosystem Assessment, GEO, FRA and LADA to pay particular attention to dry and sub-humid land biodiversity assessment.

7. That the CBD Secretariat liaise with the GTOS Secretariat and the TPNs of UNCCD to identify how its collaborating network of sites and institutions might contribute to monitoring, assessment and early warning in each of the biomes for which there are currently Programmes of Work.

*References*

Sala, O.E., Chapin III, F.S., Armesto, J.J., Berlow, E., Bloomfield, J., Dirzo, R., Huber-Sannwald, E., Huenneke, L.F., Jackson, R.B. et al., 2000. Global biodiversity scenarios for the year 2100. Science, 287: 1770-1774

### *3.2. Working group 2: Indicators of biological diversity in dry and sub-humid lands, monitoring and early warning systems*

**Content**



*Background*

55. Biodiversity indicators are information tools, summarizing data on complex environmental issues to indicate the overall status and trends of biodiversity. They are also quantitative measures against which aspects of policy performance can be measured, therefore enabling the assessment of national performance and to signal key issues to be addressed through policy interventions and other actions.

56. At its second meeting, the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) of the Convention on Biological Diversity (CBD) recognized the importance of monitoring and assessment of biological diversity, particularly with regard to the implementation of Article 7 of the Convention on identification and monitoring.

57. In this context, one of the tasks requested to the AHTEG by the Conference of the Parties in paragraph 7 of decision V/23 and SBSTTA recommendation VII/3 include consolidating and assessing information on indicators of biodiversity loss, monitoring and early warning systems.

*The 2010 target*

58. When the Ministers responsible for the implementation of the Convention on Biological Diversity met in The Hague on 17 and 18 April 2002, on the occasion of the sixth meeting of the Conference of the Parties, they resolved to "strengthen…efforts to put in place measures to halt biodiversity loss…at the global regional, sub-regional and national levels by the year 2010".

59. The Ministerial Declaration was communicated to the World Summit on Sustainable Development, which met in Johannesburg, South Africa, 26 August to 4 September 2002. The Plan of Implementation agreed by the Summit for achieving sustainable development, recognised the critical role of biodiversity, and implicitly endorsed the 2010 target of a significant reduction in the current rate of loss of biodiversity.

60. Therefore a clear mandate for assessing status and trends in biodiversity exists, and now the following questions need to be addressed:

- How will we know whether or not the proposed target has been achieved in 2010?
- What actions need to be taken in the context of the Programme of Work on Dry and Sub-humid Lands to ensure that the extent to which the target has been achieved within the biomes covered by this programme is known?

61. These questions clearly set the grounds for the need to develop relevant indicators and monitoring programmes at the national and international levels.

*Biodiversity indicator conceptual framework: the information iceberg*

62. Each species or a measurable parameter has a certain indicator value, but this does not mean that it could automatically serve as a useful and meaningful indicator amongst a myriad of national indicator set. To list some of the criteria for identifying proper indicators, they need to be relevant, measurable, of analytical value, representative, reliable and feasible.

63. The Iceberg Model could serve as a conceptual framework in creating an appropriate national indicator set. The basic idea of the Iceberg Model is to define a set of indicators at different level of aggregation. The model comprises as follows:

- a Headline indicator set;
- a Core indicator set; and
- Inventories (basic scientific datasets)

***Headline indicators*** are mainly communication tools for political decision makers and the general public (e.g. National Biodiversity Index). These indicators could also be linked to the main CBD objectives and targets. These headline indicators are located above the sea level at the tip of the iceberg.

***Core indicators*** are highly aggregated indicators derived from analysing national inventories (such as keystone species e.g. birds of prey) and are of high analytical and explanatory value.

***Inventories*** are needed to deliver systematic data (for example plants, animals, soil parameters) providing the scientific basis of the whole indicator model.

64. The iceberg model only works properly if the iceberg is able to "float" with the support of the underlying core indicators and inventories. Inventories and core indicator sets provide scientific buoyancy to make headline indicator meaningful and visible for decision makers and the general public. The common pitfall when discussing indicator systems is that decision makers are mainly interested in the most significant headline indicators, and without sufficient scientific support of core indicators and species inventories, those headline indicators can prove to of little use (see Figures 1 and 2).

65. The suggested indicators in Figure 1 are to be understood as examples of possible indicators reflecting the level of aggregation and complexity pertaining to the term "biodiversity" (e.g. the issue of biodiversity degradation and cultural identity might be indicated by the number of herbalist or the number of remaining sacred sites). The iceberg model stresses that most of the efforts needed for producing good indicators and indices happen "under the surface".

66. Generating a National Indicator System (targeting the objectives of the CBD in the drylands context for example) is a long-term and resource-intensive process. It includes defining objectives and criteria for indicator selection, interdisciplinary scientific discussion, evaluation of accessible representative datasets, testing the chosen indicator sets, capacity building and financial funding.

67. Many preliminary or ongoing initiatives on biodiversity indicators have shown that currently available indicators do not fully reflect the status and trends of the many facets of biodiversity issues in an ideal or efficient way. However some core biodiversity indicators have performed well in practice but more on local and regional levels. In this context, the iceberg model has to be regarded as an aid to conceptual thinking in what is needed at different levels of indicator development.

68. Applying the step-by-step procedure each country should start at their respective starting points where existing and readily accessible scientific data and inventories exist, and subsequently identify and fill the gaps. However, careful considerations should be given in balancing the efforts invested in monitoring biodiversity degradation and the funding of measures improving biodiversity in the field.

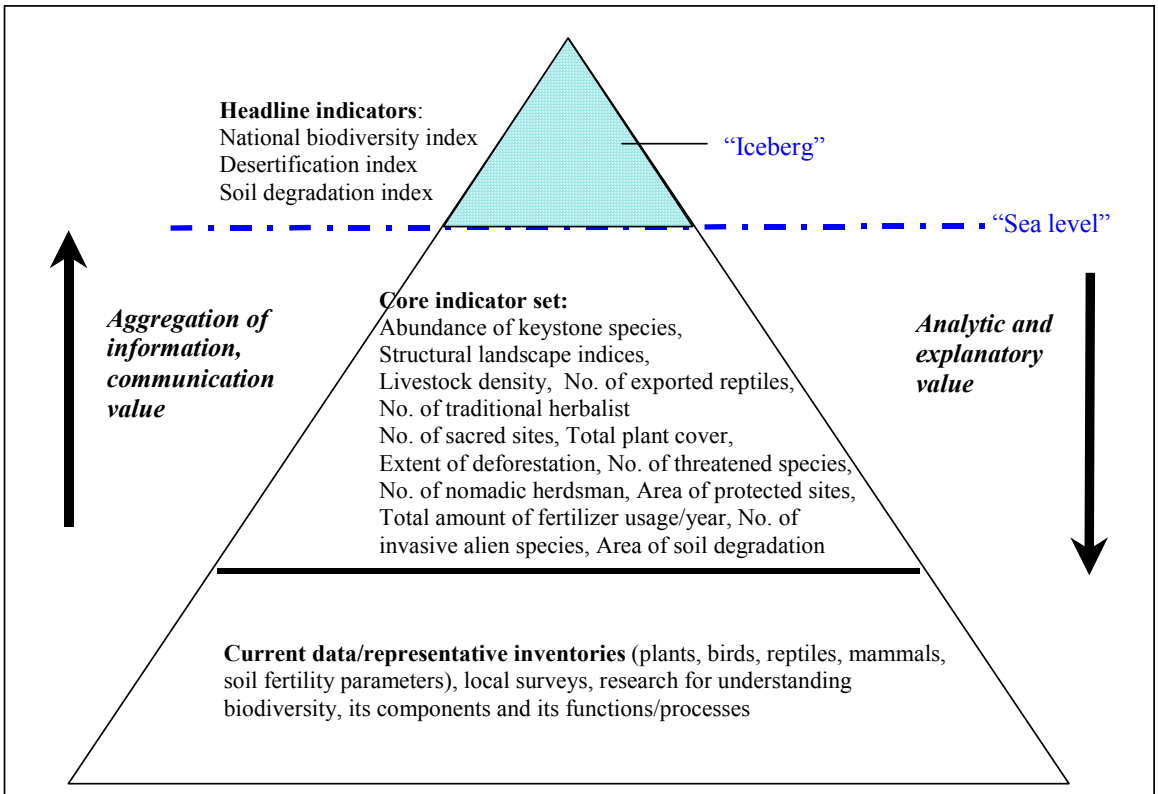



Figure 1: The Iceberg Model adapted from the EC (1999)

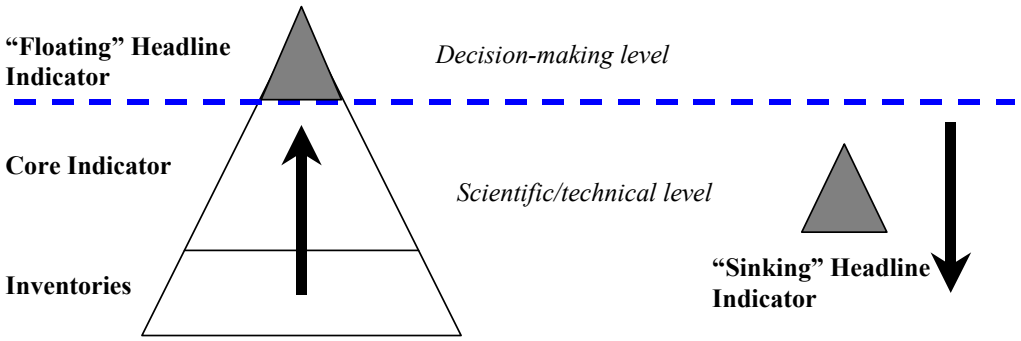



Figure 2: Useful "floating" headline indicator with support of good core indicator and scientific inventories (left) versus meaningless "sinking" headline indicator without the support of rigid core indicator and inventories (right).

*CBD biodiversity indicator development process*

69. The Convention requires development of indicators to monitor the status and trends of biological diversity, and more specifically the Conference of the Parties (COP) has requested that a core set of

indicators be developed and used, through a two-track approach, for national reporting and in the thematic areas important to the Convention (COP 4 decision VI/1 A).

70. In response to this mandate, two liaison group meetings were subsequently held and a full background document on a core set of indicators of biodiversity was drafted as document UNEP/CBD/SBSTTA/3/INF.13. The report advocates a two-track approach to assessment and indicator development: in the short term assessment of reasonably well-known sectors and components of biological diversity should be carried out, making use of indicators known to be operational; at the same time longer term programmes should be developed involving research and capacity building in areas needing advances in knowledge.

71. The SBSTTA recommendation that was endorsed by the Conference of the Parties (COP) stressed that the primary role of indicators in this context should be as a tool for management of biological diversity at local and national level and for assessing implementation of the Convention (SBSTTA recommendations III/5 and VI/11 adopted at COP 4 and 6 respectively). However, it also recognized in SBSTTA recommendation V/11 (and subsequently endorsed at COP 5) that they may have a wider role and noted that in future the development of regional and global indicators would be necessary to address specific aspects of the world's biological diversity.

*Initiatives on biodiversity indicators*

72. Past, ongoing and planned initiatives on developing biodiversity indicators at the international and regional levels. However, little has been done in the context of dry and sub-humid land and there is a need for development and testing of national biodiversity indicator framework specifically in relation to dryland ecosystems. Table 1 summarises some of these initiatives.

**Table 1:** *Summary of some relevant ongoing indicators initiatives, relevant to dry and sub-humid lands*

| ***Organization & collaborators*** | ***Initiative title*** | ***Indicator elements*** | ***Drylands component*** |
|---|---|---|---|
| OECD | To be added | To be added | To be added |
| World Bank | To be added | To be added | To be added |
| UNCCD | Ad hoc panel on Benchmarks and Indicators | Desertification indicators | Some desertification indicators could be applicable |
| UNEP-WCMC, GEF, RIVM, (CBD) | Biodiversity Indicators for National Use | Ecuador - forest ecosystems;<br>Kenya - wetland ecosystems;<br>Philippine – coastal and marine ecosystems;<br>Ukraine - agrobiodiversity. | Kenya wetlands could incorporate |
| Royal Society | Measuring Biodiversity | Increasing baseline knowledge of biodiversity and measuring biodiversity | Could be incorporated |
| IUCN | Red List Programme | Developing a system of global biodiversity indicators using the red list as a base. | Could be translated to dryland ecosystem specific application) |

| *Organization & collaborators* | *Initiative title* | *Indicator elements* | *Drylands component* |
|---|---|---|---|
| FAO | Agobiodiversity indicators | To be added | To be added |
| LADA | | To be added | To be added |
| IGBP | Biodiversity workshop (July 2003) | To be added | To be added |

*Dry and sub-humid lands biodiversity indicators*

73. The first meeting of the AHTEG on dry and sub-humid lands (UNEP/CBD/COP6/INF/39) agreed that it was important to promote the development and testing of indicators at the national level, and to promote the sharing of experience. Compilation of case studies from contracting Parties would be useful in this regard. In addition there is a need for development and testing of national biodiversity indicator frameworks specifically in relation to dryland ecosystems.

74. Although a selection of biodiversity indicators have been developed, especially at the international level, those that could be applied in the drylands context are not readily available.

75. In this light, the United Nations Convention to Combat Desertification (UNCCD) has convened an *ad hoc* panel for the purpose of developing benchmarks and indicators for desertification monitoring and assessment. The proposed indicator system includes four aspects: pressure, state, impact and implementation.

76. Pressure indicators characterise driving forces both natural and man-made, affecting the status of natural resources and leading to desertification and subsequently biodiversity loss. They will be used to assess desertification trends and for early warning. State indicators characterise the status of natural resources including land. Impact indicators will be used to evaluate the effects of desertification on human beings and environment (or biodiversity). Implementation indicators will be used to assess the actions taken for combating desertification and to assess its impacts on natural resources and human beings. The framework of state indicator is based on three aspect, namely agro climatic region, land use and degradation process. For the pressure, impact and implementation indicators, the framework of the proposed indicator system is in reference to the agro climatic regions.

77. In the context of biodiversity indicators in dry and sub-humid lands, pressure and state indicators can be considered as applicable examples (Table 2).

**Table 2:** *Some examples of pressure and state indicators potentially relevant to dry and sub-humid lands*

| | | |
|---|---|---|
| **Pressure Indicators** | Non-natural indicators: Socio-economic | Population density<br>Education status<br>Livestock density<br>Forest felling<br>Fuel and fodder consumption/supply<br>Collection of medicinal plants<br>Shifting cultivation<br>Diminishing of water resources<br>Land management practices |
| | Natural indicators: Climatic natural disasters | Rainfall<br>Temperature<br>Wind<br>Humidity<br>Potential evapotranspiration<br>Solar radiation<br>Cloud cover |
| **State Indicators** | Physical indicators | Erosion status of land<br>Salinity/alkalinity<br>Shifting in sand sheet/and dunes<br>Water logging<br>Soil moisture<br>Soil types and properties<br>Stone coverage/barren rocky area<br>Number and spread of water bodies<br>Groundwater status<br>Turbidity of water bodies |
| | Biological indicators | Types of vegetation<br>Species composition of vegetation<br>Condition and coverage of vegetation<br>Biomass and productivity of vegetation<br>Crop area and yield |

78. A case-study in Namibia illustrating examples of indicators at work in dryland situation also sheds lights on possible development of biodiversity indicators at the national level in dry and sub-humid ecosystem. They have developed the following indicators for desertification:

| Headline Indicators | Primary (Core) Indicators |
|---|---|
| Desertification | Population pressure<br>Livestock pressure<br>Rainfall index<br>Erosion risk index |

79. In addition, their national level monitoring system was developed through the following steps:

- Identifying methods used for monitoring of desertification in Namibia and elsewhere
- Developing a logical framework for causes and effects of desertification
- Developing potential indicators for desertification monitoring
- Gathering of data and developing a GIS based system that can produce annual updates
- Refinement of primary indicators and GIS system

*Monitoring and early warning systems*

80. Indicators give direction to monitoring programmes, which allows tracking of the trends in biodiversity thus providing the basis for establishing early warning systems. For early warning systems to function, thresholds need to be quantified at the national level, and a pre-defined action plan is needed in case this limit of acceptable change in biodiversity is exceeded. An illustration of the relationship between indicators, monitoring and early warning mechanism is depicted below in figure 3.

