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BIODIVERSITY OF DRY AND SUB-HUMID LANDS

Guidance on strengthening the assessment of the 2010 biodiversity target and proposals for land-use options that promote biodiversity and generate income for indigenous and local communities

Note by the Executive Secretary

EXECUTIVE SUMMARY

1. In paragraph 11 (a) of decision VIII/2 on the biological diversity of dry and sub-humid lands, the Conference of the Parties to the Convention on Biological Diversity requested the Executive Secretary to provide guidance on strengthening the assessment of the 2010 targets and to provide proposals for land-use options that promote biodiversity and generate income for indigenous and local communities.
2. In response, the Executive Secretary prepared the present note, which contains proposals on: (i) existing sources of information and projects, programmes and processes generating such information for a comprehensive global-level assessment of the status and trends of dry and sub-humid lands biodiversity, including baseline information needed for assessing trends of biodiversity within the framework of the 2010 targets and proposing cost-effective ways to fill remaining gaps; (ii) how to review ongoing and planned assessments in dry and sub-humid lands and facilitate the application, within these assessments, of indicators adopted in decision VII/30; and (iii) land-use options that promote biodiversity and generate income for indigenous and local communities, particularly options for transboundary and community-based natural-resource management.
3. A review of existing assessments indicated that a comprehensive global-level assessment could be conducted for three of the 18 indicators adopted by the Conference of the Parties in annex II of decision VIII/15: (i) trends in extent of selected dry and sub-humid lands; (ii) change in the status of threatened dry and sub-humid lands species; and (iii) trends in invasive alien species in dry and sub-humid lands. A partial global-level assessment could be conducted for an additional four indicators. ^{1/}, ^{2/} Baseline data exist for these indicators, but there is a need to identify the baseline year and establish a process for monitoring and reporting on trends based on the selected baseline.

* UNEP/CBD/SBSTTA/12/1.

^{1/} Incidence of human-induced ecosystem failure in dry and sub-humid lands; dry and sub-humid lands biodiversity used in food and medicine; trends in abundance and distribution of selected dry and sub-humid lands species; and coverage of protected areas in dry and sub-humid lands.

^{2/} The indicator “marine trophic index” is not considered in this document since it is not relevant for dry and sub-humid lands.

4. Information is insufficient to conduct a global-level assessment of 10 indicators. It is proposed that the lack of relevant information on these 10 indicators be addressed in a cost-effective manner as follows:

(a) For four indicators, 3/ a geographic overlay could be applied. This approach consists of the development of geo-referenced dataset on dry and sub-humid lands to be overlaid on relevant geo-referenced indicator datasets;

(b) For four additional indicators, 4/ bridge files could be used to link datasets on dry and sub-humid lands to data in common with the selected indicator;

(c) For the two remaining indicators, 5/ significant additional work is required to collect the necessary data.

5. With regard to land-use options that promote both income generation and biodiversity conservation and, where relevant, integrate transboundary and/or community-based natural-resource management, a review was conducted of 48 case-studies and good-practice examples provided by Parties in response to notification 2006-037 and identified through a literature review conducted by the Secretariat. The main lessons from the review of transboundary natural-resource management and community-based natural-resource management include the need for stakeholder participation and appropriate partnerships, secure user rights, clear conflict-resolution mechanisms, improved environmental governance and institutional capacity, and transparent decision-making. From this review, three categories of land-use options were proposed for scaled-up implementation of the programme of work on the biological diversity of dry and sub-humid lands: (i) tourism; (ii) sustainable harvesting of high-value wild species; and (iii) sustainable agriculture and pastoralism.

SUGGESTED RECOMMENDATIONS

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

(a) *Endorse* the two proposals on (i) information and projects, programmes and processes generating such information, for a comprehensive global-level assessment of the status and trends of dry and sub-humid lands biodiversity (contained in section II below); and (ii) land-use options that promote biodiversity and generate income for indigenous and local communities (in section III below);

(b) *Request* the Executive Secretary, in collaboration with relevant partners, to undertake, prior to the assessment of the achievement of the 2010 target, the proposed activities to fill assessment gaps and information on baselines, bearing in mind the additional resources required to fill such gaps;

(c) *Take note* of the lack of a common definition of dry and sub-humid lands and *request* the Executive Secretary to work with relevant collaborators to clarify the areas under question with a view to harmonizing the delineation of dry and sub-humid lands.

3/ Trends in genetic diversity of domesticated animals, cultivated plants, and fish species of major socio-economic importance; area of forest, agricultural and aquaculture ecosystems under sustainable management; water quality in wetlands located in drylands; and health and well-being of communities who depend directly on local ecosystem goods and services.

4/ Nitrogen deposition; ecological footprint and related concepts; status and trends of linguistic diversity and number of speakers of indigenous languages; and official development assistance provided in support of the Convention.

5/ Connectivity/fragmentation of ecosystems; and the proportion of products derived from sustainable sources.

