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### SUBSIDIARY BODY ON SCIENTIFIC, TECHNICAL AND TECHNOLOGICAL ADVICE

Eleventh meeting

Montreal, 28 November-2 December 2005

Item 4.1 of the provisional agenda\*

### STATUS AND TRENDS OF, AND THREATS TO, DRY AND SUB-HUMID LANDS BIOLOGICAL DIVERSITY

*Note by the Executive Secretary*

#### EXECUTIVE SUMMARY

1. In decision V/23, the Conference of the Parties requested the Subsidiary Body on Scientific, Technical, and Technological Advice (SBSTTA) to periodically assess and review the status and trends of biological diversity in dry and sub-humid lands. In decision VII/31, the Conference of the Parties further agreed that an in-depth review of the programme of work on the biodiversity of dry and sub-humid lands will take place during its eighth meeting in 2006.
2. Overall, the assessment of status and trends of biodiversity in dry and sub-humid lands reveals a lack of adequate information, which currently prevents the full analysis and understanding of habitat extent, species distribution, protected areas coverage, and threats to biodiversity in dry and sub-humid lands.
3. However, available information shows negative trends with regards to: (i) the extent of natural (viable <sup>1/</sup>) habitats in dry and sub-humid lands; (ii) the populations of many threatened and endangered species; and (iii) the effective control of threats. Positive trends are demonstrated with regards to the extent of protected areas although protected areas coverage within temperate grasslands, in particular, is still far below the 2010 target of 10 per cent.

\* UNEP/CBD/SBSTTA/11/1.

<sup>1/</sup> Habitat within functioning ecosystems that is capable of supporting wild biodiversity.

## SUGGESTED RECOMMENDATIONS

1. The Subsidiary Body may wish to recommend that the Conference of the Parties at its eighth meeting:

(a) *Take note* of the status and trends of, and threats to, the biodiversity of dry and sub-humid lands as described in the note of the Executive Secretary (UNEP/CBD/SBSTTA/11/4) and the related information documents;

(b) *Recognize* the need for a more comprehensive assessment of the status and trends of, and threats to, dry and sub-humid lands biodiversity;

(c) *Recognize* the need for the systematic collection of biodiversity data at all three levels (genetic, species, and ecosystem) and across all representative biomes of the programme of work on the biological diversity of dry and sub-humid lands so as to facilitate the assessment of progress towards the 2010 targets and other global goals, and as a basis for decision-making on the conservation and sustainable use of biodiversity of dry and sub-humid lands;

(d) *Encourage* Parties, other Governments and relevant organizations to improve national, regional and global data on dry and sub-humid lands ecosystem goods and services, their uses and related socio-economic variables; on species at lower taxonomic orders including soil biodiversity; and on the threats to which dry and sub-humid lands ecosystems are subjected in view of the 2010 deadline and the ongoing assessment of the implementation of the 2010 targets and other global goals.

2. In addition, the Subsidiary Body may wish to:

(a) *Recall* annex II to decision VII/2 of the Conference of the Parties requesting a preliminary assessment to be completed in 2006 in preparation for a full assessment including detailed submissions from Parties, to be delivered in 2010;

(b) *Request* the Executive Secretary, in light of the 2006 deadline, and in collaboration with relevant organizations and conventions, in particular the United Nations Convention to Combat Desertification (UNCCD), the Millennium Ecosystem Assessment (MA) and Land Degradation Assessment in Drylands (LADA), taking into account the comments made at the eleventh meeting of SBSTTA, for consideration by the eighth meeting of the Conference of the Parties to:

(i) Develop guidelines for defining and delineating boundaries for arid, semi-arid, dryland, grassland, savannah and Mediterranean ecosystems, so as to harmonize reporting on biodiversity within these biomes in the framework of different conventions/agreements;

(ii) Propose processes for gathering the information required from Parties, other governments, and organizations for a comprehensive 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

(iii) Review ongoing and planned assessments in dry and sub-humid lands and facilitate the integration within them of biodiversity indicators adopted in decision VII/30.