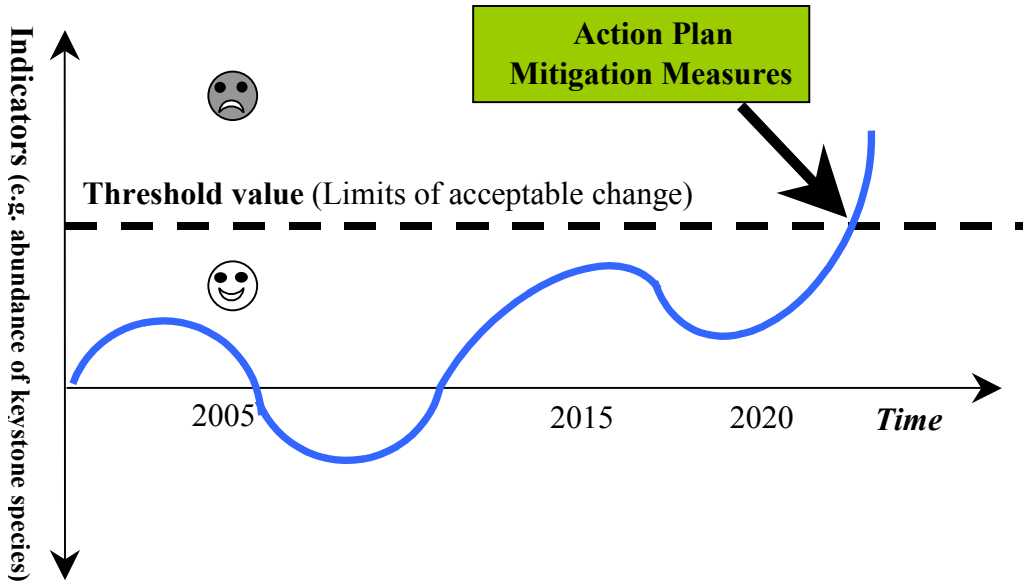



Figure. 3: General model of an early warning system (*Federal Environmental Agency Vienna, 1997*)

81. Noting the Global Plant Conservation Strategy (GPCS) adopted at the recent COP (decision VI/9) where a number of quantitative targets have been agreed, these targets can be used as biodiversity loss thresholds in early warning systems.

82. To operationalise the monitoring and early warning systems and to promote the sharing of experiences, it is necessary to establish a mechanism where information gathered at the national level be collected at a central body. This can be taken up in the form of the State of the Environment initiative implemented on a voluntary basis.

83. It is also essential to adopt a multi-disciplinary approach, involving several relevant disciplines and institutions at the country level, in order to develop and establish effective and efficient early warning system suitable to the end-user.

84. Remote sensing data and field date could be used to analyse and map vulnerability to desertification and land degradation and thus loss of biodiversity in the Geographical Information System (GIS) environment. GIS technology can be utilized in handling several layers of huge data sets during the analysis.

85. Traditional knowledge must be incorporated into the data analysis system, and more emphasis should be given to such knowledge, especially where data generation through high technology may be difficult; this will help to validate the information and to obtain feedback.

*Summary of conclusions*

86. Within the CBD process, targets for curving biodiversity loss have been agreed and subsequent need for developing national-level monitoring programmes and indicators have been recognized.

87. The Iceberg Model provides a conceptual framework to indicator development and emphasises the need to have sound "underlying data" to obtain quality headline indicators for the decision makers.

88. Conserving biodiversity needs measures on the ground and documentation and assessment on whether the measures have succeeded or not. While measures on the ground are a direct tool to mitigate biodiversity degradation, the benefits of documentation (indicators, monitoring) are indirect and delayed in time.

89. As sound science provides the overall basis for indicator systems and early warning, obtaining relevant data and biodiversity research need to be encouraged, harmonized and funded.

90. Indicators are imperative in designing monitoring programmes, early warning systems and action plans. These processes require a multi-disciplinary approach and partnerships between different disciplines that strengthen cooperation and transparency will therefore advance the work.

*Recommendations*

1. Encourage SBSTTA to recommend on-going and pending biodiversity indicator initiatives to explicitly address biodiversity indicators for dry and sub-humid lands, for example by extension of the project to include a country and relevant agency for which drylands comprise a significant focal ecosystem.

2. Encourage SBSTTA to recommend that environmental assessments such as the Millennium Ecosystem Assessment, and the Dryland Land Degradation Assessment, include explicit reference to the biodiversity of dry and sub-humid lands in their activities relating to the development of indicators.

3. Encourage countries to apply the GPCS targets in the development of their indicators, monitoring and national early warning systems

4. Periodically the indicators of the monitoring systems should be updated in order to incorporate new variables or new approaches allowing for a better monitoring capacity, while at the same time maintaining the ability to look at long-term trends and ensuring continuity between existing and new indicators

5. SBSTTA should seek to develop a classification of environmental indicators that are standardized for plants, soil, inland waters and marsh lands for users at the regional and national levels.

6. Indicators for dry and sub-humid lands exist; however, the information is scattered due to certain specific research projects, and other special interest groups keeping the information in their respective organizations. Therefore, SBSTTA should advise that indicators specific to dry and sub-humid lands are brought together in one text to advance the development and usefulness of important parameters.

7. Encourage SBSTTA to advise on greater partnership with the private sector at the national and local level for implementation, monitoring, assessing and reporting on indicators and early warning systems.

8. It is recommended that SBSTTA seek to establish standard baselines for the major dry and sub-humid ecosystems, which can serve as a starting point for field officers.

9. Encourage Parties to the Convention to assign a dedicated resource to further the work on national-level indicators and early warning systems.

10. Capacity development is needed for dry and sub-humid ecosystems to help countries, particularly the least developed countries (LDC's), in the selection and monitoring of more functional indicators applicable to their local situation.

### *3.3. Working group 3: Possible establishment of an international network of dry and sub-humid areas of particular value for biodiversity*

**Contents**



*Preamble*

91. COP Decision V/23 directs the AHTEG to, *inter alia*, "consolidate and assess information … on the possible establishment of an international network of dry and sub-humid areas of particular value for biodiversity".

92. There are two possible interpretations of the concept of an "international network", either or both of which would be relevant to implementation of the draft programme of work annexed to COP Decision V/23. These are:

(a) A network of *sites* important for the conservation of biological diversity in dry and sub-humid lands (whether that importance is assessed in terms of protection, demonstration or research); and

(b) A network of *institutions* and/or *individuals* working in dry and sub-humid lands, established to share information and experience.

93. There is already a considerable experience with the establishment of networks of internationally recognized sites, both at global and regional levels. These various networks have differing objectives ranging from cooperation in science and management practice, to recognition of global or regional importance for a particular range of features.

94. Networks of institutions and/or individuals working together with a clear purpose and objectives can be a powerful mechanism for sharing knowledge, information and experience, and coordinating research and other action on the ground, and many such networks already exist. The site networks are often based on, or closely linked to, collaborative networks of institutions and individuals.

95. There are a significant number of networks established by a wide range of organizations for a wide range of purposes. Examples of the types of networks that might be relevant to conservation and sustainable use of biological diversity in dry and sub-humid lands are briefly described in the Annex.

***Recommendations***

1. It was generally agreed by the AHTEG that a *network (or networks) of institutions and/or individuals* could provide valuable support to implementation of the Programme of Work. However, the very breadth of what is already out there suggests that before establishing a network (or networks) we need to:

   a. *First* make recommendations on the themes that an expert network (or networks) might be needed to cover and the objectives that it believes the network (or networks) should be aiming

to achieve;

b. *Then* identify the types of working mechanism that might achieve these aims (information exchange, discussion forums, workshops and meetings, fixed-term, open-ended, etc);

c. *Then* review what networks already exist to see to what extent they meet (or could be modified to meet) what is required; and

d. *Finally* identify what lessons could be learnt from previous experience with development and implementation of relevant types of network.

2. There is concern that where information and knowledge sharing networks exist, the information is not always available to the people who need it, or is not in a form that can be used. This needs to be recognised in the recommendations that SBSTTA makes on information networks, capacity development and the clearing-house mechanism of the Convention.

3. It was agreed that setting up a totally new *network of sites* of particular value for biological diversity of dry and sub-humid lands was not a practical option. However there are clearly ways in which existing site networks could contribute to the Programme of Work, this need exploring further. Possible focused recommendations include:

   a. Encouraging the World Heritage Centre to commission a thematic study on dry and sub-humid lands in the context of development and implementation of the "global strategy" to improved the representativness of the World Heritage List.

   b. Encouraging the Ramsar Convention Bureau and the Convention's Scientific and Technical Review Panel to assess the extent to which the sites on the List of Wetlands of International Importance adequately cover all of the key wetlands in dry and sub-humid lands.

   c. Encouraging the MAB Secretariat and the Biosphere Reserves Advisory Board to review the existing biosphere reserves network to assess the extent to which the sites currently cover dry and sub-humid lands, with the intention of promoting further development of the network as appropriate.

4. With the previous recommendation in mind, AHTEG encourages the CBD Secretariat to convene a liaison group meeting at the next meeting of SBSTTA to address the issue of international site networks in the context of the Programme of Work on dry and sub-humid lands. Invitees would include *inter alia* the Ramsar Convention Bureau, World Heritage Centre, MAB Secretariat, Berne Convention Secretariat, European Commission (with respect to *Natura 2000*), Wetlands International, European Environment Agency, IUCN and UNEP-WCMC, as well as interested Contracting Parties. The agenda for such a meeting might cover:

   a. Relevant coverage of each network and actions to improve this

   b. Ways in which each network can contribute to the Programme of Work

   c. Possibility for joint work programmes relating to networks of sites

   d. Lessons learnt relevant to other CBD thematic programmes of work

   e. Potential input to CBD discussion on protected areas

*Annex - Examples of existing networks relevant to dry and sub-humid lands*

a) *Convention on Wetlands:* The Ramsar Convention provides the framework for international co-operation on the conservation and wise use of wetland biomes. Wetlands are defined in Article 1 as "areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres". Each Contracting Party must designate at least one wetland site for inclusion in the *List of Wetlands of International Importance*. Article 2(2) states that sites should be selected for inclusion where they have "international significance in terms of ecology, botany, zoology, limnology or hydrology". There are currently 133 Contracting Parties to the Convention, with 1180 wetland sites, totalling 103 million hectares.

b) *Convention Concerning the Protection of the World Cultural and Natural Heritage:* The World Heritage Convention provides for the designation of natural and/or cultural areas of "outstanding universal value" as world heritage sites, with the principal aim of fostering international co-operation in safeguarding these important areas. Sites must be nominated by the signatory nation that has territorial jurisdiction over them, and they are then evaluated for their world heritage quality before being declared by the World Heritage Committee. There are currently 144 natural and 23 mixed properties in 125 States Parties. As part of its "global strategy", the Convention is addressing the extent to which it adequately covers all geographical areas and themes, though to date no review has been undertaken of World Heritage in dry and sub-humid lands specifically.

c) *UNESCO Man and Biosphere Programme:* The UNESCO Man and the Biosphere (MAB) Programme has established a network of "biosphere reserves". The objectives of the network, and the characteristics which biosphere reserves might display, are identified in various UNESCO-MAB documents, including the Seville Strategy (published in 1995) and the Statutory Framework. Biosphere Reserves are designated for a range of objectives, which include research, monitoring, training and demonstration, as well as conservation roles. In most cases the human component is vital to the functioning of the biosphere reserve. The network has the stated aim of being representative of the world's ecosystems. There are currently 908 Biosphere Reserves in 94 countries. In addition to the World Network of Biosphere Reserves, the MAB programme has significant experience with regional networks of collaborators including AfriMAB, ArabMAB, the Northern Sciences Network, and so on. None of these was set up explicitly for the purpose of sharing experience and information on dry and sub-humid lands, but MAB experience in this area is very relevant and should be taken into account in particular because of the balance in the MAB programme between conservation and effective management of the environment by those who live in it.

d) *International Long Term Ecological Research Network (ILTER):* The mission of the network is to:

- enhance understanding of long-term ecological phenomena across national and regional boundaries;
- promote comparative analysis and synthesis across sites;
- facilitate interaction among scientists across disciplines and sites;
- promote comparability of observations/experiments, integration of research/monitoring, data exchange;
- enhance training/education in comparative long-term ecological research and its relevant technologies;
- contribute to the scientific basis for ecosystem management;
- facilitate collaboration among comprehensive, site-based, long-term ecological research programs; and
- facilitate development of such programs where they currently do not exist.

As of May 2000, 21 countries had established formal national LTER programs and joined the ILTER network. Ten more were actively pursuing the establishment of national networks and many others had expressed interest.

e) *Sahara and Sahel Observatory (OSS):* OSS is an international association whose mission is to serve as a mechanism for liaison and an international forum for partnership and consultation. It is composed of institutions devoted to drought and desertification control and to the development of arid/semi-arid zones in Africa. The primary objective is to ensure more efficient and effective application of desertification control mechanisms, through the development and optimisation of information. OSS is therefore working to strengthen the capacity of the African countries affected by desertification to evaluate the state of their natural resources through the implementation of programmes that: improve the use of technological tools; establish common norms and standards; and develop information systems adapted to their specific needs. OSS is developing a network of long-term ecological monitoring observatories in order to:

- better understand mechanisms that lead to desertification
- identify methods/techniques that can improve natural resource and environmental management
- establish indicators that characterise the causes and effects of desertification

OSS also aims to optimise local natural resources management through:

- developing data banks and preparing manuals and handbooks
- facilitating exchange of experience and knowledge between experts
- providing for the transfer of know-how between the various areas of Africa

f) *UNCCD Thematic Programme Networks:* TPNs are networks of institutions and agencies linked together via a host institution working on a key theme. TPNs aim to, *inter alia*, promote capacity-building and strengthen exchange and use of information and experience. Generally speaking, the purpose of the networks is to coordinate and compile activities related to combating desertification from various aspects, undertaken by different stakeholders, in order to prevent duplication and increase efficiency, thus benefiting countries with minimum expenditure. In Asia the need for six TPNs has been identified, and several facilitation grants are supporting the launching of the TPNs and facilitating the development of a resource mobilisation strategy through the rationalisation of current activities with partners in the field, and through building partnerships with new funding mechanisms. TPN1 is on desertification, monitoring and assessment, TPN2 on rangeland management and sand dune fixation, TPN3 on agroforestry and TPN4 on water resources management for agriculture in drylands. Apparently others have yet to be fully established, but TPN5 will focus on capacity building for mitigating the effects of drought and TPN6 on local development initiatives. TPNs are now also being implemented in Africa. TPN1 is concerned with integrated management of international water basins, TPN2 on agroforestry and soil conservation, TPN3 on rangelands and fodder crop development, TPN4 on monitoring and early warning, TPN5 on energy sources and technologies, and TPN6 on sustainable agriculture.

g) *FAO and CGIAR:* FAO and CGIAR (particularly ICARDA in this theme) have experience with a wide range of networks, including those covering production and environmental protection in grassland and rangeland regions. For example, the West Asia and North Africa Plant Genetic Resources Network (WANANET) and the Central Asian and Trans-Caucasian Network on Plant Genetic Resources (CATNIPGR) play an important role in implementing the Global Plan of Action on the Conservation of Genetic Resources in their respective regions. IPGRI provides the secretariat to the two networks, which are composed of a Steering Committee and the following working groups: Cereal Crops; Horticultural Crops; Pasture, Forage and Rangeland Crops; In situ/Biodiversity; Food Legumes; and Industrial, Aromatic and Medicinal Crops.

h) *Global Terrestrial Observing System (GTOS):* GTOS is a programme for observations, modelling and analysis of terrestrial ecosystems to support sustainable development. It aims to facilitate access to

information on terrestrial ecosystems so that researchers and policy makers can detect and manage global and regional environment change. GTOS addresses this mission through a number of complementary activities, the highest priority being to strengthen the communication between similarly minded groups and harmonize their efforts. GTOS also develops regional programmes and coordinates demonstration projects. The GTOS Terrestrial Ecosystem Monitoring Sites (TEMS) programme is an international directory of sites and networks that carry out long-term terrestrial monitoring and research activities. The database provides information on the "who, what and where" that can be useful to bother the scientific community and policy-makers.

i) *IUCN Commission on Ecosystem Management:* The Commission is in the process of establishing an Arid Lands Initiative which aims to increase understanding of all issues relevant to conservation and sustainable use of biological diversity in arid land ecosystems, and to promote the sharing of relevant information and experience. This is being approached through the development of a network of institutions and individuals with relevant experience.