I. INTRODUCTION

1. The in-depth review of implementation of the programme of work on the biodiversity of dry and sub-humid lands (UNEP/CBD/SBSTTA/11/4) identified the lack of comprehensive assessments covering genetic, species and ecosystem diversity in all dry and sub-humid biomes, as a significant barrier to the global assessment of the status and trends of the biodiversity of dry and sub-humid lands. Likewise, in its decision VIII/2, the Conference of the Parties confirmed that “a major shortcoming in the current review has been the limited availability of recent information” on the status of dry and sub-humid land biodiversity. In paragraphs 5 and 6 of the same decision, the Conference of the Parties recognized the urgent need for improved data.

2. Accordingly, in paragraph 11(a) of decision VIII/2 the Conference of the Parties requested the Executive Secretary to present proposals for consideration by the twelfth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) on: (i) existing sources of information and projects, programmes and processes generating such information for a comprehensive global-level assessment of the status and trends of dry and sub-humid lands biodiversity, including baseline information needed for assessing trends of biodiversity within the framework of the 2010 targets and proposing cost-effective ways to fill remaining gaps; (ii) how to review ongoing and planned assessments in dry and sub-humid lands and facilitate the application, within these assessments, of indicators adopted in decision VII/30; and (iii) land-use options that promote biodiversity and generate income for indigenous and local communities, particularly options for transboundary and community-based natural-resource management.

3. The present note contains a review of existing assessments relevant to the biodiversity of dry and sub-humid lands; an analysis of gaps in existing assessments in terms of the 2010 biodiversity target; proposals for cost-effective ways to fill identified gaps (section II); and proposals on land-use options promoting income generation and biodiversity conservation in dry and sub-humid lands integrating transboundary and community-based natural-resource management (section III).

4. Section II on assessments is based on information gathered from: (i) partners identified as key actors in annex 1 to decision VII/2 of the Conference of the Parties; (ii) the Land Degradation Assessment in Drylands and the Millennium Ecosystem Assessment as requested by the Conference of the Parties in its decision VIII/2; and (iii) the assessment of status and trends of dry and sub-humid lands biodiversity (UNEP/CBD/SBSTTA/11/4/Add.1).

5. Section III on land-use options is based on case studies and best practices requested from Parties through notification 2006-037. Additional information and case studies were gathered through a literature review conducted by the Secretariat.

II. PROPOSALS ON BIODIVERSITY-RELATED ASSESSMENTS IN DRY AND SUB-HUMID LANDS

6. Existing sources of information and projects, processes and programmes generating such information are presented in table 1 below. Information on existing and planned assessments was evaluated based on:

(a) The identification of the relevant indicator within the 2010 biodiversity target for which the assessment will gather information; and

(b) An analysis of the coverage of the assessment in terms of: (i) its contribution to a global-level assessment; and (ii) the availability of specific information available on dry and sub-humid lands.

7. This methodology is intended to identify how planned and existing assessments contribute to the comprehensive global-level assessment of the indicators identified in annex I to decision VIII/30. The methodology is also intended to contribute to the effectiveness of planned and existing assessments in terms of identifying key considerations from assessment design and implementation.

Table 1: Existing sources of information for headline indicators, and availability of information classified as dry and sub-humid lands and at the three levels of biological organization

<i>Headline indicator</i>	<i>Assessment</i>	<i>Global coverage</i>	<i>Classified dry & sub-humid Lands</i>	<i>Genetic, species and ecosystem (G, S, E)</i>
Coverage of protected areas	World Database on Protected Areas	Yes	No	S, E
	United Nations List of Protected Areas	Yes	Yes	S, E
Trends in extent of selected biomes, ecosystems and habitats	Earth Trends – World Resources Institute	Yes	Yes	E
	Land Degradation Assessment in Drylands	Yes	Yes	E
	AfriCover - FAO	No	Yes	S, E
	Global Land Cover Network - FAO	Yes	Yes	E
Trends in abundance and distribution of selected species	World Bird Database	Yes	No	S
	World Grass Species – Royal Botanic Gardens Kew		Yes	S
	IUCN Red List Assessment	Yes	Yes	S
Change in status of threatened species	IUCN Red List Assessment	Yes	Yes	S
Trends in genetic diversity of domesticated animals, cultivated plants, and fish species of major socio-economic importance	Domestic Animal Diversity Information System – FAO	Yes	No	S, G
	Domestic Animal Genetic Resources Information System – CGIAR	Yes	No	S, G
	The World Information and Early Warning System on Plant Genetic Resources for Food and Agriculture – FAO	Yes	No	S, G
	System-wide Information System for Genetic Resources – CGIAR	Yes	No	G
Biodiversity used in food and medicine	Agricultural Production Index	Yes	No	S
	Survey of Economic Plants for Arid and Semi-Arid Lands – Kew Botanic Gardens	Yes	Yes	S
	Regional databases on medicinal plants: TRAMIL, APINMAP, PFAF,	No	No	S
Area of forest, agricultural and aquaculture ecosystems under sustainable management	Earth Trends – World Resources Institute – Organic Farming Dataset	Yes	No	E
	Global Land Cover Network - FAO	Yes	Yes	E
Proportion of products derived from sustainable sources	National reports and country information	No	No	varies
Nitrogen deposition	International Nitrogen Initiative	Yes	No	N/A
	Global Emissions Inventory Activity	Yes	No	N/A
	Emission Database for Global Atmospheric Research	Yes	No	N/A
Water quality in wetlands located in drylands	Global Water Quality Data	Yes	No	S
Ecological footprint and related concepts	Global Footprint Network	Yes	No	N/A
Trends in invasive alien species	Global Invasive Species Database	Yes	Yes	S
Connectivity /fragmentation of ecosystems		No data available		