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## I. INTRODUCTION

1. In decision V/23, the Conference of the Parties established a programme of work on the biodiversity of dryland, Mediterranean, arid, semi-arid, grassland and savannah ecosystems, in short “dry and sub-humid lands”. The programme of work on the biodiversity of dry and sub-humid lands includes activities divided into two parts as outlined during the fifth SBSTTA meeting (UNEP/CBD/SBSTTA/5/9): assessments and targeted actions. The present note responds to the first part of the work programme, assessments, specifically activity 1, which calls for the assessment of the status and trends of the biological diversity of dry and sub-humid lands.

2. The document, which was made available for peer review by SBSTTA focal points through a restricted-access website on 31 May 2005, was prepared on the basis of currently available information on the status and trends of, and threats to, biological diversity in dry and sub-humid lands. After a short description of the boundaries of dry and sub-humid lands, the note reviews successively the status and trends of the extent of viable habitat within dry and sub-humid lands, populations of selected species, coverage of protected areas, and threats to biodiversity within dry and sub-humid lands. The note then identifies gaps in our knowledge of the status and trends of biodiversity in dry and sub-humid lands. Whenever possible, the analysis of status and trends includes baseline information identified by the Global Biodiversity Assessment as being important for biodiversity conservation and management. <sup>2/</sup>

3. The proposed process for the periodic assessment of the status and trends of biological diversity in dry and sub-humid lands was adopted in paragraph 1 of decision VII/2. In paragraph 8 of the same decision, specific note is taken of the Millennium Ecosystem Assessment (MA) and the Land Degradation Assessment in Drylands project (LADA) as important contributing assessment programmes. This note draws on the second and third national reports <sup>3/</sup> to the Convention on Biological Diversity, the national reports under the United Nations Convention to Combat Desertification (UNCCD), and the national communications under the United Nations Framework Convention on Climate Change (UNFCCC). Further information was garnered from agencies through a questionnaire distributed by the Executive Secretary on 28 April and 4 May 2005.

4. In accordance with decision VII/30 of the Conference of the Parties, the note builds on past assessments circulated at meetings of SBSTTA (UNEP/CBD/SBSTTA/4/7, UNEP/CBD/SBSTTA/5/9 and UNEP/CBD/SBSTTA/8/INF/2) and:

(a) Used indicators for assessing progress towards the 2010 targets based on existing data sets. In particular, three 2010 target indicators were identified for immediate testing under the focal area addressing “the status and trends of the components of biological diversity”: (i) trends in the extent of selected biomes, ecosystems and habitats; (ii) trends in abundance and distribution of selected species; and (iii) coverage of protected areas. Additional consideration was given to the status of threats to biodiversity within dry and sub-humid lands;

(b) Considered strategic items identified as priorities by the World Summit for Sustainable Development; and

(c) Built on the assessment mechanisms initiated at the seventh meeting of SBSTTA (UNEP/CBD/SBSTTA/7/4), which linked dry and sub-humid lands assessments to, *inter alia*, the Global Biodiversity Outlook and the Global Taxonomy Initiative.

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<sup>2/</sup> World Conservation Monitoring Centre, 1995. Global Biodiversity Assessment. UNEP.

<sup>3/</sup> As at 30 June 2005, 9 third national reports were submitted: Algeria, Bangladesh, Botswana, Democratic Republic of the Congo, Finland, Niue, Senegal, Sweden

## II. OVERVIEW ON STATUS AND TRENDS OF BIODIVERSITY IN DRY AND SUB-HUMID LANDS

### A. *Characterizing dry and sub-humid lands*

5. The UNCCD definition classifies dry and sub-humid lands as areas in which the ratio of annual precipitation to potential evapotranspiration falls within the range from 0.05 to 0.65 (also classified as arid, semi-arid, and sub-humid landscapes). <sup>4/</sup> The definition of the Convention on Biological Diversity, as set out in decision V/23, also includes hyper-arid areas, grasslands, savannahs, and Mediterranean landscapes which extend beyond this ratio.