***Working group 4: Threats and processes of biodiversity degradation***

**Contents**



*Introduction*

96. The working group noted that dryland ecosystems comprise a rich biodiversity including varieties of species and natural and human-made habitats (forests, woodlands, grasslands and savannah) adapted to the management systems, the heterogeneity and special driving forces of the ecosystems. According to FAO estimates (2000), most of dryland countries fall into the category of "Low Forest Cover", with forest and woodlands covering less than 10% of the total area.

97. The group recognised that in the last fifty years, extinction of global biodiversity has been observed in a continuous manner, preceding now at an alarmingly high rate, due to habitat loss, particularly the loss of natural vegetation cover. It is estimated that before human life on earth, the speed of extinction was about one species per year. The IUCN's 1996 "red list", estimated that about 34 % of all fishes, 25 % of mammals, 25 % of amphibians, 20 % of reptiles and 11 % of birds were threatened with extinction at that time (IUCN, 2001).

98. There are three categories of causes leading to loss of drylands biological diversity: (1) natural causes, (2) anthropogenic causes, including changes in atmosphere, exacerbated drought, and (3) interactive natural-human causes.

99. The group recognized that there are abundant data and information on the processess leading to degradation/loss of biodiversity. To show the relationships between the factors governing these processes, a problem-tree was developed to show the linkages (Figure 1).

100. The problem-tree was developed to highlight the cause-effect relationships in a complex biophysical (natural) and anthropogenic (human) environment, highlighting forward and backward linkages. It should be appreciated that dry and sub-humid lands are heterogeneous and therefore this problem tree is not universal, hence different processes might have different impacts in various ecosystems.

*Anthropogenic causes*

101. The anthropogenic factors (Figure 1) are among the major causes of biodiversity degradation and loss, with regard to the fact that they also compound the natural causes.

*Climate changes*

102. Climate in terms of rainfall and temperature increases is one driving factor inducing changes in land characteristics and ultimately biological conservation applied in dry and sub-humid lands. It has been observed that Carbon Dioxide elevation and changes in aridity and temperature regimes resulting e.g. from industrialisation, unsustainable patterns of consumption and production, and excessive human induced fires play a major role in biological diversity degradation and loss. It was also noted that degradation of vegetation cover above soil surface increases dust into the atmosphere and decreases carbon sequestration capacity of dry and sub-humid lands, thus increasing emissions of carbon dioxide into the atmosphere.

*Desertification/Land degradation*

103. Rapid increase in the population during the last three decades has induced land use changes including habitat conversion. These changes in land uses lead to disruption and loss of habitats.

104. The working group noted that human-induced causes will be a serious threat to biological diversity conservation. The UN-Population commission (2001) estimated that more than 50% of the world population will be living in urban areas by 2025. In this context, as population densities grow without being matched by increased food and other products production, the previously undisturbed lands and natural environment will be damaged, including substantial decline in biodiversity within the various urban and agro-ecosystems.

105. With the increase of the population, to satisfy the needs for farmlands, fallow period has been considerably reduced and farmers are increasingly clearing and cultivating marginal lands susceptible to various forms of degradation. In addition, uncontrolled human settlements and infrastructure (roads, industries, etc.) construction, mining, logging and tree harvesting have also been recognised as major causes of forest resource degradation. Periodic burning of savannah landscape has also been shown to have implications for forest cover decrease, and potentially related biodiversity loss.

106. Changes in agricultural practices and land uses have led to disruption of natural ecosystems and loss of habitats. As immediate consequences, there is a displacement of populations towards other zones, which are relatively good for productive agricultural and pastoral activities. New land areas are cleared and cultivated, increasing the risk to induce land degradation processes. The breakdown of the system has serious impact on the diversity of living organisms but also on the wealth of indigenous knowledge accumulated over decades.

107. The group also recognized that policy, institutional and governance weaknesses (including e.g. poor governance, insecure land tenure policy, inadequate technical and scientific capacity, loss of cultural identity and spiritual values), are also major causes contributing to degradation and loss of dry and sub-humid lands biodiversity. It was observed that many changes at legal and policy levels occurred during these last two decades in many developing countries.

*Natural Causes*

*Natural environmental variability*

108. The group recognised that natural environmental variability such as extreme weather changes diverging from natural long-term cycles, and geomorphological and evolutionary processes could affect biological diversity. Other changes such as El Niño and la Niña have contributed to changes of forest,

woodlands and habitat constitution, including changes biological diversity. These natural changes may destabilise the ecosystem leading to change and sometimes making it susceptible to degradation.

*Natural disasters*

109. Natural disasters, such as drought, flood, landslide, wind storm, wild fires, volcano eruptions, pest outbreaks and earthquakes are also determining factors potentially leading to biodiversity degradation and loss. For example during the last three decades, due to exacerbated drought periods in Africa and Asia, a number of plant and animal species have become extinct or near extinct.

*Exacerbated effects of drought*

110. The working group noted that both natural and anthropogenic factors leading to drought may cause degradation of biological diversity in the dry and sub-humid lands. The drought impact compounded by the population pressure on lands may lead to desertification and loss of habitats. Scientific models assessing biodiversity changes, predict that dry and sub-humid lands, especially in Southern Africa and the Near East, will be among the biomes experiencing the largest biodiversity change, and will be affected significantly by a combination of natural and anthropogenic changes.

*Interactive natural-human causes*

111. The interaction between human-induced causes and natural causes has been recognised as affecting biological diversity in dry and sub-humid lands.

112. Changes in climate and also in land uses, including inappropriate agricultural and natural resource use practices lead to ecological disruption and loss of habitats. These result in soil erosion, sand encroachment, sedimentation (e.g. rivers, cricks), loss of soil fertility and resilience, dissemination of invasive alien species, which are likely among the most widespread causes of biodiversity degradation in dry and sub-humid lands.

113. During the last decade biodiversity potential has been seriously affected by soil erosion and degradation (e.g. water erosion, wind erosion, salinization and acidification, irrigation). This may contribute to the degradation of international waters and affects biodiversity in rivers, lakes and coastal ecosystems, for example.

114. In the context of degradation of genetic diversity the placing on the market of Genetically Modified Organisms is discussed controversial amongst scientists. Applying the precautionary principle in case of uncertainty, GMOs have at least to be considered to pose a potential risk affecting biodiversity. In ecological risk assessment of GMOs used in dry and sub-humid lands particularly the fact that a great number of crop origins and theire close relatives might cause outcrossing, introgression, decrease in genetical diversity and uncontrolled spreading of synthetic transgenes, need to be considered. In case the genetically modified trait is “drought tolerance” the GMO itself or it’s hybrids might become invasive in natural or seminatural ecosystems causing similar biodiversity degradation to that of alien invasive species (exotic species model). These issues have to be considered in performing ecological risk assessment.

*Recommendations*

1. For effective interventions, it is important to analyse and address the underlying causes of these processes; in this respect linkages and interrelationships between biodiversity and poverty need to be considered, including an analysis of: (i) the benefits from biodiversity for poverty alleviation; and (ii) the impact of biodiversity conservation on the poorest (activity 5 of the programme of work on dry and sub-humid lands).

2. Given that billions of people derive their livelihoods from dry and sub-humid lands, we recommend that National Biodiversity Strategies and Action Plan (NBSAPs) should be an integral part of poverty reduction strategies and linked directly to measures aimed at combating desertification (including NAPs) and sustainable development initiatives.

3. Given the large-scale degradation of forest cover occurring in many dry and sub-humid lands due to human activities, it is recommended that member countries implement an appropriate policy for community-based environmental protection, including valuation of traditional knowledge.

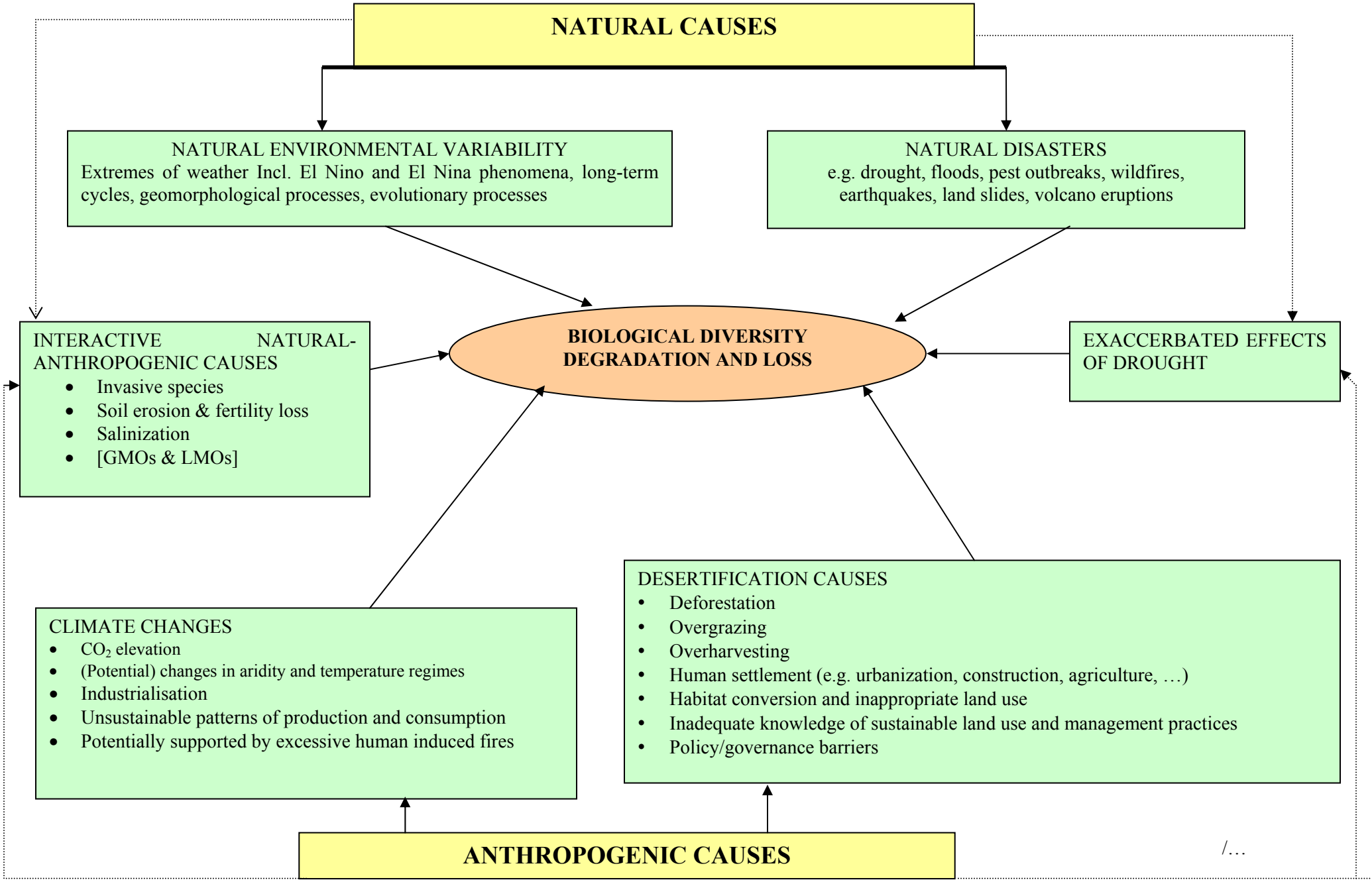
4. With regard to lack of information and weakness of institutional capacity, it is recommended to establish a monitoring and reporting system on changes in the biodiversity (quality and quantity) in dry and sub-humid lands, from the national to the global level.

5. It is also recognized that the conservation of dry and sub-humid biological diversity should be an overall objective of sustainable management of all types of ecosystems by all countries, and not be limited to selected areas, such as protected areas.

6. Effective action for biological diversity needs to address both the direct and the underlying causes of loss, and therefore it is required to have a detailed understanding of the causes at both the international and national levels, since each country has different circumstances and will need a specific approach. Many of the issues can only be addressed globally or regionally.

7. In order to achieve the goals of sustainable livelihoods in dry and sub-humid lands, the group support all initiatives, such as the Maputo principles of sustainable use of biological diversity (UNEP/CBD/SBSTTA/7/INF/9, annex I:) as applicable in both conventions (CBD and UNCCD).

**Table 1:** *Generic diagram showing causes affecting biological diversity in dry and sub-humid lands*

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### *3.5. Working group 5: Global benefits, economic valuation and the socio-economic implications of loss of biodiversity in dry and sub-humid lands*

**Contents**



*Review of values and uses of dry and sub-humid lands biodiversity, focusing on global benefits taking into account traditional knowledge*

115. The value of dry and sub-humid land biodiversity resides not only in its direct and indirect uses, but also in its socio-cultural and spiritual benefits. Following the Global Biodiversity Outlook, the benefits derived from biological diversity of dry and sub-humid lands can be generally classified as follows: i) genetic resources (wild relatives of cultivated plants and domestic animals, crop landraces and local breeds), ii) ecotourism, iii) use of plants (medicines, cosmetics, aromatics, stimulants, ornamentals etc), iv) wildlife, v) ecosystem services (soil stabilization, erosion prevention, habitat, pollination, carbon cycle, food, water control and regime etc), vi) pastoralism and livestock industry, vii) energy (firewood, charcoal etc), viii) cultural, spiritual and aesthetic values, ix) wild food.

116. Most of the identified benefits of dry and sub-humid land biodiversity are of a global nature. The scope of some benefits (pastoralism and livestock industry, wild food) depends on the existence and the extent of export markets. Socio-cultural benefits can arise not only on a local or regional, but also of a global nature, as people often assign value to the existence of species or ecosystems even if they live far away from the habitat of the species or from the area hosting the ecosystem. The geographical scope of the benefits arising from dryland biological diversity is indicated in Table 1.

117. It is, however, necessary to further differentiate and amend these benefits with regard to the specific type of dry and sub-humid land. For instance, Mediterranean ecosystems also include forests, which may generate other benefits. In this context, the carbon storage capacity of forests and some types of grasslands has to be underlined. Conversely, it has also be pointed out that the prospect of global warming through the accumulation of greenhouse gases in the atmosphere – most notably CO2 emitted through the combustion of fossil fuels and land use changes (i.e. deforestation, conversion of grasslands to crops) – will likely exacerbate desertification and the degradation of arid lands. A classification of benefits taking into consideration the benefits of specific types of dry and sub-humid lands is given in Table 2.

118. Since crops originating from dry- and sub-humid lands, such as wheat, maize, sorghum, millet and barley are the major source of human food globally and are particularly important for poor people in rural areas of the developing countries, food security depends to a large extent on conservation of indigenous genetic resources coming from dryland ecosystems. Being adapted to stressful and highly variable environments, which prevail in dry- and sub-humid regions, they are a rich reservoir of genes for adaptation and abiotic (drought, heat, cold, salinity) and biotic (diseases and pests) stress tolerance. These traits are indispensable for crop improvement targeted at low-input, stress-affected rainfed farming systems, in which many poor farmers grow their crops and their family livelihood depends upon. As recognized by recent global fora,

conservation of plant genetic resources for food and agriculture is essential in meeting the goals of the Rome Declaration on World Food Security and the World Food Summit Plan of Action.

119. Traditional knowledge plays an important role in most values and uses of dry and sub-humid land biodiversity. Traditional knowledge is dynamic and adapts to change; it needs an enabling environment to be developed. The degradation of biodiversity may often lead to the devaluation and eventual loss of traditional knowledge. Traditional knowledge may also provide useful information for nature restoration efforts (e.g., soil stabilization and rehabilitation), especially when combined with new adaptive technologies. With regard to socio-economic benefits, traditional knowledge has to be identified as an integral part of the cultural identity of traditional communities.

*Economic valuation tools*

120. The value placed on biodiversity varies with the preferences, cultural and ethical values, the worldview and, probably most importantly, the immediate needs of the different individuals and different societies under consideration. Whether the value of biodiversity stems from their usefulness in production or consumption, from their cultural significance or from the notion that specific species or ecosystems should have a right of existence, taking all these different components into consideration is crucial in determining how much biodiversity should be conserved and sustainably used. The concept of *total economic value* seeks to include all of these components. In addition to the *direct* and *indirect use values*, it takes into account the value of biodiversity components that are currently not used, stemming either from keeping such resources for future use (*option value*) or adding a value due to their pure existence or due to the wish that later generations should also enjoy existence of the resources (*existence and bequest value*) (see Table 3).