<i>Headline indicator</i>	<i>Assessment</i>	<i>Global coverage</i>	<i>Classified dry & sub-humid Lands</i>	<i>Genetic, species and ecosystem (G, S, E)</i>
Incidence of human-induced ecosystem failure	The Global Assessment of Human Induced Soil Degradation	Yes	No	E
	Land Quality Indicators Information System	No	No	E
	Land Degradation Assessment in Drylands	Yes	Yes	E
	Global Land Cover Network - FAO	Yes	Yes	E
Health and well-being of communities who depend directly on local ecosystem goods and services	Global Database on Child Growth and Malnutrition - WHO	Yes	No	N/A
Status and trends of linguistic diversity and numbers of speakers of indigenous languages	Endangered Languages Database	Yes	No	N/A
Official development assistance provided in support of the Convention	Official development assistance database	Yes	No	N/A

8. For a comprehensive global-level assessment of the status and trends of the biodiversity of dry and sub-humid lands, information is available for the following: (i) trends in extent of selected biomes, ecosystems and habitats; (ii) change in status of threatened species; and (iii) trends in invasive alien species.

9. Baseline data already exist for these indicators, although there remains a need to identify the baseline year and establish a process for monitoring and reporting on trends based on the selected baseline. It should also be noted that the exact delineation of dry and sub-humid lands has not yet been resolved. While this may have a minimal impact on the accuracy of the global level assessment, for regional, subregional and national planning, the lack of clear delineation may be a serious impediment to the establishment of a clear baseline.

10. Information on four indicators can provide only a partial global-level assessment. ^{6/} The partial assessment would not include all three levels of diversity (genetic, species and ecosystem) and would not cover all biomes within the dry and sub-humid lands programme of work. However, it would contain some useful information for planning and decision-making.

11. A global-level assessment of status and trends could not be compiled for 10 indicators ^{7/} for which:

- (a) Information may not exist (information gaps);
- (b) Information may exist, but is not defined by dry and sub-humid lands (gaps in scope); or
- (c) Information exists at the regional, sub-regional or national level but not as a global aggregate (gaps in scale).

^{6/} (i) Incidence of human-induced ecosystem failure, (ii) biodiversity used in food and medicine, (iii) trends in abundance and distribution of selected species and (iv) coverage of protected areas.

^{7/} (i) Trends in genetic diversity of domesticated animals, cultivated plants, and fish species of major socio-economic importance, (ii) area of forest, agricultural and aquaculture ecosystems under sustainable management, (iii) nitrogen deposition, (iv) water quality in wetlands located in drylands, (v) ecological footprint and related concepts, (vi) health and well-being of communities who depend directly on local ecosystem goods and services, (vii) connectivity/fragmentation of ecosystems, (viii) the proportion of products derived from sustainable sources, (ix) status and trends of linguistic diversity and number of speakers of indigenous languages and (x) official development assistance provided in support of the Convention.

A. Information gaps

12. Information is not available for the indicator on connectivity/fragmentation of ecosystems and for the area of forest, agricultural and aquaculture ecosystems under sustainable management other than areas classified as organic farms.

13. This information gap could be filled by expanding the scope of some ongoing assessments and programmes since making use of existing capacity and infrastructure would be more cost-effective than developing new assessments. Ongoing assessments which could be expanded include:

(a) The European Space Agency Diversity project, which could explore opportunities for modelling connectivity and fragmentation based on satellite imagery.

(b) The Land Degradation Assessment in Drylands, which could focus on strengthening indicators for areas under sustainable management.

(c) Assessments conducted by the Food and Agriculture Organization including the Forest Resource Assessment (FRA), which may, in 2010, expand to include an analysis of land cover change and fragmentation in forest and agricultural ecosystems including those which are located in dry and sub-humid lands.

B. Gaps in scope

14. Global information is available in the identified assessments but is not classified by dry and sub-humid lands for eight indicators: (i) trends in genetic diversity of domesticated animals, cultivated plants, and fish species of major socio-economic importance; (ii) area of forest, agricultural and aquaculture ecosystems under sustainable management; (iii) nitrogen deposition; (iv) water quality in wetlands located in drylands; (v) ecological footprint and related concepts; (vi) health and well-being of communities who depend directly on local ecosystem goods and services; (vii) status and trends of linguistic diversity and numbers of speakers of indigenous languages; and (viii) official development assistance provided in support of the Convention.

15. Where global information is available but not classified by dry and sub-humid lands, two approaches are proposed to facilitate a comprehensive global-level assessment of the status and trends of the biodiversity of dry and sub-humid lands.