6. As explained in the document presented to the fifth meeting of SBSTTA (UNEP/CBD/SBSTTA/5/9), hyper-arid, arid, and semi-arid areas are defined using climatic characteristics while grasslands, savannahs, and Mediterranean landscapes are defined based on vegetation types. The Global Biodiversity Outlook provides general descriptions for Mediterranean landscapes, grasslands, and savannahs; this information is not repeated here however below is a summary of some of the more commonly accepted scientific definitions.

7. For the purpose of assessing the status and trends of biodiversity in dry and sub-humid lands, this review considers three groupings of the work programme component ecosystems based on the available information and common classifications of data. In particular, the initial review revealed that much dry and sub-humid lands information can be best considered as:

- (a) Arid and semi-arid ecosystems;
- (b) Grassland and savannah ecosystems; and
- (c) Mediterranean landscapes.

8. This classification system is a slight adaptation of that presented in the final report of the Ad Hoc Technical Expert Group on the Biological Diversity of Dry and Sub-Humid Lands (UNEP/CBD/SBSTTA/8/INF/2), which considered: (i) desert and semi-desert systems; (ii) Mediterranean-type ecosystems; (iii) savannahs; and (iv) grasslands. In particular, for the purpose of this assessment, grassland and savannah ecosystems are considered jointly since many of the principle data sources merge the two biomes and deserts and semi-deserts are defined more broadly as arid and semi-arid lands.

#### 1. *Arid and semi-arid ecosystems*

9. Arid and semi-arid ecosystems are defined using the aridity index; the ratio between mean annual precipitation and mean annual potential evapotranspiration whereby arid and semi-arid lands are classified as those areas (excluding arctic and near-arctic areas) with an aridity index range from 0.05 to 0.50.

#### 2. *Grasslands and savannah ecosystems*

10. Grassland and savannah ecosystems can be defined ecologically based on vegetative cover. In particular, grasslands are considered areas with less than 10 per cent tree cover while savannahs are defined as areas with 10-15 per cent tree and woody cover. <sup>5/</sup>

#### 3. *Mediterranean landscapes*

11. Mediterranean landscapes are characterized by mild wet winters and warm dry summers. Such landscapes occur in areas between 30-35° latitudes North and South. <sup>6/</sup>

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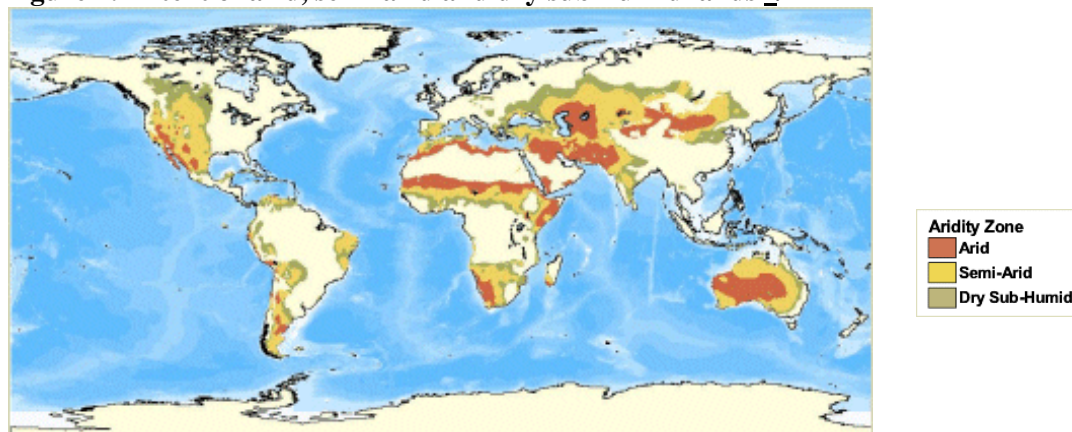
<sup>4/</sup> UNCCD, 1994. Text of the United Nations Convention to Combat Desertification – Article 1. [www.unccd.int](http://www.unccd.int)