121. Economic valuation can be seen as a method to reveal those values that are not reflected in market prices. Hence, the valuation of biodiversity seeks to *reveal* its total value assigned in a given society and will reflect the society's ability and willingness to pay for biodiversity. A number of tools for economic valuation of biological diversity resources exist. An overview is provided in Box 1. Economic valuation tools have specific advantages and disadvantages, some of which are also identified in Box 1. A specific tool may perform well to valuate some benefits of dry and sub-humid land biodiversity, but may perform poorly for others. Tools identified to be especially able to valuate specific benefits of dryland biological diversity are given in Table 1.

122. Consequently, the economic valuation of biodiversity can serve a number of purposes:

- It can demonstrate the value of biodiversity to private and public decision-makers and stakeholders and thus raise awareness;
- It can therefore informing decision-making on private and public investment projects;
- It can contribute to setting of priorities for conservation programmes;
- It can contribute to improve the quality of environmental and economic information systems, e.g. contribute to green national accounting;
- It can help to choose appropriate policy instruments and to fine-tune these instruments. In this regard, the group noted and welcomed the work on environmental valuation as a basis for payments for ecological services, undertaken by the Unit on Environmental Economics and Indicators of the World Bank Institute.

123. The value attributed to biodiversity is also influenced by the overall incentive structure of a society. The technologies and other monetary and non-monetary resources which are available, as well as the property rights and specific incentive measures assigned to biodiversity-related resources, are important elements influencing the values individuals attribute to biological

resources. For instance, poor people, almost by definition, have little resources at hand to pay for and afford conservation of biological diversity, and might therefore be deemed to attribute low value even to the private-good characteristics of biodiversity. But on the other hand, poor people often directly depend on biodiversity and related ecosystem services for their daily livelihoods. Therefore, they may actually be ready to assign high value to the preservation of biodiversity. However, due to a number of reasons, this value may not adequately be reflected by their actual willingness-to-pay, which, in turn, leads to sub-optimal economic activities of these individuals. For instance, property rights mat be not properly assigned and enforced even while the relevant components of biodiversity may have the characteristics of a private good. (refs, include Juma & Ojwang, 1996; Ogolla & Mugabe, 1996). The existence of perverse incentives may also induce unsustainable behaviour. For instance, market interventions through agricultural subsidies lead to degradation by placing larger values on agricultural development instead of maintaining and marketing locally agricultural biological diversity, thus leading to a major loss of biodiversity and natural resources (e.g. Repetto, 1989).

124. A good application of valuation tools would seek to properly correct for such income and endowment differentials as well as such institutional deficiencies. In addition, the establishment of improved knowledge systems will often be necessary prior to the application of valuation tools. People might not readily understand the meaning of biodiversity and consequently cannot place the appropriate value to the term without adequate explanation and information.

*Socio-economic implications of biodiversity degradation and loss, including the impact on poverty and poverty alleviation*

125. Elucidating biological diversity values to their full extent illustrates the potential threat that biodiversity loss posses to food security, income diversification, vulnerability to shocks (economic, social and natural disasters) and spiritual well being, especially to the poor. Desertification or land degradation leads to a loss of biological diversity, often linked to a loss of productivity. It is apparent that biodiversity loss severely impacts on the livelihoods of people, especially those that are directly dependent on them. Thus, as a flipside to the identified benefits and opportunities that can be derived from biological diversity resources, costs are incurred when biodiversity is lost. Even if not directly generating losses of income or of nutritional components, biodiversity degradation may restrict future economic options, thus generating losses of opportunity. In the case of socio-cultural/spiritual benefits, biodiversity degradation may also lead to a loss of identity. The socio-economic implications of biodiversity loss are summarized in Figure 1.

126. As an example, Box 2 presents a case from northern Namibia of how much a rural household may loose in financial terms due to natural resource degradation, including biodiversity loss. Considering that cash income is very low for rural households in Namibia, the monthly income in a household that has access to remittances e.g. pension, is around U$ 50 (N$ 500) in that region (UNDP, 2001). That would mean that the income of 4 months over a year would have to be used to cover “environmental degradation” induced expenses.

127. On a global level, there is a growing consensus that five main processes are driving environmental and biodiversity change: (1) land use change, (2) climate change, (3) nitrification, (4) alien invasive species, and (5) $CO_2$ elevation (Sala et al., 2001). Considering the various ecosystems covered in the dry and sub-humid lands programme, i.e. drylands, Mediterranean, arid, semi-arid, grassland and savannah ecosystems, in several geographic regions, the main drivers and perceived threats to current biological diversity differ. However, it can be safely assumed that in dry and sub-humid land areas where poverty is prevalent, the main relevant processes are land use change, alien invasive species and climate change. Even while the impacts

of the latter are not clearly discernable today, vulnerability indices show potential increase in aridity in southern Africa and central Asia (IPCC, 2001).

128. The role of land use change and the interconnectivity to land degradation and desertification is analyzed in some more detail in Table 4. Poverty related constraints are also identified in this table. The degradation of biological diversity resources is implicit.

129. As the benefits and costs of biological diversity resources are distributed unevenly in society, it follows that the micro-economic impacts of interventions are also uneven. The nature of impacts depends on local factors such as the quality and availability of resources, the characteristics of local institutions, and the nature of environmental-livelihood patterns and interaction. Furthermore, the socio-economic implications of biodiversity degradation are ambiguous in some cases, which needs to be reflected in the policy response. For instance, conservation programmes for charismatic species should be carefully balanced when these species are a nuisance for affected local communities, e.g., through the introduction of compensation packages.

130. The analysis suggests the need to prioritize protection of those biological diversity resources that provide benefits to local populations, especially the very poor to alleviate the poverty related constraints to biodiversity conservation. In this regard, some important linkages between poverty and biodiversity need to be stressed.

131. First, most environmental degradation is not caused by poor people. It is a fallacy that poor people are primarily responsible for degradation of the environment. Most environmental degradation is caused by the non-poor as a result of their production and consumption levels, which are much higher than those of the poor. Even where poor people are the apparent cause of environmental degradation, this is often due to inappropriate incentives set by the institutional and policy environment, for instance, the poor being denied access and full resource rights by wealthier land-owing elites, or being hired by wealthier producers to engage in environmentally damaging practices. In the case of a loss of genetic resources due to biodiversity degradation, the losses of opportunity for local communities are also contingent on whether their traditional property rights are protected and on whether benefits-sharing agreements are in place (DFID et al., 2002).

132. Second, population growth does not necessarily lead to increased degradation. While increasing population undoubtedly places greater pressure on productive land and resources, it is not necessarily population per se that causes the damage. The complexity of local social, economic, environmental and governance circumstances in which demographic change takes place, which in turn can be strongly influenced by external policy and institutional factors, are the driving forces behind poverty–environment interactions. Indeed, conventional economic theory would suggest that, as the population increases and land becomes scarcer, the land should increase in value and merit greater care and investment. Research in Kenya has documented cases where, even in the face of increasing population pressures, farmers have managed semi-arid, degraded, unproductive lands in a manner that has rehabilitated them and made them profitable (Tiffen et al., 1994). A wider review shows that for population growth to lead to improved soil and water investments, market access and attractive producer prices are essential, as well as social and economic support to prevent the collapse of social structures (Boyd and Slaymaker, 2000).

133. Third, the conventional wisdom has been that poor people are too impoverished to mobilize resources for enhancing the environment. In some cases this is true. But numerous experiences demonstrate that when incentives are favourable, low-income households and social

groups can mobilize enormous resources, particularly labour. Many urban environmental problems can most effectively be solved when poor communities mobilize themselves or form coalitions with less poor groups to improve service provision, often with some contribution in cash and kind (Satterthwaite, 2001).

134. Fourth, it is often assumed that a lack of technical knowledge is a key constraint to poor people's management of natural resources. Indeed, when poor people move to areas with new ecological regimes, or when something happens to change the balance under which their resource management practices developed, a period of adjustment is required. Evidence is increasingly showing that poor people have an enormous store of traditional technical knowledge, such as use of medicinal plants, water harvesting structures, fishing sites and so on. This knowledge is often undervalued or completely ignored. There are many well-documented cases of poor people investing in their own time and resources in environmental management, and succeeding in maintaining production and profitability, while keeping their families and communities from the worst effects of poverty. (e.g. UNDP, 1999a & b). In consequence, the collapsing of traditional practices and knowledge systems is a major threat to world heritage areas and to biological resources. The loss of the wealth of traditional knowledge and know-how attached to these systems will also imply a loss of opportunities for future generations to capitalize on the natural resource management of dry and sub-humid lands.

*Recommendations*

*Values and uses of dry and sub-humid lands biodiversity*

1. Any assessment of the socio-economic value of dry and sub-humid land biodiversity should include both its direct and indirect economic benefits as well as its socio-cultural/spiritual value.

2. The relative importance and scope of the identified benefits will largely depend on the peculiarities of the area under consideration, for instance, on the type of dry and sub-humid land. In this regard, it was noted that some degraded (desertified) drylands offer considerable opportunity for carbon sequestration. As effective policy responses need to be based, *inter alia*, on the identification of these benefits and the socio-economic implications of their loss, this observation prohibits the use of "one-size-fits-all" instruments and calls for the use of a carefully tailored policy package.

3. In order to set policy priorities for the conservation and sustainable use of biodiversity of dry and sub-humid lands, attention should be given to identify areas of particular value with regard to their associated benefits. Such areas could include, e.g. hot spots (with a high degree of species and genetic diversity), vulnerable farmland or oases (important as nodes of development and as resting sites for migratory animals).

4. As traditional knowledge may provide valuable information for the setting of priorities in conservation policies and for the design of rehabilitation and restoration programmes, national governments are advised to actively involve indigenous and traditional communities in the design and implementation of such plans, policies and programmes.

5. With regard to some activities (e.g., soil stabilization measures), the use of traditional knowledge as reflected in traditional management systems and institutions may be particularly effective when combined with the introduction of new adaptive technologies. National governments and non-governmental organizations as well as development

cooperation partners could play an important role to facilitate and foster the introduction of such technologies, through technology transfer, funding and capacity building for local communities.

*Economic valuation tools*

1. There is an urgent need for more research to establish the total economic value of dryland biological diversity other than for genetic resources, taking especially into account and correcting for income differentials and institutional deficiencies. Techniques for economic valuation to deal with all goods and services provided by dryland plant and animal resources s need to be more widely applied.

2. As some tools are better suited to economically valuate a specific benefit than others, the identification of the main benefits arising from a specific area of dry and sub-humid land, by way of a careful qualitative analysis, has to be undertaken prior to any valuation exercise in order to choose the adequate valuation tool.

3. The cost and efforts related to data gathering as well as the required technical and human capacity to use a specific valuation tool should also be given due consideration in choosing the adequate tool. The principles of cost-benefit-analysis should also be applied when deciding whether and what extent economic valuation should be undertaken in a specific case.

4. Given that the application of all valuation tools requires a considerable amount of money as well as technical expertise and capacity, which limits their use on a wider scale especially in developing countries, organizations working on economic valuation should be encouraged to undertake additional research to develop effective low-cost valuation tools. It should especially be considered how valuation studies based on benefit function transfer approaches could be adapted to the peculiarities of developing countries.

5. Economic valuation is no panacea and should be embedded in a broader assessment exercise. Specifically, once a specific valuation tool is chosen, careful consideration should also be given to those benefits that are not well covered by this tool, e.g. through a flanking qualitative assessment. It has also borne in mind that even those tools able to cover bequest and existence values (the contingent valuation method) may not register the totality of socio-cultural and/or spiritual values. Research institutions are encouraged to undertake further work on how to make such benefits amenable to an economic analysis, like the work on economic valuation of cultural heritage undertaken by the Work Bank Institute.

*Socio-economic implications of biodiversity degradation and loss, including the impact on poverty and poverty alleviation*

1. In assessing the socio-economic implications of biodiversity degradation, it is not sufficient to consider only the actual losses. Careful consideration should also be given to the loss of opportunities that could be realized under changed policy frameworks, e.g. with regard to the protection of traditional knowledge or to the improvement of market access.

2. Even if not directly amenable to an economic analysis, the losses of socio-cultural values should be given due consideration in an assessment of the implications of biodiversity degradation.

3. Ongoing collaborative work by DFID, EC, UNDP and the World Bank (DFID et al., 2002) on linking poverty reduction and environmental management should be included into the

work programme on the biodiversity of dry and sub-humid lands of the Convention on Biological Diversity. Biodiversity conservation and poverty alleviation are also research priorities of 16 International Agricultural Research Centers (IARCs) of the CGIAR system, whose work should also be taken into due consideration.

4. It has to be recognized that most environmental degradation is not caused by the poor. It is a fallacy that poor people are primarily responsible for degradation of the environment, including biological diversity. Most environmental degradation is caused by the non-poor as a result of their production and consumption levels, which are much higher than those of the poor.

5. The poor often rely directly on the environment including biological diversity for their livelihoods. Biological diversity resources can therefore provide substantial opportunities to livelihood improvements and poverty alleviation. The poor are a valuable human resource themselves, responsible and capable for taking their own development into their hands. Efforts have to be directed to create a conducive and supportive environment, including enabling poor people to capitalize their traditional knowledge by identifying possible biodiversity products, developing them in high and marketable quality and marketing them successfully

6. The supportive policy framework should also include the implementation of appropriate incentive measures, including financial gains and support. For instance, access and resource and property rights should be granted to local resource users, and the devolution of responsibility for sustainable land and resource management should also be achieved to that level. Appropriate negative or positive incentives need to be implemented to capture the public values of biodiversity.

7. It has, however, to be recognized that conservation and development are not always mutually supportive, and integrated strategies such as integrated land management aiming at the one and/or the other in differing areas and situations should be developed. Furthermore, it is important to acknowledge if the objective of an intervention is (a) the conservation of biological diversity, or (b) the alleviation of poverty (by e.g. enhancing the natural and/or financial capital of the poor). To achieve either objective, different, complementary measures will often have to be taken for an overall successful policy intervention.

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**Table 1:** *Global benefits of dry and sub-humid land biodiversity*

| Benefits | Geographical scope | Socio-economic implications of degradation, incl. poverty. | Role of traditional knowledge | Type of economic value | Possible valuation instruments1 |
|---|---|---|---|---|---|
| Genetic resources (wild relatives of cultivated plants and domestic animals, crop landraces and local breeds) | Global | Loss of opportunity, depending on policy framework (IPR/sui generis-regimes, benefit sharing) | (Valuation; formulating conservation policies and bioprospecting) | Direct use value; option value | Hedonic Pricing |
| Tourism, ecotourism | Global | Policy-dependent (wildlife and park management, benefit-sharing, compensation mechanisms) | (Interaction with local communities; knowledge on animal behaviour) | Use value, option value | Travel costs<br>CVM |
| Use of plants (medicines, cosmetics, aromatics, stimulants, ornamentals) | Global | Loss of traditional medicine; loss of opportunity; loss of income | (Traditional medicine, use or abuse of stimulants) | Use value; option value | Market value<br>Hedonic Pricing<br>CVM |
| Wildlife | Global | Policy-dependent (nuisance species require balanced policy approach) | (Interaction with local communities; knowledge of animal behaviour) | Use value | Market value,<br>CVM |
| Ecosystem services (Soil stabilisation/ erosion prevention, provision of habitat for wild pollination essential for food production, recharging of water tables etc.) | Global | Loss of opportunity; loss of nutritional components; loss of income | (Traditional management systems and institutions) | Indirect use value (ecosystem function) | Productivity approach |
| Pastoralism/livestock industry | Local/regional/global (depending on existence and scope of export markets) | Loss of income or nutritional components (subsistence pastoralists) | (Traditional management systems and institutions) | Use value | Market value<br>CVM |
| Energy wood (firewood, charcoal etc.) | Local/regional/global | Loss of habitat, loss of income, degradation | Indigenous knowledge | Use value, ecological value | Market value |
| Cultural/spiritual values including aesthetics | Local/regional/global | Loss of identity, loss of traditional knowledge | (Traditional knowledge integral part of cultural identity) | Bequest/existence value (with caveat) | CVM<br>(with caveat) |
| Wild food | Local/regional/global | Loss of nutritional components; loss of insurance (famine food); loss of income | (Knowledge on the value of wild food) | Use value; option value | Market value<br>CVM |

1/ See box 1 for an explanation of the valuation tools.

**Table 1 addendum:** *Benefits of different types of dry and sub-humid lands*

*Ponds, lakes, rivers, oases and protected areas* are the major poles of socio-economic activities with significant effects on biodiversity. Global significance of these habitats is increasingly realised. For example, migratory birds depend on these sites, such as the Djoudj national park in Senegal for survival (GEPIS, 2000). Another global dimension of these habitats is that degradation of the basins of transboundary rivers has serious repercussions for a huge population covering several countries.