16. Four of the eight indicators facing gaps in scope contain geo-referenced data: (i) trends in genetic diversity of domesticated animals, cultivated plants, and fish species of major socio-economic importance; (ii) area of forest, agricultural and aquaculture ecosystems under sustainable management; (iii) water quality in wetlands located in drylands; and (iv) health and well-being of communities who depend directly on local ecosystem goods and services. For these indicators, a geographic overlay could be applied to address gaps in scope

17. For the remaining four indicators, which contain non geo-referenced data: (i) nitrogen deposition; (ii) ecological footprint and related concepts; (iii) status and trends of linguistic diversity and numbers of speakers of indigenous languages; and (iv) official development assistance provided in support of the Convention, bridge files could be applied.

Geographic overlay ^{8/}

18. A geographic overlay combines geo-referenced indicators datasets with prepared datasets on dry and sub-humid lands. It is simplest to execute during the course of the analysis that produces datasets. To facilitate this operation, guidance tailored to the principal Geographic Information System packages on overlaying dry and sub-humid lands data could be developed by the Secretariat, the World Conservation Monitoring Centre (UNEP-WCMC), the Land Degradation Assessment in Dry Areas, or other relevant

^{8/} Examples can be found at: <http://abstracts.co.allenpress.com/pweb/esa2002/document/?ID=17136>, <http://radar.weather.gov/GIS.html>, <http://ies.jrc.ec.eu.int/esdi0.html>.

organizations, and disseminated to partners. This could include the development of a pre-prepared geo-referenced dataset on dry and sub-humid lands in the main Geographic Information System formats.

19. A geographic-overlay approach needs to consider differences in definitions of dry and sub-humid lands—for example, the United Nations Convention to Combat Desertification defines dry and sub-humid lands differently from the Convention on Biological Diversity. The difference between the two definitions has been mapped by the World Conservation Monitoring Centre. ^{9/}

20. Key factors for the success of the implementation of the above approach include:

- (a) Ensuring the participation of data producing organizations and Parties;
- (b) Capacity-building to manage the new datasets in relevant organizations;
- (c) Adequate financial resources to develop a geo-referenced dataset that is easily updatable and adaptable;
- (d) Ensuring that the cost implications for data-producing organizations are met;
- (e) Addressing inconsistencies in the delineation of dry and sub-humid lands.

Bridge files ^{10/}

21. For non geo-referenced data, the main challenge is in determining which data points are relevant for dry and sub-humid lands. This challenge is compounded by the wide variety of data that needs to be filtered. Bridge file toolkits are proposed to assist partners to filter relevant data.

22. Toolkits could consist of bridge files and associated guidance on applying them. A bridge file links a dataset defining dry and sub-humid lands (e.g. the name of a dry and sub-humid lands biomes or species) to a dataset that is in common with the indicators dataset. ^{11/} This allows indicators to be filtered based on whether the data is relevant for dry and sub-humid lands. This is less cost-effective than a geographic overlay since it requires the development of many different filters.

23. Key factors in the success of the implementation of the above approach include:

- (a) Collaboration with data producing organizations during the development of bridge files;
- (b) Ensuring that the cost implications for data producing organizations are met;
- (c) Maintaining consistency in data collection and coding methodologies so as to avoid the need to constantly develop new bridge files.

C. Gaps in scale

24. Information is available in various assessments identified in national reports and the in-depth review of implementation at the national/subregional level, but not at a global level for indicators on: (i) the proportion of products derived from sustainable sources and (ii) for the regional databases within the indicator on biodiversity used in food and medicine.

25. A data-management system to facilitate online contributions by Parties could enable the collection and analysis of national and sub-regional information including information provided through national reports. Such a data-management system could be similar in format to the clearing-house

^{9/} <http://www.unep-wcmc.org/habitats/drylands/index.htm>.

^{10/} Examples can be found at: <http://gis.esri.com/library/userconf/proc03/p1012.pdf>, <http://cipa.icomos.org/fileadmin/papers/antalya/194.pdf?PHPSESSID=c43849630f35436f94047a3d71af8cd0>, <http://earth-info.nga.mil/gns/html/index.html>

^{11/} For example, using the dry and sub-humid lands dataset and the Nima Names Database, a bridge file can be produced to determine whether any named place on Earth (town, province, village, etc.) is located within dry and sub-humid lands. This will allow any data linked to a named place to also be linked to dry and sub-humid lands.

mechanism under the Convention, ^{12/} which addresses differences in criteria, definition and data formats. The main characteristics of the clearing-house mechanism include:

- (a) Compatibility with different levels of national capacity;
- (b) Needs-driven;
- (c) Structurally decentralized;
- (d) Provision of access to information;
- (e) Supports decision-making;
- (f) Has no vested interest in controlling the expertise or information;
- (g) Created for the mutual benefit of all Parties and other stakeholders.

26. Key factors to the success of the implementation of the above approach include:

- (a) The identification of an organization to house the aggregate data;
- (b) Party participation in the development of the data management system;
- (c) Strong commitments from Parties, other Governments and relevant organizations to contribute relevant data to the data management system.