<sup>5/</sup> WRI. 2000. Pilot Analysis of Global Ecosystems: Grassland Ecosystems. [http://forests.wri.org/pubs\\_description.cfm?PubID=3057](http://forests.wri.org/pubs_description.cfm?PubID=3057)

### B. Status and trends in extent of dry and sub-humid land habitat

12. Dry and sub-humid lands are found throughout the world with total coverage, as identified in the Global Biodiversity Outlook, measuring approximately 47 per cent of the world's terrestrial area (see figure 1 below). Grassland and savannah ecosystems account for approximately 74 per cent of the world's dry and sub-humid lands while Mediterranean landscapes encompass only 4 per cent. The remaining 24 per cent of dry and sub-humid lands consist of cropland, scrubland and dry forests.

**Figure 1: Extent of arid, semi-arid and dry sub-humid lands <sup>7/</sup>**



13. As a result of deforestation, climate change, and other anthropogenic factors, dry and sub-humid lands are actually increasing in overall extent. However, much of the total extent of dry and sub-humid lands has been given over to agricultural uses and therefore, presents limited habitat value for biodiversity. As such, the trend in extent is actually diminishing in terms of viable habitat within dry and sub-humid land ecosystems despite the overall expansion of such lands (see box 1 below).

#### **Box 1: Extent of dry and sub-humid lands habitat in Argentina ~~Error! Bookmark not defined.~~**

It is estimated that two-thirds of Argentinean terrestrial areas are classified as arid, semi-arid or sub-humid lands. This includes extensive grasslands habitats and one of the few cold semi-arid rangelands in the world, Patagonia.

A LADA pilot study assessed the extent of degradation of Argentinean drylands using the ecosystem approach. The study is commended for the scope and preciseness of its coverage, its diversity of sources, its ease of access and integration of results in future planning of LADA activities and expected integration into other national plans. However, the report concluded that natural resource data in Argentina was scattered which made it difficult to obtain critical information regarding trends in ecosystem services.

Available data was, however, provided on: (i) total numbers of species, (ii) prevalence of endemic species, and (iii) trends concerning threatened and endangered species.

#### 1. Arid and semi-arid ecosystems

14. *Baseline.* As of 2002, arid and semi-arid ecosystems accounted for approximately 25.8 per cent of the global terrestrial area (10.6 per cent arid and 15.2 per cent semi-arid) and contained more than 14

<sup>6/</sup> Biodiversity Web. 2001. Encyclopedia of Biodiversity. <http://www.biodiversity.nl/encyclopedia.htm>

<sup>7/</sup> WRI. 2002. Drylands, People, and Ecosystem Goods and Services: A Web-based Geospatial Analysis. [http://biodiv.wri.org/pubs\\_description.cfm?PubID=3813](http://biodiv.wri.org/pubs_description.cfm?PubID=3813).

per cent of the global human population. <sup>8/</sup> A majority of this area (13.8 million km<sup>2</sup>) is located in Asia, including Russia. An additional 10 million km<sup>2</sup> is located in Africa. Significant areas of arid and semi-arid ecosystems can also be found in Australia and Eastern Europe. <sup>9/</sup>

15. *Trends.* Although complete information on the extent of viable habitats in arid and semi-arid ecosystems is not available, of the two biodiversity hotspots entirely contained within arid areas (Succulent Karoo and Horn of Africa), the area of intact vegetation remaining is 112,748 km<sup>2</sup> compared to an original extent of more than 1.7 million km<sup>2</sup>. This represents a 94 per cent decrease in habitats. <sup>10/</sup>

16. Overall, trends in the extent of viable habitat within arid and semi-arid ecosystems are difficult to quantify given the current lack of data and the complex interactions between desertification, climate change, and shifting land use patterns. <sup>11/</sup> Given that the aforementioned factors exert negative pressure on viable habitat within arid and semi-arid ecosystems, however, it can be extrapolated that the decreasing habitat trends observed within the biodiversity hotspots will be mirrored, to varying degrees, throughout the remaining extent of arid and semi-arid ecosystems.