*Oases* are small islands of greenery in the dry landscape with sites of intensive and highly productive systems in drylands. Accessibility to water makes these sites the engines of desert life. Biodiversity per unit land area is probably very high, although not well documented.

*Groves,* as forest patches may be a remnant of the original vegetation or not. They play religious and cultural role, worshiped as shrines. Sacred groves and taboo species of animals and plants are part of a community's cultural heritage of natural resource management and biodiversity conservation (Millar et al, 2000). Sacred groves, like oases, are biodiversity micro "hot spots". The persistence of shrines and groves in many dryland rural communities despite degradation of the surrounding environment are testimony to their importance for these communities.

As mentioned above, this biodiversity carries additional values because of its role in providing ecosystem services. These services are conventionally not given any value but are regarded as 'free' resources. As such ecosystem functions, such as nutrient cycles and water regimes, biological control of diseases and pests and the regulation of greenhouse gases are exploited by humans for their benefit.

*Crops and trees.* Although biodiversity may induce reduced crop yields in many cases, through crop competition, farmers consider that the overall benefits of the biodiversity rich system override the shortcomings. During years of drought, annual crops may fail completely. Farmers then rely heavily on the products of trees and shrubs for survival. Even during years of good harvest, people depend on tree products for vitamins, minerals, medicine, etc. many valuable plants (*Acacia spp., Commiphora, Boswellia neglecta*, etc.) found in drylands produce resin, myrrh and gums arabic used for food, fragrances and pharmaceuticals.

Also, trees and herbaceous hedges on farms contribute to increased carbon storage in biomass above and below ground, thus reducing emissions of carbon dioxide to the atmosphere. Agro-forestry systems in drylands based on parkland system increase biodiversity and carbon stocks on-farm lands and is a good asset with global significance.

*Animals and microorganisms.* Animal diversity has been shown to have the same functions and to provide the same benefits in many farming systems. Soil organisms contribute a wide range of essential services to the sustainable function of agro-ecosystems through their actions in nutrient cycling, their regulation of the dynamics of soil carbon sequestration and greenhouse gas emission, their effect on soil physical structure and water regimes, and influence on plant life (e.g. nitrogen fixation and the interactions in the soil of pests, predators and other organisms). Pollinators are essential for seed and fruit production and their number and diversity can profoundly affect crop production levels.

*Plants*. Old civilizations in drylands, like everywhere else, care for medicinal plants because they have built up generations of tried and tested curative methods and products. In India, for example, Shankar et al (2000) reported that 4 671 plant species are used in folk medicine. Although not unique to drylands, it is a remarkable fact that the use of medicinal plants is a living tradition of dryland rural people. In addition to the "professional" healers, countless of millions of women and elders have invaluable knowledge of herbal home-remedies and food and nutrition. However, more investigation and analysis would be necessary, for example, in correlating dryland epidemiology with pharmacopae, developing benefit sharing regimes, and enhancing effectiveness of remedies for countless of rural populations without adequate health coverage.

*Carbon storage.* Soil cover degradation and air pollution decrease carbon storage capacity. However, it has not yet been fully documented at which extent this affects the capacity of drylands carbon sinking. Given the increasing recognition that many dryland plant species develop extensive below ground biomass, current estimates of C sequestration in drylands are probably vastly underestimated.

**Table 2:** *Benefits derived from dry and sub-humid lands biodiversity*

| ***Global use system*** | ***Biodiversity functions and values*** |
|---|---|
| **Sustainable agriculture** | •Soil fertility e.g. through nutrient cycling and bio-perturbation esp. in low-input agricultural systems, and other ecosystem services<br>•Choice of produce i.e. of crops, livestock, fruit trees and other natural resources (both on genetic and species)<br>•Resilience to drought, pests, frosts, floods, climate change through and at all, genetic, species and habitat, diversity<br>•Resilience to market changes and demands through larger portfolio of product choice |
| **Sustainable game farming** | •Habitat characteristic game species<br>•Choice of usage I.e. meat production, tourism, hunting<br>•Resilience to market changes and demands through larger portfolio of product choice<br>•Habitat conservation through maintenance of natural and balanced communities and populations<br>•Resilience to drought etc – see above for agriculture |
| **Sustainable forestry** | •Natural water balance in ecosystem<br>•Soil fertility<br>•Choice of produce i.e. wood and timber products, non-timber products<br>•Resilience to disturbance through diversity of species, genes, habitats<br>•Resilience to market changes and demands through larger portfolio of product choice Production of household goods e.g. energy supply, furniture |
| **Sustainable land and water management** | •Maintenance of land and water ecosystem functions<br>•Ecosystem approach, integrated L & W management |
| **Sustainable inland fisheries and aquaculture** | •Healthy inland water systems; buffer against pollution; ecosystem services<br>•Nutrient cycling in inland water systems<br>•Provision of food at several levels of food chain (e.g. phyto plankton)<br>•Choice of natural and commercial fish and aquatic produce<br>•Resilience to disturbances in ecosystem e.g. through floods, droughts, pollution<br>•Resilience to market changes and demands through larger portfolio of product choice |
| **Biodiversity and natural resource based livelihood diversification** | •Bush meat and other bush products, not included in sustainable agriculture, forestry, fisheries and game farming (e.g. Mopane worm industry)<br>•Tourism value and associated industries<br>•Crafts and production industry (e.g. reed/thatching grass, furniture, household utensils)<br>•Medicinal products<br>•New species/genetic varieties for utilisation<br>•Biodiversity/natural resource based technologies e.g. lotus plants water proof surfaces, water harvesting surfaces |

| | |
|---|---|
| **Spiritual values** | •Pristine ecosystem<br>• Sites of cultural worship<br>• Species of cultural value<br>• Beauty of species and ecosystem diversity |
| **Health** | •Provision of clean air through cycling of components<br>•Clean water through cycling of nutrients, breakdown of pollutants etc.<br>•Resilience against epidemics<br>•Health and resilience of agricultural and other natural resource produce<br>•Medicinal products<br>•Spiritual values |
| **Technological and industrial innovations Medicinal products** | •Traditional knowledge and innovations<br>•Industrial products such as waxes (e.g. from lotus), surfaces for efficient water harvesting (tenebrionid beetles from Namib desert)<br>•Many potentially useful adaptations esp. In extreme environments e.g. heat adaptation, water use efficiency, which can be used<br>•Marketable genetic and species materials |
| **Scientific collaboration and knowledge exchanges** | •Scientific research; basis for scientific exchange, training, partnerships<br>•Indigenous and local knowledge systems |

**Table 3:** *Total economic value of biodiversity*

Under some variants of this classification, option values are classified as indirect use values. However, all of them highlight the need to distinguish different values (e.g. Krutilla, 1967; Weisbrod, 1964; Arrow and Fisher, 1974; Pearce and Tuner, 1990; Perrings et al., 1995; Dasgupta, 2000, OECD, 1995, 2002; IUCN, 2001; Grimble & Laidlaw, 2002).

| ***Total economic value*** | | | |
|---|---|---|---|
| **Use values** | | **Non-use values** | |
| *Direct* | *Indirect* | *Option* | *Existence/bequest* |
| • Bushmeat<br>• Ecotourism<br>• Technology | • Watershed protection<br>• Pollinators & seed dispersers<br>• Resilience e.g. to climate change, drought, pests and other natural and human induced disasters<br>• Aesthetical value | • Assuring of possibility of future use | • Charismatic megafauna preserved for future generations |
| • Agricultural products<br>• Game hunting<br>• Production of surfaces e.g. waxes based on BD examples<br>• Genetic varieties and strains from wild species | • Water quality<br>• Air quality<br>• Soil fertility | | • Spiritual value |

**Box 1: Economic valuation tools**

Economic tools for biodiversity valuation can be classified according to three different types.

- Market-price approaches use market prices occurring in the market for the biodiversity asset or prices that are revealed in some other markets.
- Stated preference approaches use willingness to pay estimates derived from questionnaires.
- Benefits function transfer approaches use values borrowed from existing studies.

*Price-based tools*
These tools are able to capture those components of biodiversity whose value is reflected in market prices for biodiversity goods and services (the direct and indirect use values). They can be further differentiated as follows.

- The observed market and related good prices can be used to assess the value of the biological asset. The method consists in correcting observed market prices for production and transport costs as well as for any known price distortions (e.g., taxes and subsidies).
- The productivity method values biological resources as inputs by observing the physical changes in environmental quality and estimating what differences these changes will make to the value of marketed goods and services. The difference in the value of the marketed output is the value attributed to the change in environmental quality.
- Cost-based valuation approaches may rely on replacement or restoration costs, relocation costs, or preventative expenditures. The value assigned to the environmental asset is the cost of different measures that would ensure the maintenance of the services of the environmental asset.

Revealed preference methods also use observed behaviour on markets to infer environmental values. However, these approaches rely on prices observed in surrogate markets that are affected by a non-marketable environmental asset.

- Under the travel cost method, the travel costs incurred by individuals to visit environmental amenities or recreational sites serve as a proxy for the value of the relevant environmental assets.
- The hedonic price method relies on the fact that some goods are in demand because of characteristics relating to environmental quality (e.g., houses). To assign value to environmental quality, it isolates the price differential that is paid on the market for these environment-related characteristic

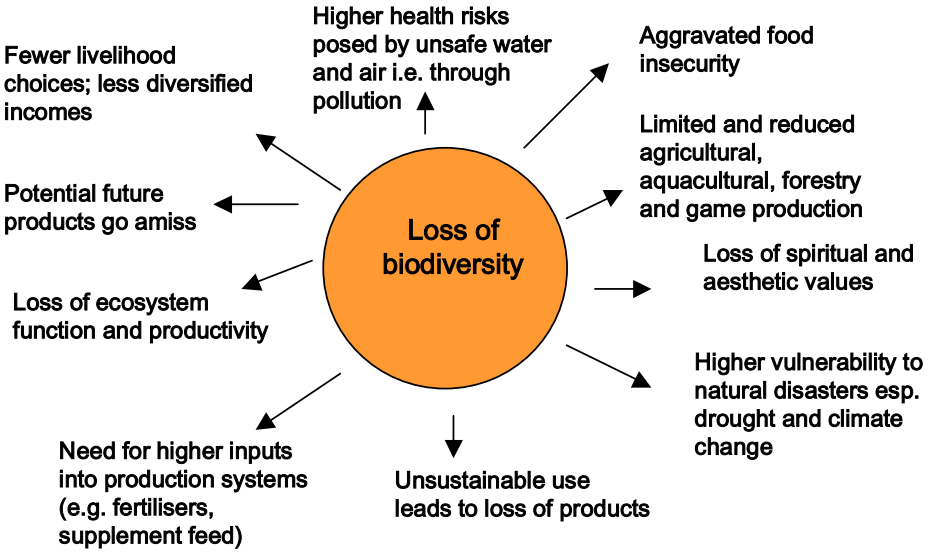
*Willingness-to-pay estimates (stated preferences):*
Stated preference approaches are questionnaire-based tools. By means of a set of carefully designed questions, they seek to elicit the willingness-to-pay of a representative group in regard to changes in environmental quality. They can further be differentiated into the contingent valuation method (CVM) and attribute based choice modelling methods or conjoint analysis (including choice experiments, contingent ranking and rating as well as paired comparison methods). The difference is that CVM directly asks for the willingness-to-pay, whereas other approaches elicit the willingness-to-pay only indirectly, though a set of observed trade-offs made by respondents. Stated preference methods can also elucidate non-use values.

**Benefit (function) transfer approach**

Benefit transfer potentially avoids the cost and time of engaging in primary studies (in which the willingness-to-pay is elicited with one or more of the methods enumerated above) by borrowing the estimates from the site or sites of the primary studies and applying it to the site that is to be studied now. A meta-analysis on existing studies would seek to explain the differences in the willingness-to-pay estimates. Benefits transfer is still a developing subject. The vision is to borrow from a library of valuation studies and applying them to new sites and issues. However, the existence of a large set of high-quality primary studies is a crucial pre-condition.

Source: OECD (2002), 89-132.

**Figure 1:** *Socio-economic impacts of loss of biodiversity of dry and sub-humid lands*



**Box 2:** Some indicative costs of resource degradation for an Uukwaluudhi household, Oshana, Namibia (Quan et al., 1994; http://www.dea.met.gov.na)

| | N$ per year (1994: 1 N$ +/- 0.2 U) |
|---|---|
| **Lost fuel wood supply**<br>Cost of commercially purchased fuelwood<br>1bundle/day @ N$2 per bundle | 720 |
| **Lost fencing material**<br>Cost of purchasing wire and poles for replacing 1/5 of fence around mahangu field | 400-640 |
| **Lost livestock** due to lack of access to grazing, exacerbation of drought; replacement cost of 2 cattle, 3 goats | 480 |
| **Lost milk output** due to lost/inaccessible cattle; 50% loss of 6 months output of small milking herd; Cost of purchasing substitute protein plus loss of income from sale of surplus | 300-600 |
| **Reduced millet production** due to shortage of cattle dung; Purchase of commercial substitute foods (Millimeal) for 1.5 months | 165 |
| **TOTAL national costs which might be incurred in a single year** | N$ 2,065 – 2,565 |

These costs are beyond the means of most households in Uukwaluudhi and most regions in Namibia, according to data available. In practice people's coping strategies are to:

- Use natural substitutes, which has an opportunity cost, either for the labour time, for the substitute's better alternative use, and potential depletion of a unsustainably used resource
- Use commercially available substitutes, at urban or village prices
- Reply on informal family or local support structures, which may carry reciprocal obligations and might not be sustainable
- Go without,

All to varying degrees, according to the opportunities and means available.

***Note:*** *1. Non-monetizable economic costs are excluded; 2. building and house/fence maintenance costs have not been calculated and are excluded, although in principle monetizable; 3. It is assumed that 3 months' millet requirement and 6 months' milk output is lost, of which 650% is attributable to long-term degradation rather than drought. In practice, these two sets of losses are inseparable and the costs faced by households would be higher.*

**Table 4:** *Land use changes, associated degradation processes in arid, semi-arid, Mediterranean, savannah and grassland ecosystems, and poverty related constraints.*

| ***Land use change*** | ***Associated degradation processes*** | ***Poverty related constraints*** |
|---|---|---|
| Habitat conversion<br>Wild land to cultivated land<br>Urban expansion | Vegetation clearing, deforestation<br>Set bush fires<br>Habitat fragmentation and loss | Need for more land, even less suitable land will be converted, although it might be obvious that it will not be agriculturally productive for long, especially without fertilizer inputs etc. |
| Irrigation versus rain-fed production systems | Salinization<br>Water over-utilization<br>Leaching of soil nutrients | |
| Overgrazing | Change of biotic and soil biotic communities (including species loss), in some cases leading to disruption of biogeochemical processes<br>Loss of productivity | Causes can include: lack of alternative gazing areas, especially in periods of prolonged drought, overstocking, disruption of traditional range management systems (e.g. nomadic, rotational); poverty can exacerbate these |
| Intrusion into protected areas | Loss of wild habitat<br>Introduction of livestock and human activity into exclusion areas, competition leading loss of wild species<br>Poaching | Need for more grazing land, as well as firewood and other bush products |
| Biological diversity resource use change<br>Exploitation of species previously not utelised and marketed | Over-exploitation/harvesting of resource | Lack of knowledge on natural resource management, the resource itself, especially in the context of a producing and supplying a marketable good |
| Changing/eroding land, water and natural resource use and management practices | Often associated with higher user pressure and lack of adapted and more appropriate management systems | Pressure and higher production expectation<br>Erosion of traditional knowledge systems, modern education does not necessarily fill the gaps<br>Lack of incentives for good management e.g. where user and |

| | | |
|---|---|---|
| | | property rights are not clarified and pro-poor |
| Institutional changes | Government intervention, dis-empowerment, disincentives for self initiative, other perverse incentives<br>Careless utilization and no management of resources<br>Erosion of traditional systems, changes in governance<br>Weak property and use right systems | Lack of financial and human capital for intensive management<br>General lack of expertise and capacity<br>Lack of responsibilities - and rights |
| Traditional biodiversity values degraded, information on new generation of biodiversity values not known and capitalized on | Ignorance of biodiversity values and potential<br>Degradation of resource, often out of ignorance | Lack of relevant information and capacities to capitalize on such potential usage |
| Urbanization | Pollution, poor waste and sanitation management | On national and industrial level: often in appropriate, old technologies<br>Lack of infrastructure, know-how and incentive to self-act |

### *3.6 Working group 6: Measures taken for the conservation and sustainable use of biodiversity, including the role of ex situ conservation, resource management and preventive measures; measures taken for the support of sustainable livelihoods*

**Contents**



***Note of the editor:*** *This working group reviewed measures taken under activities7 to 9 "targeted actions" of the programme of work on dry and sub-humid lands biodiversity. The relevant headings are being used in the following text.*

135. There are undoubtedly a lot of efforts put in conservation of biological diversity by various key stakeholders in drylands. It is anticipated that most of the efforts are fragmented and not always well recorded and tend to be biased towards a specific resource.