III. PROPOSALS ON LAND-USE OPTIONS COMBINING INCOME GENERATION AND BIODIVERSITY CONSERVATION IN DRY AND SUB-HUMID LANDS

27. Proposals on land-use options combining income generation and biodiversity conservation in dry and sub-humid lands are presented based on an analysis of 48 case-studies and good-practice examples provided by Parties in response to Secretariat Notification 2006-037, requesting case-studies and lessons learned on land-use options that promote biodiversity conservation and income generation within dry and sub-humid lands. Additional case-studies were identified through research conducted by the Secretariat.

28. Dry and sub-humid lands are often characterized by low overall productivity and high instances of poverty where, as a result, conservation and development often collide. ^{13/} Accordingly, in paragraph 11 (a) of decision VIII/2, the Conference of the Parties requested the Executive Secretary to present proposals for consideration by SBSTTA on land-use options that promote biodiversity conservation and generate income for indigenous and local communities, with particular focus on transboundary and community-based natural-resource management.

29. A number of land-use options for dry and sub-humid lands were described in the case studies submitted by Parties and gathered through the literature review undertaken by the Secretariat - although it is important to note that not all Parties responded to the request for case studies and, as such, options beyond these categories may exist. The described land uses include, *inter alia*:

- (a) The establishment of national parks and other protected areas;
- (b) Wildlife watching and other tours;
- (c) Agriculture;
- (d) Agroforestry;
- (e) Afforestation, reforestation
- (f) Herding;

^{12/} <http://www.biodiv.org/chm/>

^{13/} Millennium Ecosystem Assessment. 2005. Ecosystems and Human Wellbeing: Biodiversity Synthesis. World Resources Institute. Washington DC

- (g) Gathering medicinal plants;
- (h) The use of biodiversity resources for crafts;
- (i) Marketing of indigenous crop varieties;
- (j) The domestication of dry and sub-humid plants; and
- (k) The exploitation of non-timber forest products.

30. Of the above land-use options:

(a) The establishment of national parks and other protected areas, and wildlife watching and other tours can both be aspects of *tourism*;

(b) Gathering medicinal plants, the use of biodiversity resources for crafts, and the exploitation of non-timber forest products are all aspects of *sustainable harvesting of high-value wild species*; and

(c) Agriculture, agroforestry, herding, marketing of indigenous crop varieties, and the domestication of dry and sub-humid plants are all aspects of *sustainable agriculture / pastoralism*.

31. Tools that can be integrated into the above land-use options include transboundary and community-based natural-resource management.

32. Community-based natural-resource management is the management of natural resources under a detailed plan that is: (i) agreed to by all concerned stakeholders; and (ii) community-based. In this regard, community-based natural-resource management is a relevant tool for the implementation of activities 8 (a) and 8 (b) of the programme of work, which call for strengthened local capacities and enhanced decentralization.

33. In community-based natural-resource management, communities are the primary managers and decision makers, assisted and monitored by technical services. ^{14/} Community-based natural-resource management can take a number of forms including community consultations, the development and implementation of joint management with a higher-level government agency and full decision-making responsibility.

34. Key considerations in the implementation of successful community-based natural-resource management include: the active participation of stakeholders in natural-resource decision-making; securing user rights for natural resources; improving environmental governance and relevant institutional capacity at the local level; and formalizing an appropriate conflict resolution mechanism. ^{15/}

35. There are a number of advantages to a community-based natural-resource management approach, including: ^{16/}

(a) *Proximity to resources*: those in closest contact with, and whose livelihoods are affected by, natural resources are often best placed to ensure effective stewardship;

(b) *Equity*: natural resources should be managed to ensure equitable benefits for the diverse interest groups within a population;

(c) *Capacity*: communities often have better knowledge and expertise in the management of the natural resources than do government agencies/private industry;

^{14/} Community-Based Natural Resource Management Network. 2006. Terminology: Community-Based Natural Resource Management. http://cbtnrm.net/resources/terminology/terms_cbtnrm.html

^{15/} World Bank Group. 2006. Agriculture Investment Sourcebook. Washington, DC. <http://www-esd.worldbank.org/ais/index.cfm?Page=mdisp&m=05&p=1>.

^{16/} Brown, D., Y. Malla, K. Schreckenber, and O. Springate-Baginski. 2002. "Community Forestry, From Supervising 'Subjects' to Supporting 'Citizens': Recent Developments in Community Forestry in Asia and Africa." Natural Resources Perspectives 75. ODI, London.