## 2. Grasslands and savannah ecosystems

17. *Baseline.* Approximately 34.8 per cent of the global terrestrial area is classified as grassland and savannah ecosystems. Grassland and savannah ecosystems are represented on every continent although a majority of the world's savannah ecosystems are located in Africa. <sup>8/</sup> In particular, the Sub-Saharan African region encompasses approximately 14.5 million km<sup>2</sup> of the global total, followed by Asia which contains 8.9 million km<sup>2</sup>. <sup>12/</sup> Overall 42 per cent of global grassland and savannah ecosystems occur in arid and semi-arid ecosystems while 23 per cent are located in humid areas.

18. *Trends.* While information is not readily available on changes in the global extent of viable habitat within grassland and savannah ecosystems, some data is available for specific areas/locations. Detailed United States Geological Survey monitoring has revealed that between 1830 and 1994 the extent of tall-grass prairie in North America has decreased by 97 per cent, mixed-grass prairie has decreased by 64 per cent and short-grass prairie has decreased by 66 per cent. <sup>13/</sup> A great deal of natural habitat has also been lost within grassland and savannah ecosystems such as the Guinean and Sahelian savannahs, the Eurasian steppes and the North American Great Plains, all of which once boasted very high levels of floral diversity and supported large populations of ungulates.

19. The tropical savannahs of Southwest Australia, however, still encompass over 56 per cent of the original grassland and savannah extent, while the Asian/Daurian Steppes <sup>14/</sup> and Central and Eastern Mopane and Miombo woodlands <sup>15/</sup> have retained 71.7 per cent and 73.3 per cent respectively<sup>13</sup>. As such, these areas remain capable of supporting high biological diversity including many endemic species.

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<sup>8/</sup> Millennium Ecosystem Assessment. 2005. Desertification Synthesis Report.  
<http://www.millenniumassessment.org/en/index.aspx>

<sup>9/</sup> WRI. 2002. Drylands People and Ecosystem Goods and Services: A Web-Based Geospatial Analysis.  
[http://biodiv.wri.org/pubs\\_description.cfm?PubID=3813](http://biodiv.wri.org/pubs_description.cfm?PubID=3813)

<sup>10/</sup> Conservation International. 2005. Biodiversity Hotspots Revisited.  
[http://www.biodiversityhotspots.org/xp/Hotspots/hotspotsScience/hotspots\\_revisited.xml](http://www.biodiversityhotspots.org/xp/Hotspots/hotspotsScience/hotspots_revisited.xml)

<sup>11/</sup> UNDP. 2001. Vulnerability and Adaptation to Climate Change in Drylands.  
<http://www.undp.org/seed/unso/globalpartnership/docs%20/Vulnerability%20Challenges.doc>

<sup>12/</sup> WRI, 2000. Pilot Analysis of Global Ecosystems: Grassland Ecosystems.  
[http://forests.wri.org/pubs\\_description.cfm?PubID=3057](http://forests.wri.org/pubs_description.cfm?PubID=3057)

<sup>13/</sup> Samson and Knopf, 1994 in: Pilot Analysis of Global Ecosystems: Grassland Ecosystems, 2000. WRI.

<sup>14/</sup> Mongolia and China.

<sup>15/</sup> Tanzania, Rwanda, Burundi, Democratic Republic of the Congo, Zambia, Botswana, Zimbabwe and Mozambique.