*Activity 7: Promotion of specific measures for the conservation and sustainable use of the biological diversity of dry and sub-humid lands, through, inter alia actions (a)-(m)*

*(a) The use and the establishment of additional protected areas and the development of further specific measures for the conservation of the biodiversity*

136. The working group acknowledged that there are a number of protected areas (PA) and networks (physical and for people) established by the member countries to conserve biodiversity, mainly in threatened areas. Many countries (in Africa, Asia, Latin America, and the Near East) have developed extensive experience and skills, and have put into place appropriate legal and policy measures for biological conservation and improvement.

137. A range of internationally operating organizations including IUCN, WWF, FAO, UNESCO have assisted member countries in establishing and managing protected areas. The pattern of protected areas remains uneven, especially in terms of distribution and the variability of the types.

138. Although the number of protected areas has increased in recent years in both developed and developing countries, it has to be noted that generally biodiversity conservation issues have not been well addressed, not even in protected areas. For example in Sahelian Africa, most of the protected areas established since early fifties have been partially or totally destroyed, due to various causes, including climate degradation and overuse by increase population. In addition, the status of the protected areas, objectives and the effectiveness of their management techniques, remain a major problem for sustainable conservation.

*(b) The rehabilitation or restoration of the biodiversity of degraded dry and sub-humid lands.*

139. It was noted that various forms of land reclamation and rehabilitation undertaken manually or mechanically have improved soil and water conservation in many countries. Restoration of biological diversity in degraded drylands through afforestation/protection is of growing importance in both the developed countries and the developing world.

*(c) The management of invasive alien species*

140. It was noted that alien species represent a major disruption for all biotic systems including terrestrial and aquatic, managed and wild. These species seem to have double effects, one is of economic and human health interest and the second has negative effects on plant and crop growth.

Most of the countries have taken appropriate measures and have institutional capacities to mitigate adverse effects of invasive alien species.

141. The working group also recognises issues related to invasive alien have been addressed in different occasions and forums (ICIPE, SBSTTA, COP 6) and appropriate guidelines to address the problem are in support of decision VI/23 of COP 6.

*(d) The sustainable management of dry and sub-humid land production systems*

142. The working group recognized that given the escalating population growth, intensified cropping, widespread land degradation, shrinking agricultural lands, and with regard to increased demands on limited water resources, environmental and biodiversity conservation is becoming more critical.

143. Natural resource degradation and the breakdown of the traditional land use systems in drylands have induced many changes in agricultural production practices during the last three decades throughout sub-Saharan Africa, Asia and the Near East. Each transition has required an adoption of new strategies or technologies aiming at reducing desertification and the impact of the causes of climate change.

*(e) The appropriate management and sustainable use of water resources*

144. Despite the aridity of the areas, drylands encompass a huge potential of water resources (e.g. lakes, rivers, oasis, cricks, ground waters). They are habitats for important wildlife (birds and animals). However, in many areas, particularly in Mediterranean, India and coastal Sahel, most of the water resources are not suitable for plant growth, due to salinity, acidity or alkalinity.

145. Due to the growing need for drinking water for the population and irrigated agricultural production and industrialization process, including mining, aquatic ecosystems are at threat from water shortage and pollution induced by salinization increase and intensive use of chemical fertilizers and pesticides.

146. Appropriate measures to transfer water and irrigation management responsibilities from public authorities to farmers with assistance from NGOs and private sector should be encouraged, including through financial support.

*(f) Where necessary, the conservation in situ as well as ex situ, as a complement to the latter, of the biodiversity of dry and sub-humid lands, taking due account of better understanding of climate variability in developing effective in situ biological conservation strategies*

147. Regarding the progress made since COP V held in the year 2000, it was mentioned that there has certainly been progress in *ex situ* plant conservation. The CBD's Global Strategy for Plant Conservation, for example, revised its target to 60 percent of threatened plant species in accessible *ex situ* collections.

148. Many efforts have been developed in the past regarding (i) *ex situ* conservation of major food crop genetic resources and (ii) *in situ* conservation of natural systems in protected areas.

149. *In situ* conservation through protected forest areas and woodlands has increased in recent years, both in number and in area. However, particularly in tropical areas, only a minor portion of all the so-called protected areas is actually secure. Unfortunately, only rarely are genetic studies available, and even when data exist there are difficulties in readily using such information for identifying conservation priorities.

150. Regarding the *ex situ* conservation, it is important to note that various national regional and international institutions, programmes and projects have participated in wide-range collections and conservation in gene-banks of tropical food crop and tree genetic resources, including dryland species.

151. These species enrich and/or complement the biological diversity of the habitat by introducing new/formerly present but then locally extinct species into the ecosystem. Conservation of natural species away from the areas of adaptation and natural occurrence and growth is part of the mandates of some of the Government Ministries (Agriculture, Environment or forestry) of the member countries provide *ex situ* conservation programs and strategies at national research institutions.

152. Much interest is currently focused on identifying the genetic basis for drought tolerance, salt tolerance and other traits associated with stress conditions that could eventually be utilized to improve productivity in dryland agriculture.

*(g) The economic valuation of the biodiversity of dry and sub-humid lands, as well as the development and the use if economic instruments and the promotion of the introduction of adaptive technologies that enhance productivity of dry and sub-humid lands ecosystems*

153. In marginal and difficult farming conditions biodiversity management (crop, genetic resources, plants, wildlife) has become a central part of the livelihood strategies of farmers and communities for biodiversity conservation. The diversity of plant and animal species maintained in traditional farming systems over many centuries and the knowledge associated with managing these resources constitute key assets of the rural poor.

154. The working group acknowledged the added value of indigenous knowledge especially of medicinal plants and ecosystems management. With decreasing natural stocks of medicinal plants, traditional healers are now interested in sustainable management of non-wood forest products and conservation of the biological diversity.

155. However, critical levels of biological diversity loss and/or change, as well as the human impacts that cause them and which affect dryland ecosystem functioning are still largely unknown.

*(h) The sustainable use or husbandry of plant and animal biomass, through adaptive management, bearing in mind the potential population fluctuation in dry and sub-humid lands, and the support by Parties of national policies, legislation and land-use practices, which promote effective biodiversity conservation and sustainable use*

156. Over the centuries farmers and herders have developed effective systems of land use, allowing for the re-growth of the natural vegetation and the restoration of soil fertility to ensure sustainability through practices such as shifting cultivation in the savannah, humid tropics and nomadic grazing in the semi-arid areas. Wildlife and natural vegetation are thought to be severely affected, but tree-based and other diverse production systems contribute to diversification of agricultural production and enhancement of agro-biodiversity.

157. Many governments have implemented environmental policies with incentive measures to draw the private sector within the programme of work.

*(i) The establishment and promotion of training, education and public awareness*

158. Progress has been made at the training and education level. Many countries in Africa, particularly in Sahel, in Asia and Latin America have implemented projects aiming at training and teaching school children and students the best practices of biological diversity conservation. More work was also done regarding public awareness raising about the relevance of biological conservation, e.g. under the Global Initiative on Biological Diversity Education and Public Awareness of UNEP (UNEP/CBD/COP/6/613/Add.2) and also FAO field program.

159. There is also a general understanding of the objectives of the framework of CBD and CCD as a vehicle of development and conservation and safe use of natural resources.

*(j) The facilitation and improvement of the availability, the accessibility and exchange of information on sustainable use of biological diversity of dry and sub-humid lands*

160. The working group noted that this issue is linked to information/knowledge sharing and should be addressed within the networking framework. The CBD Clearing House Mechanism (CHM) has a significant role to play supported by national programmes to achieve local delivery.

161. In October 2001, a Civil Society Dialogue was organised by UNCCD in order to improve dialogue and information exchange between farmers, privates, NGOs and Governmental policy and decision-makers involved in desertification and biodiversity conservation issues.

162. The mechanisms by which these conventions might be made to work are not yet well defined. At national and regional level, there is the challenge of shaping existing governmental institutions to respond to the new demands of implementing projects to satisfy the biological conservation requirements.

*(k) The establishment and promotion of research and development programmes with a focus on, inter alia, building local capacity for effective conservation and sustainable use of biodiversity of dry and sub-humid lands*

163. Government of many countries have been supporting research activities focused on crop and plant selection and improvement, with financial and technical assistance from donors and cooperation agencies, particularly FAO, World Bank, UNEP and UNDP through GEF projects.

164. However, due to the weakness of the economy, many countries, particularly developing countries, have not been able to provide sustainable financial support to research programmes and institutions to carry out assessment and taxonomic studies to identify all effective level of biodiversity.

*(l) Cooperation with the Ramsar Convention on Wetlands and the Convention on the Conservation of Migratory Species with regard to, inter alia, integrated catchment management incorporating wetlands ecosystems as integral part of dry and sub-humid lands, and the creation of migratory-species corridors across dry and sub-humid lands during seasonal periods, as well as the Convention on International Trade in Endangered Species (CITES) with regard to rare and endangered species in dry and sub-humid lands*

165. The working group recognized that in this regard Convention on Biological Diversity and the Convention on Wetlands are already cooperating to a significant extent, and there was a joint programme of work. A joint programme of work was also already in preparation in collaboration with the Convention on Migratory Species.

*(m) Cooperation with all relevant conventions, in particular with the Convention to Combat Desertification (CCD) with respect to, inter alia, the sustainable use of the biological diversity of dry and sub-humid lands, the application of ecosystem approach, the assessment of the status and trends of this biological diversity as well as to its threats.*

166. Assessment done by the first AHTEG meeting recognized that several interregional cooperation meetings between Africa and Latin America have been held: for example the Third African/Latin American and Caribbean interregional forum organized by CCD held in Caracas, Venezuela in February 2002.

167. Further to the technical questions related to the management of natural resources and capacity building, there is a need to find a common way to include specific needs of our region in the development scenario, such as

- Economic valuation of dry ecosystems;
- Improvement of productivity for agricultural activities and fisheries;
- Improvement of the education and health indexes;
- Setting up of instruments and economic mechanisms to control the deterioration of environment;
- The inclusion of concrete measures in the national development plans; and
- Improvement of the quality of life of local communities so that their participation in the management of resources is facilitated.

*Activity 8: promotion of responsible resource management, at appropriate levels, applying the ecosystem approach, through an enabling environment, including, inter alia actions(a)-(e)*

(a) *Strengthening of appropriate local institutional structures for resource management, supporting indigenous and local techniques of resource use that enable conservation and sustainable use in the long-term, and/or combining appropriate existing institutions and techniques with innovative approaches to enable synergies.*

168. Traditional knowledge has been recognized to play an important role in the conservation of biological diversity, because farmer's livelihood is directly related. With regard to some activities (e.g., soil stabilization measures), the use of traditional knowledge as reflected in traditional management systems and institutions, may be particularly effective when combined with the introduction of new adaptive technologies.

169. The fifth meeting of the Conference of the Parties to the UNCCD in Geneva recognized that secure access to land and entitlement to productive resources including water and credit are core issues in the fight against desertification, including biological diversity degradation.

*(b) Decentralization of management to the lowest level, as appropriate, keeping in mind the need for common resource management and with due consideration to, inter alia, involving indigenous and local communities in planning and managing projects*

170. For more involvement of all stakeholders, at the country level, various political, policy and institutional measures have been taken towards decentralization of decision-making for natural resource management. Most national action programmes (NAPs) prepared under the UNCCD, and which also protect the environment, are strongly supported by decentralization policy and legal measures.

171. It was noted that the implementation of these decentralization frameworks has involved many stakeholders, particularly farmers and private sector in the process of tree protection and woodlot establishment for diverse purposes and uses, through community-based management approaches. This decentralization process has an increasing understanding at country level, and highlights also the importance of considering biodiversity issues in all development activities or programmes.

172. Unfortunately, although this involvement of the stakeholders and the decentralization of the decision-making to a lower level is deemed important, information on such processes and experiences made are sparse and need to be gathered and disseminated in a concise and accessible form. Making experiences and knowledge gained from this process readily available to the stakeholders remains a hot issue.

*(c) Creating or strengthening appropriate institutions for land tenure and conflict resolution.*

173. The issue of land tenure and conflict resolution seems to be very country and government specific. Many countries have established policy and legal measures to mitigate land degradation. However, only few countries have set up mechanisms and restrictions to access land and title by farmers in the long-term, providing appropriate incentive measures, and also resolving conflicts generated from land issues. In practice, these measures for land access and titration have had adverse effects, leading to conflict and population migration to other areas, such as protected areas under government control, accelerating destruction of natural resources upon facilitating the exchange of lands.

174. In many urban and peri-urban areas, and also irrigated agricultural lands, the inhabitants have taken advantage of their lands upon selling, due to the inconsistency and lack of control of the law and the policy put into place.

*(d) Encouraging bilateral and subregional cooperation to address transboundary issues (such as facilitating access to transboundary rangelands), as appropriate, and in accordance with national legislation and international agreements*

175. Transboundary issues are considered very relevant for addressing desertification and biodiversity issues. The use of transboundary resources has always been recognised to be critical and threatened by absence of agreement and appropriate measures to be implemented by the neighbouring countries.

176. At regional level, recently a number of initiatives are being implemented, developing long-term strategies for usage of transboundary resources. These address, amongst other, issues relating to land degradation, impacts on water and other resources, including biodiversity loss. For example, in 1998 GEF funded a transboundary project (Mauritania, Senegal) along the Senegal River valley addressing land degradation and biodiversity loss through soil and water conservation. The results and experience gained from this project will be extended to other countries with similar situation.

177. At international level, over the last ten years the importance of maintaining agricultural biodiversity has been increasingly recognized by international agencies and in international agreements. Examples include CBD decision V/5, the adoption of work programmes on agricultural biodiversity by both CBD and GEF, the development of the International Treaty on Plant Genetic Resources for Food and Agriculture (PGRFA), the work of the FAO Commission on Genetic Resources for Food and Agriculture (GRFA), and the inclusion of specific targets on sustainable production in the CBD's Global Plant Strategy. The most recent ($6^{th}$) Conference of the parties of the CBD reviewed work on agricultural biodiversity and called for further action on increasing our understanding of the functions of biodiversity in agro-ecosystems and on promoting methods of sustainable agriculture that maintain appropriate levels of biodiversity.

178. There has also been an increasing number of international, national and local actions on agricultural biodiversity management over last few years as shown by the work of the Community Biodiversity Development and Conservation Programme (CBDC), the IPGRI global on farm conservation project, the People Land Management and Environmental Change Project (PLEC) and CIAT-TSBF-GEF below ground biodiversity project (BGBD).

*(e) Harmonizing sectoral policies and instruments to promote the conservation and the sustainable use of biological diversity of dry and sub-humid lands, including by, inter alia, taking advantage of the existing national action programmes under the Convention to Combat Desertification frameworks at the country level, as well as, as appropriate, other existing and relevant sectoral plans and policies.*

179. It was noted that many national action programmes (NAP), also relating to biological diversity, have been designed and implemented by the member countries. Many CCD NAP have been carried out to date in Africa and Asia. The process of designing the UNCCD NAPs was based on the analysis of the status, extent, threats and processes of desertification within the countries and their impacts on the livelihoods and biodiversity conservation. A part from that, the NAP examines legal, financial, and institutional measures to ensure the implementation of specific actions which impacts have local and global benefits to biodiversity. All of them have set up the aims by which implement long-term objectives on conservation and restoration and proper use of biological resources of the country.