- (d) *Cost-effectiveness*: local management may help reduce government costs.
36. Potential disadvantages to community-based natural-resource management may include:
- (a) *Elite capture*: when a local minority gains control over natural resource decisions to the exclusion of disadvantaged or marginalized groups;
- (b) *Weak technical capacity*: communities may not have the technical knowledge required to make appropriate sustainable use decisions;
- (c) *Time and cost*: community-based natural-resource management often requires significant capacity-building and, in many cases, the development of an appropriate legislative framework. As such, establishing community-based natural-resource management can be a slow process with relatively high transaction costs.
37. Transboundary natural-resource management is another useful tool that can be applied to the proposed land-use options in order to maximize benefits. Transboundary natural-resource management is defined as any process of collaboration across boundaries so as to increase the effectiveness of attaining natural-resource management or biodiversity conservation goals. As such, transboundary natural-resource management is a relevant tool for the implementation of activity 8 (d) of the programme of work, which calls for bilateral and subregional cooperation to address transboundary issues.
38. Transboundary natural-resource management consists of a number of approaches from transboundary community-based natural-resource management and transboundary protected area management to large-scale natural-resource management and landscape management integrated within regional economic development. ^{17/} Transboundary tools, such as the transboundary harmonized land cover database (FAO), can support improved decision-making at the ecosystem and regional levels
39. Key considerations for the implementation of transboundary natural-resource management include: stakeholder participation, establishing partnerships (between communities and between different levels of management), the role of the private sector, capacity-building, and the establishment of a transparent and inclusive decision-making process. ^{18/}
40. Advantages of the transboundary natural-resource management approach include:
- (a) *Ecological opportunities*: maintenance of links between ecological landscapes and processes, maximization of the extent of dry and sub-humid lands under sustainable management, reduced transboundary threats to biodiversity (trade, invasive alien species, etc.);
- (b) *Social and cultural opportunities*: strengthened decision-making among marginalized and border communities and facilitation of formal contact between divided communities;
- (c) *Economic and financial opportunities*: enhanced opportunities for earnings from tourism, enhanced economies of scale, and opportunities to benefit from regional initiatives.
41. Disadvantages that can be encountered in transboundary natural-resource management include:
- (a) *Complex institutional structure*: institutions across borders may have different structures, roles and responsibilities, which can be difficult to balance;
- (b) *Inequitable sharing of benefits*: as a result of foreign investments and relationships between organizations that are often complex, the benefits from transboundary natural-resource management often bypass local communities.

^{17/} van der Linde, H., J. Oglethorpe, T. Sandwith, D. Snelson, and Y. Tessema (with contributions from Anada Tiéga and Thomas Price). 2001. Beyond Boundaries: Transboundary Natural Resource Management in Sub-Saharan Africa. Washington, D.C., U.S.A.: Biodiversity Support Program.

^{18/} Katerere, Y., R. Hill, and S. Moyo. 2001. A Critique of Transboundary Natural Resource Management in Southern Africa. Paper no.1, IUCN-ROSA Series on Transboundary Natural Resource Management.

Tourism

Objectives

42. Tourism can enhance implementation of activities 7 (a), (g), and (h), 8(a)-(b), and 9 (a)-(c) and (e) of the programme of work by providing: ^{19/}

- (a) Economic alternatives for local people to reduce overexploitation of biodiversity;
- (b) Economic justification for protected areas; and
- (c) Constituency-building to promote biodiversity conservation.

Proposed areas for investment

43. Tourism in dry and sub-humid lands is already a significant contributor to livelihoods. For example, in Morocco (which is more than 90 per cent drylands), tourism earnings account for more than 20 per cent of foreign earnings. ^{20/} At the same time, dry and sub-humid lands tend to be especially susceptible to the negative impacts of tourism, including water stress, habitat destruction and human-wildlife conflicts. As such, while tourism has a demonstrated potential to contribute to income generation and biodiversity conservation, a number of factors must be taken into account to ensure appropriate benefits. Many of these factors are outlined in the Convention on Biological Diversity Guidelines on Biodiversity and Tourism Development, which emphasizes the need for investments to: (i) mainstream stakeholder participation; and (ii) build collaborative partnerships (including public-private partnerships). ^{21/}

Stakeholder participation

44. The involvement of stakeholders, especially local communities, in tourism is identified by the United Nations Commission on Sustainable Development as an important condition for the conservation and sustainable use of biodiversity (see box 1). ^{22/} Tools to ensure stakeholder participation in tourism include prioritizing local employment, taking advantage of the unique knowledge of indigenous and local communities, and devolving ownership or user rights over biodiversity resources to local communities where appropriate. ^{23/}

Box 1. Il Ngwesi Community Conservation Area – www.tve.org/ho/doc.cfm?aid=1294

Objective: To enhance local economic opportunities while ensuring the conservation of biodiversity.

Main activities: Development of a community conservation area and lodge, and a community re-investment programme funded through proceeds from the lodge.

Factors for success: Involvement of local people in management decisions, communal ownership and democratic management, use of revenue to enhance social services, use of environmentally sound technologies, attention to addressing security threats.

Benefits achieved: Employment for more than 400 people, investments in the local community of more than US\$ 80,000 since 1996, improved status of certain species such as lions, elephants and zebra.

^{19/} World Bank. 1996. Ecotourism and Conservation: A Review of Key Issues. Environment Department Paper no. 33. Washington, DC.

^{20/} World Bank. 2002. World Development Indicators. International Bank, Washington, DC. 405pp.

^{21/} <http://www.biodiv.org/programmes/socio-eco/tourism/guidelines.asp?page=1>.

^{22/} UNEP. 1999. Seventh Session of the United Nations Commission on Sustainable Development.

^{23/} UNEP and Tour Operators Initiative for Sustainable Development. 2006. Tourism and Deserts.