Although precise data is not available, it is known that the Tibetan Plateau grasslands are also largely intact and are able to support migrations of Tibetan antelope and Tibetan wild ass. <sup>16/</sup>

### 3. Mediterranean landscapes

20. *Baseline:* Mediterranean landscapes are the smallest of the dry and sub-humid land ecosystems covering only 2 per cent of global terrestrial area. Much of this is located within the Mediterranean basin, which includes areas within Portugal, Jordan, Italy, Morocco, Spain, France, the Balkan States, Greece, Turkey, the Syrian Arab Republic, Lebanon, Israel, Egypt, Libya, Tunisia, and Algeria.

21. Globally there are five main Mediterranean landscapes: the Mediterranean basin, the California Floristic Province (United States of America), the Cape Floristic Kingdom (Southern Africa), south-west Australia, and the Chilean Matorral. Although these Mediterranean landscapes are defined by common climatic conditions, including seasonal rains and notable seasonal temperature changes, they extend across various topographies, temperature zones, and geological landscapes.

22. *Trends.* Overall, the extent of Mediterranean natural vegetation has been reduced from a historical area of almost 3 million km<sup>2</sup> to approximately 450,000 km<sup>2</sup>, representing a decrease in habitat extent of 87 per cent. <sup>17/</sup> Within the California Floristic Province alone, only about 25 per cent of the original vegetation of the hotspot remains in very good condition. The largest landscape (the Mediterranean basin) has been under pressure from human development for over 8,000 years and is currently home to approximately 300 million people. As a result, the Mediterranean basin is one of the four most significantly altered biodiversity hotspots in the world.

#### C. Status and trends in abundance and distribution of selected species

23. The IUCN Red List of Threatened Species lists 2,311 threatened species in drylands, shrublands, savannahs, and grasslands. One hundred and ten of those species are critically endangered, including, *inter alia*, the California Condor (*Gymnogyps californianus*), the Giant Ibis (*Thaumatibis gigantea*) and the Island Grey Fox (*Urocyon littoralis*). <sup>18/</sup> The IUCN Red List also identifies 15 known dry and sub-humid land species that are either extinct or extinct in the wild, including, *inter alia*, the Guam Rail (*Rallus owstoni*) and the Wyoming Toad (*Bufo baxteri*).

24. In addition to global and regional assessments and monitoring tools, a number of countries are independently conducting national observations (see box 2). For example, the Ministry of Environment and Tourism of the Government of Namibia has conducted extensive work on assessing the status and trends of biological diversity. This has included both the identification of 293 species within Namibia (of which 72 dry and sub-humid lands species are threatened). <sup>19/</sup> Regional government agencies within Australia also produce comprehensive biodiversity assessments as a component of regional biodiversity plans. <sup>20/</sup> Within the United States, the United States Geological Survey maintains a detailed species dataset (the National Biological Information Infrastructure). Although these national data sources are useful when examining a particular dry or sub-humid site, greater coordination and consolidation of information is required along with expanded coverage in order to develop an adequate global view.

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<sup>16/</sup> WWF. 2005. Global 200: Blueprint for a Living Planet. [http://www.panda.org/about\\_wwf/where\\_we\\_work/ecoregions/index.cfm](http://www.panda.org/about_wwf/where_we_work/ecoregions/index.cfm)

<sup>17/</sup> Conservation International. 2005. Biodiversity Hotspots Revisited. [http://www.biodiversityhotspots.org/xp/Hotspots/hotspotsScience/hotspots\\_revisited.xml](http://www.biodiversityhotspots.org/xp/Hotspots/hotspotsScience/hotspots_revisited.xml)

<sup>18/</sup> IUCN. 2004. IUCN Red List of Threatened Species. [www.redlist.org](http://www.redlist.org). Downloaded on 04 February 2005

<sup>19/</sup> Government of Namibia – Ministry of Environment and Tourism. Environmental Indicators [http://www.dea.met.gov.na/met/programmes/env\\_indic/env\\_indic.htm](http://www.dea.met.gov.na/met/programmes/env_indic/env_indic.htm)

<sup>20/</sup> Australia Department for Environment and Heritage. 1999. Biodiversity Plan for the Southeast of Australia. Government of Australia.