180. At the Fifth Conference of the Parties (COP 5) of the UNCCD important decisions paving the way for an improved implementation of the Convention were taken. It was noted, so far global problems such as drought, poverty and food insecurity have been tackled within the CCD institutional mechanisms in an unsatisfactory way. There is a need to move towards effective responses to the challenges faced by some of the world's poorest countries experiencing dryland. In this line on 22 January 2002 the Commission has met with the UNCCD Secretariat in Brussels to define a systematic and planned approach to pursue awareness raising activities on the objectives of the UNCCD so to mainstream CCD issues into poverty reduction strategies at all levels, also in the context of community development cooperation. It is expected that this new trail can reverse the unsatisfactory trend experienced during the first five years of operation of the Convention.

181. The crucial role played by NGOs in the implementation of the Convention is not always recognised since their work often has little visibility. One of the basic requests expressed by NGOs concerned the possibility of establishing an effective information exchange channel between communities, government and civil society that could be regularly used to circulate relevant information on UNCCD and other matters, including awareness raising, implementation of activities, development of concerted positions on different issues, information about ongoing and new projects, input to the "institutional" functioning of the Convention, in a partnership between the community, national and NGO level.

182. Community-based natural resources management (CBNRM) approaches seem to facilitate processes that could help restore the original biological conservation concept amongst societies. Incentives to provide an enabling environment for the conservation of biological diversity are keys to meeting the objectives of the Convention on Biological Diversity.

*Activity 9: support for sustainable livelihoods through, inter alia actions a-e*

*(a) Diversifying sources of income to reduce the negative pressures on the biological diversity of dry and sub-humid lands*

183. Although some farmers have developed sound traditional technologies years to conserve biodiversity throughout the, it is noted that some evidence indicates that in the less marginal areas, the poorer a farming household, the more reliant it is likely to be on biodiversity for its livelihood.

184. However, in many cases, when change occurs, resilience provides the components for renewal and reorganization. In a system that has lost its resilience, adaptation to change is not possible and therefore, all change is potentially disastrous. The consequences of biodiversity decline for small-scale farmers in developing countries can be devastating with substantial decrease in the resilience of farmers' agro-ecosystems and a consequent increase in farmers' vulnerability.

185. New opportunities for income diversification and improvement have taken some farmers to abandon their traditional crops for high yield and quick money crops. In many case, these changes have been freely adopted by the farmers on the information concerning the price of the product and the incentives provided by the government or the private companies trading the products.

*Crop diversity management*

186. Management of crop-biodiversity by local farmers in drylands dates back to the dawn of agriculture. This has generated a vast array of farming systems and crop genetic resources.

187. The last three decades of farming systems research have shown the tremendous diversity and vitality of many traditional cropping systems in drylands, as elsewhere. It is now better appreciated the reasons why farmers continue to nurture biodiversity despite pressures to convert to mechanized mono-cropping. This has much to do with risk management, balancing long-term ecological sustainability versus short-term gains, and multiple uses and products rather than specialization in productivity.

*Grazing and rangeland management*

188. Regarding rangeland resource management, indigenous pastoralists have acquired extensive knowledge of species, habitats and key ecological processes and have developed efficient management skills for the dryland grazing agro-pastoral ecosystems, contributing to the conservation of great diversity in domestic livestock.

189. Contrary to the widely held view that herders in their ignorance are raising their animals in an irrational way and destroying the environment, traditional herders have accumulated invaluable indigenous knowledge and skills for optimum use of their marginal land.

*(b) Promoting sustainable harvesting including of wildlife, as well as ranching, including game-ranching*

190. Promotion of crop genetic diversity is part of farmer's coping strategies for mitigating weather unpredictability; it also reduces the so-called "hunger period" by spreading availability of food products over time. For example, in mixed farming, green leaves from cowpeas may be harvested as early as 21 days after sowing, whereas early green maize harvest is done at 60 days and late material at 120 days.

191. Farmers maintain different varieties of maize, sorghum and other crops because of the two above reasons. Evidence from other dryland ecosystems types support these findings that farmers value having agricultural biodiversity in their farming systems. This has been the experience with millet farmers in Rajastan in India and Sahel, with sorghum farmers in Tharaka, Kenya, with sorghum and millet farmers in Zimbabwe and West Africa, and with potato farmers in Peru.

192. Rubyogo (1999) investigated farmers' crop variety ranking criteria in Kenya and reports the use of the following criteria:

- Early maturity (drought escaping)
- Drought tolerant
- Stable and if possible high yield
- Pest/disease and weed tolerance
- Socio-economic criteria - e.g. variety for market production or household consumption.

193. Progress in range science and better appreciation for indigenous knowledge have increased our awareness of the resilience of rangelands and the reversibility of the alleged degradation of rangeland ecosystems.

*Exploring innovative sustainable uses of the biological diversity of dry and sub-humid lands for local income generation, and promoting their wider application*

194. Plants and wildlife biodiversity is used in a variety of ways, including direct or commercial use of products, without any appropriate legal or regulatory measure. Because of this, in many countries sport hunting of game and trophy species has contributed to the extinction of some valuable and rare animals, which are harvested every year on special licences issued to foreign hunters. For instance, in Mongolia, about 59 mammals, 128 birds and 30 fish species are utilized for commercial purposes and for direct subsistence without appropriate control.

195. The lack of appropriate measures is mainly due to the fact that Government do not have adequate tools and required human resources to assess the level of biodiversity and to identify the endangered species. However with assistance from international development agencies, donors and NGOs, legal measures and technical guidance to promote efficient use of the biodiversity are being put into place by number of member countries.

*(c) Developing markets for products derived from the sustainable use of biological diversity in dry and sub-humid lands, adding value to harvested produce*

196. Information on this issue is very limited and not well documented. Further assessment is needed at country and global levels.

*(d) Establishing mechanisms and frameworks for promoting fair and equitable sharing of the benefits arising out of the utilization of the genetic resources of dry and sub-humid lands, including bioprospecting*

197. The relative importance and scope of the identified benefits largely depend on the peculiarities of the area under consideration, for instance, on the type of dry and sub-humid land. As effective policy responses need to be based, inter alia, on the identification of these benefits and the socio-economic implications of their loss, this observation prohibits the use of "one-size-fits-all" instruments and calls for the use of a carefully tailored policy package.

198. Biological development based on genetic resources is one of the important issues for the sustainable development of drylands economy, which offers their biodiversity for improving agriculture, forestry and health, industry and environment.

*Recommendations*

The working group recommends:

1. That improvement of protected areas management should entail the involvement of the local people and relevant stakeholders, including recognizing the importance of participatory management, the incorporation of traditional systems, and the socio-economic benefits arising from such initiatives.

2. That the role and participation of main stakeholders, particularly the private sector, would be facilitated if activities in question made business sense for the farmers.

3. To recognize that the conservation of dryland biological diversity should be an overall objective of sustainable management of all types of protected lands and by all countries.

4. That experience and advice provided by IUCN, WWF, FAO, UNESCO on issues of the protected areas need to be fed into the development exercise.

5. That the Parties encourage establishment and use of additional protected areas through

concessions to the private sector or conversion of endangered private land, as appropriate.

6. That the Parties and relevant organizations review and identify the distribution of protected areas and compare it with dry and sub-humid land distribution to see how much of the protected areas actually cover drylands (such as UNESCO MAB Biosphere Reserves, Ramsar sites and World Heritage sites).

7. That the Parties take appropriate decisions for the implementation of measures for the conservation and sustainable use of dry and sub-humid land biological diversity during COP 7 building on the recommendations of this working group and the World Congress on Protected Areas (Durban).

8. That dry and sub-humid lands are not homogeneous, thus restoration of biodiversity should be addressed within a specific rather than general context.

9. That clear indicators should be developed that signal whether and at which rate rehabilitation/restoration has taken place at a given site.

10. That the Parties make available and share lessons learned and success stories on the restoration and rehabilitation of the biodiversity of degraded dry and sub-humid lands and make them though existing networks and information systems, such as the CHM of the Convention.

11. That the governments should implement an appropriate environmental policy, including incentive measures to involve and promote all interested stakeholders, with particular attention to the private sector and farmers.

12. In enhancing soil fertility by intensive use of chemical fertilizers for more food production in drylands, during the World Food Summit (WFS) in 1996, there was consensus that special effort was needed to identify and apply solutions to arrest the increasing decline in soil fertility, progressive land degradation, desertification and all the associated problems leading to increased food insecurity and poverty. FAO and World Bank are assisting, and should continue to do so, a number of countries to analyse and re-appraise the entire approach of farming practices through collaborative programmes on sustainable agriculture based on integrated production systems and agro-biodiversity improvement.

13. That measures taken in this regard should be dependent on ecosystems and be consistent with the ecosystem approach and would therefore have different characteristics depending on the region in question.

14. To overcome these constraints many efforts were focused on water management and harvesting. Agricultural production is mainly irrigated with sound drainage techniques and leaching salinity excess from both irrigation water and ground water.

15. That all stakeholders involved in sustainable land development and biodiversity conservation should consider appropriate technology water management in less-favoured rain-fed dry fragile lands, as key component of development strategies for agricultural production and biodiversity conservation, particularly in developing countries.

16. To recognize that biological diversity will never be maintained by a network of protected areas alone, therefore sustainable management of large associated areas is also required.

17. That appropriate legal measures should be enforced by Parties in order to protect the areas against illegal exploitation.

18. That current status of *ex situ* conservation for animals, however, needs to be looked into in detail

to see how future programme of work can be built on the basis of existing information and also the effect of improved genetic resources (GMOs, LMOs, etc.) on biological diversity conservation.

19. That the Parties should be encouraged to develop and implement national strategies for environmental impact assessment, including appropriate legislation and policy to enhance the productivity of the ecosystems. These strategies have the advantage of addressing poverty and socio-economic issues.

20. To better improve biodiversity conservation by farmers, the ecosystem approach should require adaptive management to deal with the complex and dynamic nature of dry ecosystems, and also the absence of complete knowledge or understanding of their functioning.

21. That monitoring of dryland biological diversity and of changes caused by habitat loss are important in order to assess the effectiveness of management strategies and the cumulative change of land use.

22. That in term of management approaches, integrated watershed development should be desired, because of the inter-relatedness of ecological, social and economic factors causing soil and aquatic biodiversity degradation, and also because of the need to include these factors when reclaiming or improving land and water quality.

23. Slow down and reverse the degradation of the natural resources, particularly in fragile areas, through the development and use of appropriate soil and water conservation measures.

24. Promote sustainable production systems for food, fodder, forest and livestock products that improve beneficiaries' incomes and well being on a sustainable basis.

25. That environmental regulation, including restriction of access to protected areas and to title to farmers for a long-term time, should be further developed and fully implemented in all countries.

26. That in the current context of severe threat for biodiversity conservation, to take profit of the valuable traditional knowledge, it should well understood that appropriate institutional, economic and legal measures should be put into place, including economic and cultural incentives.

27. That training, education and awareness should be included as a major component of all development projects.

28. That on the bias of their mutual interest, the parties should try to establish a structured and recurrent pattern of dialogue between all communities working on land degradation and related issues.

29. That it was essential to develop adequate means to ensure a regular consultation and information flow on the respective activities relating to the implementation of the Convention.

To strengthen the country research capacities, there is a need to assess the activity carried out to identify gaps and achievements. Such information might be necessary for helping to better focus the assistance and establish coordinated plan and define adequate approach for national capacity self-assessments.

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### *3.7. Working group 7: Consideration of capacity development and the need of some parties for assistance in seeking resources to develop proposals*

**Contents**



*Background*

199. Capacity development is a cross-cutting issue that requires a conceptual approach that can be conceived in terms of the systemic, institutional and individual dimensions of the process, while also recognizing the dynamic nature of the process. In order to effectively address capacity needs, it is essential to effectively integrate environmental management within a holistic development framework. At the country level, the need for a more integrated approach calls for strengthened national expertise in areas such as natural resources mapping, environmental economics, ecosystem management and taxonomy, among others.

200. Developing capacity at the institutional level implies the need to adjust existing structures, whereas at the individual level, it is likely to involve demands for new and more focused forms of training. At the systems level, there is need to integrate capacity development interventions into a holistic development framework in order to ensure a more systematic integration of such needs into the overall national planning process. It is necessary to integrate systems for environmental management in order to achieve a better linkage among political, legal and institutional frameworks. This would include the strengthening of mechanism to initiate dialogue, seek consensus and integrate environmental considerations within sectoral policies and development plans. National self-assessments of capacity development need to be participatory, nationally driven, and should receive needed technical and financial support. Equally, targeted capacity development initiatives should enable countries to address priority issues within the framework of global environmental conventions, and to revisit the way in which capacity development activities are being designed and implemented within the context of existing and future projects.

201. Strengthening the capacity of countries to undertake global environmental management is an important objective of the CBD and the UNCCD. The Convention frameworks provide the basis for action, set out the guiding principles and initial scopes of activities that will need to be supported in a coordinated manner in order to promote sustainable development in countries, while meeting convention objectives. The specific objective of capacity building efforts is to build capacity, where none exists, and develop, strengthen, enhance, improve and retain the capabilities of the countries to achieve the objectives of disciplines and institutions, as well as across the conventions.

202. Recently, the issue of capacity building has received renewed attention from the conventions as it has become increasingly clear that capacity needs and priorities of Parties will have to be addressed in a systematic way if countries are to be effective in implementing the Conventions. This became very clear through the Global Environment Facility (GEF) supported capacity development initiative study, through which the GEF developed the "Elements for Strategic Collaboration and a Framework for GEF Action for Capacity Building for the Global Environment", which is a framework for GEF support to countries to build/strengthen capacities to address issues of concern for implementation of the conventions. The objective of this ongoing initiative is to produce a comprehensive approach for developing the capacities needed at the country level to meet the challenges of global environmental management. This initiative has evolved through a consultative process involving extensive outreach and dialogue to identify countries' priority issues and capacity development needs, and, based on these findings, to develop a strategy and action plan that addresses identified needs. The process has brought to the fore some priority issues and capacity development

needs of countries in responding to the global environmental management challenges presented in the three thematic areas of biodiversity, climate change and land degradation.

203. The broad capacity building needs identified by the Conventions, through the GEF supported capacity development initiative study reveals the enormity of the task of capacity development, and that it needs to be accomplished through partnerships. Moreover, a coordinated and cost-effective response demands the exploitation, wherever possible, of synergies between the capacity building requirements of various conventions.

*Areas of capacity-building needs as reflected in the Convention on Biological Diversity and UNCCD*

204. Within the context of national commitments under the Convention on Biological Diversity and the UNCCD most countries have identified priority issues for capacity building. While the emphasis on each issue varies from country to country, many are common across both countries and regions, and can be summarized as follows:

(a) *Awareness and knowledge*:

(i) Raising the low levels of awareness and knowledge of biodiversity issues of dry and sub-humid lands, particularly targeting women, youth and the NGO community in general;

(ii) Building public support and mobilizing government, professional bodies, and regional and international agencies to participate in actions to prevent land degradation;

(iii) Management and delivery of biodiversity information and knowledge, including both monitoring and gap filling;

(iv) Taking appropriate measures to avoid the loss of indigenous biodiversity knowledge and technology;

(v) Identifying areas facing imminent or possible threat of degradation, as well as factors and activities that lead to degradation, and their root causes, and the impacts of land degradation.

(b) *Policy-making*:

(i) Integrating land degradation and biodiversity concerns into existing, making or planning policies, laws and programs including establishing priorities and developing action plans;

(ii) Identifying and addressing gaps, overlaps and conflicts in legal and regulatory frameworks and institutional jurisdictions and mandates;

(c) *Implementation of Convention provisions and theoretical underpinnings*:

(i) Promoting access and benefit sharing and developing skills in environmental economics and taxonomy;

(ii) Promoting *in situ* management of biodiversity, in particular protected areas and their integration into the surrounding landscape, and ex situ conservation of both wild and domestic biodiversity (botanical gardens, zoos, gene banks, etc.) including launching field programmes;

(e) *Institutional capacity development*:

(i) Supporting the development of capacity of institutions dealing with the issues of biodiversity of dry and sub-humid lands;

(ii) Promoting the capacity of research institutions, and specialized institutions of excellence and encouraging the dissemination of best practices.

205. Priority capacity development needs in the thematic area of biodiversity of dry and sub-humid lands are predominantly of a broad systemic nature, but also come with a range of supporting needs at the level of institutions and individuals. The above areas of capacity development as reflected in the Convention on Biological Diversity and the UNCCD also apply to the needs for this thematic area. Moreover the report of the Consultative Group on Biological Diversity Education and Public Awareness (UNEP/CBD/COP/6/13/Add.2) also contains important capacity building elements, which if targeted to dry and sub-humid land areas for implementation would go a long way in meeting the needs in this thematic area.