Building collaborative partnerships

45. Building partnerships for tourism can ensure that the negative consequences of tourism are minimized through up-stream consideration of impacts, obstacles and opportunities. Involving different government agencies and the private sector in tourism to promote income generation and biodiversity conservation can yield many benefits. Many tourism companies, for example, recognize the importance of maintaining the biodiversity and cultural heritage of the sites they visit. As such, the private sector has initiated a number of programmes in support of biodiversity and livelihoods, including voluntary environmental guidelines and certification and awards programmes. ^{24/}

Sustainable harvesting of high-value wild plant and animal species*Objectives*

46. High-value wild species form an integral component of alternate livelihood planning and many micro-credit programmes for local economic development. High-value wild species also form an integral part of coping mechanisms in dry and sub-humid lands. ^{25/} As such, the sustainable harvesting of high-value wild species can enhance implementation of, in particular, activities: 7 (d), (g), (h), and 8 (a)-(c) and all components of activity 9.

Proposed areas for investment

47. In order to ensure that livelihoods based on the sustainable harvesting of high-value wild species benefit both local communities and biodiversity, Parties may wish to invest in (i) access to markets and (ii) the appropriate consideration of scientific and traditional knowledge.

Access to markets

48. Access to markets is important so as to ensure an avenue for income generation. In fact, lack of market access is identified as one of the principal constraints to biodiversity-based livelihoods. Providing market access can involve a number of investment activities including, *inter alia*: ^{26/}

- (a) Capacity-building in product marketing;
- (b) Improved transportation to markets;
- (c) The development of selling cooperatives;
- (d) The development of long-term partnerships with the private sector (see box 2).

Box 2. Aveda Sandalwood Sourcing – Western Australia

Objective: Develop a long-term market relationship for a sustainable source of sandalwood oil in partnership with indigenous people in Western Australia.

Main activities: Development of a business partnership for the sustainable harvesting and extraction of sandalwood oil, support for the development of a protocol of indigenous raw material certification, capacity building for economic development.

Factors for success: Long-term partnership agreement, stakeholder participation, provision of capacity-building.

Benefits achieved: Indigenous people are receiving a fair market price for sandalwood oil, indigenous organizations are strengthened, improved marketing potential for Aveda.

^{24/} UNEP. 2003. Tourism and Biodiversity: Mapping Tourism's Footprint. http://www.uneptie.org/pc/tourism/library/mapping_tourism.htm

^{25/} Millennium Ecosystem Assessment. 2005. Ecosystems and Human Wellbeing: Biodiversity Synthesis. World Resources Institute. Washington D.C.

^{26/} Natural Resources System Programme. 2006. Caribbean: Policy knowledge for Alternative Natural Resource Livelihoods. http://www.nrsp.org.uk/6_3_2.aspx

Merging scientific and traditional knowledge

49. Many high-value species that are currently exploited for economic gain have been identified based on indigenous knowledge of their uses and properties. As markets for such species expand, there is increasing pressure from over-use, which is threatening the sustainability of traditional harvesting techniques. ^{27/}

50. Scientific research on the propagation and preservation of such species is very important to identify uses, market potential and production procedures. Combining traditional and scientific knowledge can also increase the extent to which benefits are equitably shared, conservation is prioritized and sustainable use is implemented.

51. Including traditional knowledge in land-use planning for biodiversity conservation and income generation can yield a number of benefits, including: ^{28/}

- (a) Creating mutual respect, encouraging local participation, and building partnerships for joint problem resolution;
- (b) Facilitating the design and implementation of culturally appropriate development programs, avoiding costly mistakes;
- (c) Identifying techniques that can be transferred to other regions; and
- (d) Helping to identify practices suitable for investigation, adaptation and improvement.

Sustainable agriculture / pastoralism

Objectives

52. No less than 44 per cent of the world's cultivated systems are located in dry and sub-humid lands, which are the source of many of the world's important food crops, such as barley, olives and wheat. ^{29/} Dry and sub-humid lands also contain a vast array of wild races of common crops. Furthermore, the genetic diversity of African dryland cattle is greater than that of cattle from more humid regions in Europe and Western Asia. This genetic diversity contributes to the resistance of crops and livestock to tropical diseases, poor food/soil quality and drought.

53. Traditional livelihoods in many of the world's dry and sub-humid lands have been based on agriculture and pastoralism, and livestock plays a major role in the local and national economies of many countries. In recent years, however, traditional agricultural and pastoral practices, such as terrace cropping, live fences, etc., have been eroded in favour of commercial practices. While in some cases commercial farming practices have contributed to poverty alleviation, in other cases they have contributed to the erosion of both biodiversity and cultural resources. ^{30/} At the same time, agriculture in drylands is identified as the sector that is most vulnerable to the loss of ecosystem services.

^{27/} IUCN. 2006. Safeguarding Traditional Knowledge – A guide to medicinal plants in North Africa. IUCN Centre for Mediterranean Cooperation. Malaga, Spain.

^{28/} Grenier, Louise. 1998. Working with Indigenous Knowledge - A Guide for Researchers. IDRC. Ottawa, Canada.

^{29/} Millennium Ecosystem Assessment. 2005. Ecosystems and Human Wellbeing: Desertification Synthesis. World Resources Institute. Washington, DC.

^{30/} International Fund for Agricultural Development. 2001. Sustainable Livelihoods in the Drylands – a discussion paper for the eighth session of the Commission on Sustainable Development. Rome, Italy.

54. As such, sustainable agriculture, including agroforestry/pastoralism (defined as production that does not reduce the overall productive potential of the area), can enhance the implementation of, in particular, activities 7 (b)-(h), 8(c) and (e), and all components of activity 9.

Proposed areas for investment

55. Balancing biodiversity and production is an escalating challenge as population pressures in dry and sub-humid lands increase. Biodiversity is already being negatively affected by agriculture and pastoralism through competition for water resources, conversion of natural habitat to agricultural land and livestock-wildlife conflicts. Addressing these conflicts in a manner that maintains and enhances agricultural and pastoral livelihoods may require investments in (i) capacity-building for the communal management of common resources; and (ii) supporting traditional livelihoods. Additional key considerations are presented in box 3

Box 3. Areas for investment

- Attention should be given to food security, seed diversity and resource sovereignty and to biodiversity recovery, not just conservation.
- Provision of credit to local livestock producers to ensure access to sustainable technologies
- Further action needs to be taken to appreciate and support local and indigenous knowledge systems, Extension services need to be revitalized, but also remodeled to ensure that research, training and support initiatives are developed with communities, on a needs driven basis.
- Processes for enhancing community-to-community knowledge exchange and networking are central to capacity development.
- Further incentives to implement ecoagriculture are needed including through: market opportunities, enabling political frameworks and cross-sector institutional support.

Communal management of common resources

56. Dry and sub-humid lands resources such as grazing land, water and wood are often located on communal lands. In order to avoid over-exploitation, clear communal management plans must be in place.

57. There are a number of mechanisms for the management of communal resources, including: ^{31/}

- (a) Co-management: decision-making shared between the government and communities;
- (b) Epistemic communities: a network of knowledge-based experts holding a common set of beliefs and shared notions of validity; ^{32/}
- (c) Policy networks: a group of actors with a common interest and the capacity to determine policy success or failure; and
- (d) Boundary organizations: organizations or institutions that draw expertise from the fields of both policy and science.

^{31/} Berkes, F. 2006. From community-based resource management to complex systems. *Ecology and Society* 11(1): 45. <http://www.ecologyandsociety.org/vol11/iss1/art45/>.

^{32/} Peter M. Haas, "Introduction: Epistemic Communities and International Policy Coordination" *IO*, 46:1, Winter 1992.

58. Communal management also has proven success as an approach to restore ecosystem services in degraded lands (see box 4). As such, it is an important consideration of land-use options in both pristine habitat and dry and sub-humid lands suffering from desertification.

Box 4. The Livestock and Pasture Development Project in Morocco – IFAD

Objectives: Provide innovative technical solutions to rehabilitate severely degraded rangelands in the sheep-raising community of the semi-arid Eastern Region of Morocco.

Main activities: The establishment of grass-roots cooperatives to manage and restore rangelands, animal health campaigns.

Factors for success: Address the legislative environment, ensure the participation of all relevant stakeholders and the equitable sharing of benefits, attention to long-term sustainability of the project.

Benefits achieved: 34 cooperatives were formed, two-year reserves were created on 450,000 ha of previously degraded rangeland, plant cover was reestablished and fodder production increased fivefold.

Traditional livelihoods

59. Traditional knowledge remains an important component of agriculture and pastoralism in dry and sub-humid lands, particularly when considering the role of transhumant populations, the recovery of seed stock, and traditional natural-resource management practices and processes.

60. Traditional technologies, such as combined production systems, mulching and integrated pest management, have formed the basis of traditional livelihood systems in many dry and sub-humid lands for thousands of years. ^{33/} Climate change, desertification, population expansion and pollution are, however, placing increasing pressure on traditional agricultural and pastoral systems. As such, a shift has been observed towards combining traditional knowledge with modern science through processes such as community mapping and integrated pest management (see box 5). ^{34/}

Box 5. The Bioactive Agents from Dryland Biodiversity in Latin America Project – International Cooperative Biodiversity Group

Objective: Biodiversity conservation and sustained economic development through the identification of natural products with pharmaceutical and crop-protection potential.

Main activities: Scientific study on the pharmaceutical and crop-protection agents in plants and microbes, habitat restoration, technology transfer and training workshops.

Factors for success: Combination of scientific and traditional knowledge, stakeholder participation, capacity building within local communities, collaboration with local universities.

Benefits achieved: Support to local producers, establishment of botanical parks, restoration of threatened habitat and recovery of traditional food.

^{33/} Mukhtar, A. Mustafa. 2004. Traditional knowledge and modern technology for sustainable agricultural development in the drylands of Sudan in UNESCO Traditional Knowledge and Modern Technology for the Sustainable Management of Dryland Ecosystems: Proceedings of the International Workshop. Elista, Russian Federation. 23 – 27 June 2004.

^{34/} Boerma, David and Parviz Koohafkan. 2004. Local knowledge systems and the management of dryland agro-ecosystems: some principles for an approach in UNESCO Traditional Knowledge and Modern Technology for the Sustainable Management of Dryland Ecosystems: Proceedings of the International Workshop. Elista, Russian Federation. 23–27 June 2004.