*Recommendations*

1. Recognizing the sovereignty of Parties and the national responsibilities which accompany it; the AHTEG reiterated the importance of the initiative supported by the GEF and other partners, to help countries undertake "National Capacity Self Assessments (NCSA)" for Global Environmental Management, and which is geared to assist countries to articulate their capacity building needs. In this regard, the AHTEG reinforced the view that developing country Parties and those with economies in transition should speedily undertake the comprehensive self-assessment sought by the NCSAs, in order that gaps can be quickly identified and filled.

2. The AHTEG recommends that needy countries in dry and sub-humid lands should be supported to raise the project development and management skills, which currently inhibits their ability to access the available and necessary financial support for their work on behalf of both the Convention on Biological Diversity and UNCCD. The AHTEG commends the on-going UNCCD initiative, in collaboration with other partners, to assist countries build their capacity for developing proposals for submission to funding agencies, such as GEF.

3. The AHTEG also reiterated that country Parties:

   (a) Develop a plan of action to address the critical capacity constraints identified in the overall project ("institutional strengthening and enabling activities" to comply with the project to develop greater capacity) in order to enhance national capacities in a sustainable and cost-effective manner;

   (b) Request Parties to review and where necessary amend their working practices to ensure work in support of all the three Rio Conventions is fully coordinated and so cost-effective in achieving sustainable development and promoting synergy;

   (c) Consider the capacity available to bring the value of biological diversity to civil society within the dry- and sub-humid lands, particularly aware of the fact that survival of human beings on these fragile lands is often a pressing concern;

   (d) Build capacity in understanding traditional value systems so they can be properly included in non-use economic valuation.

4. The AHTEG recommended that capacity-building, particularly at the national and local levels, as well as investments in the development and promotion of sustainable livelihoods, including alternative livelihoods and conservation measures, through participatory and bottom-up processes, with funding from bilateral sources, and catalytic support from international organizations. The issues of development and testing of indicators, incorporation of socio-economic considerations, should also be taken into account.

### *3.8. Working group 8: International priorities set up at the regional and global levels, and made proposals for expected outcomes, further activities, possible actors, and timetables for action*

**Contents**



*Background*

206. The working group

(a) Considered international priorities set at the regional and global levels and decided to focus on the CBD draft programme of work on biodiversity of dry and sub-humid, which encompasses most of the priorities;

(b) Examined whether some activities in the programme of work need refinement; and

(c) Discussed priorities of the programme of work.

*Programme of work on biodiversity of dry and sub-humid lands*

207. The programme of work annexed to decision V/23 of the Conference of the Parties constitutes a comprehensive programme that will allow the conservation of dry and sub-humid land biodiversity, the sustainable use of its components, and fair and equitable sharing of benefits derived from the utilization of dry and sub-humid lands genetic resources. A proposal for the further refinement of expected outcomes, timetables

208. Recognizing that the successful programme implementation and its sustainability depends primarily on the native and indigenous people, who are living in dry the dry and sub-humid lands, utilizing the biodiversity and, at the same time, being its custodians, the group suggests that particular attention be paid to the following programme activities:

(a) Success stories and best practices should be widely publicized and tested globally in relevant situations in joint collaboration between the Convention on Biological Diversity and UNCCD and other Conventions/programme;

(b) Participation of local communities in the planning phase and implementation of targeted actions is essential for sustainability of the conservation measures, including the use of biodiversity for sustainable livelihoods.

(c) Other activities:

(i) Identification and dissemination of best management practices (Activity 6);

(ii) Building knowledge (Activity 4);

(iii) Promotion of specific measures for the conservation and sustainable use (Activity 7);

(iv) Promotion of responsible management (Activity 8);

(v) Support for sustainable management (Activity 9).

209. Considering the essential role of the human element and the need for a holistic approach in the implementation of the programme of work, the group further agreed that a particular attention be paid to the following recommendations:

(a) A holistic, integrated ecosystem approach involving all relevant stakeholders at all levels, local communities in particular, should be applied in the programme implementation.

(b) Public awareness should be increased through close interaction with mass media and other means to address a broad audience and stakeholders. However, capacity building and awareness of the young generation on biodiversity issues should receive a special attention, including the maintenance of traditional knowledge through its sharing at the community level.

(c) The best practices should be based both on the traditional knowledge and adapted advanced technologies, as appropriate.

(d) Support for sustainable livelihood should be an integral part of all biodiversity conservation efforts.

*Draft synthesis table on further refinement of programme of work*

See table 1, on page 70 below.

**Table 1:** *Synthesis table of expected outcomes and timeframes, potential actors, and indicators of progress in the implementation of the programme of work*

| *Activity* | *Expected outcomes* | *Time-frame* | *Key actors* | *Status* | *Progress indicators* | *Date* |
|---|---|---|---|---|---|---|
| **PART A: ASSESSMENTS** | | | | | | |
| **Activity 1**. Assessment of status and trends | • Comprehensive review and assessment report on status and trends of biological diversity in dry and sub-humid land | 2012 | FAO, LADA, MA, Parties, SCBD | Planned | Preliminary assessment<br>Draft full assessment | 2006<br>2010 |
| **Activity 2**. Areas of particular value and/or under threat | • Review and assessment of areas of value/under threat | 2012 | World Heritage Centre, MAB Secretariat, WCPA, IUCN, WCMC, Parties | Planned | Draft map and assessment report | 2008 |
| **Activity 3**. Indicators | • Indicators for assessment of status and trends fully operational | 2012 | FAO, LADA, MA, Parties, SCBD | In progress | Draft set of indicators | 2004 |
| **Activity 4**. Knowledge on processes that affect biodiversity | • Reports and publications on the structure and functioning of dry and sub-humid lands ecosystems, including the potential impact of climate change on dry and sub-humid lands. | Ongoing | Various research and development institutes, including local knowledge systems, Parties | Ongoing | Draft summary publication<br>AHTEG on biodiversity and climate change | 2006<br>2003 |
| **Activity 5**. Benefits derived from the biological diversity | • Compilation of information on local and global benefits<br>• Assessment of the socio-economic impact of biodiversity loss and linkage to poverty<br>• Case-studies on inter-linkages between biodiversity loss and poverty | 2012<br>2006<br>2006 | Various research and development institutes, including local knowledge Parties,<br>Parties, various research and development institutes, including local knowledge<br>Parties, collaborating partners, SCBD | In progress<br>In progress<br>Planned | AHTEG on dry and sub-humid lands<br>Draft publication<br>AHTEG on dry and sub-humid lands<br>Draft report<br>Submission of case-studies from Parties | 2002<br>2006<br>2002<br>2005<br>2005 |
| **Activity 6**. Best management practices | • Case-studies including consideration of traditional knowledge<br>• Guidelines for assessment of good practices | 2006<br>2004 | Parties, collaborating partners, SCBD<br>SCBD, Parties | Planned<br>Planned | Submission of case-studies from Parties<br>Draft guideline | 2005<br>2003 |

| *Activity* | *Expected outcomes* | *Time-frame* | *Key actors* | *Status* | *Progress indicators* | *Date* |
|---|---|---|---|---|---|---|
| **PART B: TARGETED ACTIONS** | | | | | | |
| **Activity 7**. Measures for conservation and sustainable use | | | | | | |
| (a) Protected areas | • Guidelines on establishment of "adequate and effective protected areas networks" | 2008 | WCPA, Environmental conventions, IUCN, World Heritage, MAB Sec. | In process | Protected areas report | 2012 |
| | • Additional protected area established | Ongoing | Parties | Ongoing | | |
| (b) Rehabilitation and/or restoration | • Report and database on appropriate technologies and transfer mechanisms | 2002 Ongoing | Norway, SCBD, Parties and various collaborating partner | Ongoing | Workshop on transfer of technologies | 2003 |
| | • Evaluation of effectiveness of measures at test sites | | Parties | Proposed | Sites established; exchange visits between affected countries | 2008 |
| | • Measures implemented through NBSAPs and NAPs | | Parties | Proposed | Explicit rehabilitation Project implemented worldwide | 2008 |
| (c) Invasive alien species | • Increased information and information exchange on invasive alien species | Ongoing | Parties, supported by GISP | In progress | Workshops, CHM includes explicit information | 2008 |
| | • Guidelines and mechanisms for best management; integration through NBSAPs | 2008 | Parties, GISP | In progress | Draft guidelines | 2006 |
| (d) Production systems | • Operational guidelines on sustainable use, good farming practices, integrated production system and drought preparedness | 2004 | Parties, FAO, CGIAR centres, WB, various research institutes | In progress | Draft guidelines | 2003 |
| | • Progress report on development of incentives, including "fair and equitable" markets | 2004 | Parties | Proposed | Draft resource paper; 3rd National Reports | 2006 |
| (e) Water resources | • Guidelines on management and sustainable use of water resources implemented | | Parties, Ramsar and other environmental conventions, GIWA, research institutes | Proposed | Guidelines drafted | 2008 |
| | • Case-studies on best practices available | | Parties | Proposed | Submission of case-studies by Parties | 2007 |
| (f) *In situ* and *ex situ* conservation | • Guidelines for in situ and *ex situ* conservation and management needs based on best practices implemented | | WCPA, IUCN, WWF, CGIAR centres, Parties | Proposed | Draft guidelines | 2006 |

| *Activity* | *Expected outcomes* | *Time-frame* | *Key actors* | *Status* | *Progress indicators* | *Date* |
|---|---|---|---|---|---|---|
| | • Capacities of zoos and seedbanks and other institutions for ex-situ conservation strengthened | | Parties, regional centres | Proposed | Integration into NBSAP and NAP | 2008 |
| (g) Economic valuation and adaptive technologies | • Study on economic valuation of goods and services in areas of specific value for biodiversity<br>• Guidelines for the use of economic instruments implemented through NBSAP | | Parties, WB, various research and development institutes<br>Parties, various research and development institutes | Proposed<br>Proposed | Draft report by AHTEG<br>Draft guidelines | 2002<br>2006 |
| (h) Plant and animal biomass | • Case studies on best practices<br>• Incorporation of lessons learnt in NBSAPs and NAPs | | Parties, various collaborating partners<br>Parties | Proposed<br>Proposed | | |
| (i) Training, education and public awareness | • Training programmes nationally and regionally in place<br>• Public awareness campaigns on the importance of dry and sub-humid lands biodiversity | | Parties, regional centres of excellence, TPN of UNCCD<br>Parties, CBD, UNCCD | Proposed<br>Proposed | Training workshops per year per region<br>Year of biodiversity in dry and sub-humid lands | 2006 |
| (j) Information on sustainable use | • Development of information exchange mechanisms | | Parties, sub-regional organisations, TPNs | Planned, ongoing | TPNSs discuss 2 themes relevant to PoW per year | 2008 |
| (k) Promotion of research and development programmes | • Research priorities established<br>• Pilot projects developed and implemented on local level | | Parties, research and development institutes<br>Parties | Planned, ongoing<br>Planned, ongoing | Partnerships for collaborative research<br>Demonstration sites per region per year | <br>2006 |
| (l) Integrated catchment management and endangered species | • Case-studies on (i) integrated catchment mngt, (ii) migratory species corridors, (iii) conservation of rare and endangered species | | Parties | Proposed | Case-studies per region documented | 2006 |
| (m) Cooperation with relevant conventions | • Memoranda of Cooperation (MoC) with relevant conventions<br>• Joint work programme with relevant conventions | | Various conventions<br>Various conventions | In progresss<br>In progress | <br>Synergy workshops<br>Pilot synergy projects | |
| **Activity 8**. Promotion of responsible resource management | | | | | | |
| (a) Local institutional structures; and indigenous and local techniques | • Case-studies in place and success stories documented and shared<br>• Broad implementation through NBSAP and NAP | | Parties<br>Parties | Proposed<br>Proposed | Regional level exchange<br>Visit programmes in place | 2006 |
| (b) Decentralization of | • Case-studies and success stories of | | Parties | Proposed | Publication of case-study; | 2006 |

| *Activity* | *Expected outcomes* | *Time-frame* | *Key actors* | *Status* | *Progress indicators* | *Date* |
|---|---|---|---|---|---|---|
| management | community-based management of resources | | | | exchange visits to sites | |
| (c) Institutions for land tenure and conflict resolution | • Case-studies and success stories of strengthened national organization structures | | Parties | Proposed | Workshops demonstrating case examples | 2008 |
| (d) Transboundary issues<br><br>( | • Guidelines on transboundary collaboration implemented through NBSAP and NAPs<br>• Increased number of bilateral and subregional collaborative arrangements in place | | Parties, WCPA, IGOs<br><br>Parties | Proposed<br><br>Ongoing | Draft guidelines | 2008 |
| (e) Policies and instruments | • Mechanisms for collaboration between respective national focal points developed<br>• Case-studies, guidelines for cross-sectoral integration, integration of NBSAP and NAPs | | Parties, SCBD, UNCCD<br><br>Parties | In process<br><br>In process | Synergy workshops held per annum<br>Presentation of first case-studies (UNCCD CRIC 1) | 2004<br>2002 |
| **Activity 9**. Support for sustainable livelihoods | | | | | | |
| (a) Income diversification | • Case-studies on income diversification<br>• Guidelines for income diversification opportunities implemented through NBSAP and NAPs | | Parties<br><br>Parties | Proposed<br><br>Proposed | Initial case-studies reported on<br>Draft guidelines | 2006<br>2008 |
| (b) Sustainable harvesting | • Guidelines on best practices incorporated in NBSAP, NAPs and other relevant policies | | Parties | Proposed | Draft guidelines | 2004 |
| (c) Innovations for local income generation | • Relevant case-studies made available | | Parties | Proposed | Workshops and exchange visits | 2006 |
| (d) Market development | • Products derived from sustainable use increasingly marketed<br>• Conducive market relationships developed | | Parties, WHO<br><br>Parties, WHO | Proposed<br><br>Proposed | Initial case-studies reported on | 2006 |
| (e) Fair and equitable sharing of the benefits | • Guidelines produced and integrated in NBSAP, NAPs and other relevant policies | | Parties, SCBD | Proposed | Draft guidelines | 2008 |

**Indicative list of potential collaborators 2/ and abbreviations**

CBD=Convention on Biological Diversity; CCD=Convention to Combat Desertification; CGIAR=Consultative Group on International Agricultural Research; CIAT=International Centre for Tropical Agriculture; CIFOR=Centre for International Forestry Research; CILSS=Permanent Inter-State Committee for Drought Control in the Sahel; CITES=Convention on International Trade of Endangered Species of Wild Fauna and Flora; CMS = Convention on the Conservation of Migratory Species of Wild Animals; CPF=Collaborative Partnership on Forests; FAO=Food and Agriculture Organization of the United Nations; GEF=Global Environment Facility; GISP=Global Invasive Species Project; GIWA=Global International Waters Assessment, ICARDA=International Centre for Agricultural Research in the Dry Areas Species Programme; ICRAF=International Centre for Agroforestry; ICRISAT=International Crops Research Institute for the Semi-Arid Tropics; IFAD=International Fund for Agricultural Development; IGBP=International Geosphere and Biosphere Programme; IITA=International Institute for Tropical Agriculture; ILRI=International Livestock Research Centre; ILTER=International Long-term Ecological Research Network, IPGRI=International Plant Genetic Resources Institute; IPPC=Integrated Pollution and Prevention Control; IGO=Intergovernmental organization; IUCN=International Union for Conservation; IUFRO=International Union of Forestry Research Organizations; LUCC=Land Use and Cover Change Programme (of IGBP); MA=Millennium Ecosystem Assessment; OIE=World Organization for Animal Health; OSS=Observatoire du Sahara et Sahel; SADC=Southern African Development Community; TPN=Thematic Programme Networks of the CCD; UNDP=United Nations Development Programme; UNEP=United Nations Environment Programme; UNEP-WCMC=World Conservation Monitoring Centre; UNESCO=United Nations Educational, Scientific and Cultural Organization; UNESCO-MAB=Man and Biosphere Project; UNFCCC=United Nations Framework Convention on Climate Change; UNFF=United Nations Forum on Forests; UNITAR=UN Institute for Training and Research; WB=World Bank; WCPA=World Commission on Protected Areas; WHC=World Heritage Centre (UNESCO); WIPO=World Intellectual Property Organization; WMO=World Meteorological Organization; WRI=World Resource Institute; WTO=World Trade Organization; WWF=World Wide Fund for Nature

2/ Based on a questionnaire sent out in August 2002, see UNEP/CBD/SBSTTA/8/2.

*Annex*

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