**Box 2: Species status and trends in Australia** Error! Bookmark not defined./

Australia has published two studies on bird population status and trends, the threats they face and evaluation of conservation efforts. Although the assessment does not classify species by habitats or describe trends by biome, the analysis of 422 species revealed that between 1977 and 2002, 48 per cent of species showed no variation, 15 per cent were recorded less frequently, and 37 per cent were recorded more frequently. The increase in species populations can be credited to an increase in rainfall over the whole country, which created better reproductive conditions.

A. *Arid and semi-arid ecosystems*

25. *Baseline:* The distribution of endemic biological diversity within arid and semi-arid ecosystems is typically sporadic with concentrations centered along waterways. Much of the vegetative cover in arid and semi-arid ecosystems consists of shrub lands, croplands, and pastures with only scattered tree and forest stands. Leaf and stem succulents as well as Acacia species are well represented due to their high tolerance for drought. <sup>10/</sup>

26. Arid and semi-arid ecosystems also support diverse populations of reptiles such as *inter alia*, the Armadillo Girdled Lizard (*Cordylus cataphractus*) and the Namaqualand Tent Tortoise (*Psammobates tentorius trimeni*), while amphibians tend to be poorly represented. <sup>10/</sup> Arid and semi-arid ecosystems also contain important habitat for a number of well adapted threatened and endangered mammal species including, *inter alia*: the Speke's Gazelle (*Gazella spekii*) and the Riverine Rabbit (*Bunolagus monticularis*). Finally, arid and semi-arid ecosystems contain a large number of endemic species and diverse populations of species such as bees and ants. <sup>21/</sup>

27. While information is not available for all arid and semi-arid ecosystems, snapshot information within the Horn of Africa and Succulent Karoo biodiversity hotspots reveals rates of endemism <sup>22/</sup> of 55 per cent and 38.4 per cent respectively. <sup>17/</sup>

28. The Survey of Economic Plants for Arid and Semi-Arid Lands database has further identified and catalogued 5,907 species of economic value within the 75 countries in the tropics with more than 10 per cent of their area in drylands. Of these species, 1,428 have medicinal uses. <sup>23/</sup>

29. *Trends:* Since the IUCN Red List does not classify habitats according to the aridity index, it is difficult to extrapolate information regarding endangered and threatened species in arid and semi-arid ecosystems. Within the two arid hotspots, however, there are 20 threatened endemic species and two known cases of species extinction.

3. *Grasslands and savannah ecosystems*

30. *Baseline:* Grassland and savannah ecosystems are dominated by herbaceous and shrub vegetation. Some key threatened and endangered species in grassland and savannah ecosystems include *inter alia*, bird species including the Blue-eyed Ground Dove (*Claravis pretiosa*) in Brazil, the Greater Sage Grouse (*Centrocercus urophasianus*) in Canada, and the Taita Thrush (*Turdus helleri*) in Kenya. <sup>9/</sup>

31. Biological diversity in grassland and savannah ecosystems is closely linked to agricultural biodiversity since such areas continue to be the source of wild seed stock for the development and dissemination of resistant crop varieties. For example, ongoing work by the International Center for Agricultural Research in the Dry Areas (ICARDA) has capitalized on forage legumes that are native to

<sup>21/</sup> McNeely, J. Biodiversity in Arid Regions: Values and Perceptions. Presented to the International Conference on the Conservation of Biodiversity in Arid Regions, March 27-29, 2000.

<sup>22/</sup> Endemic species are those which are unique to the stated ecosystem or region.

<sup>23/</sup> Royal Botanic Gardens, Kew. Survey of Economic Plants for Arid and Semi-Arid Lands database. <http://www.rbgekew.org.uk/ceb/sepal/internet/>

grasslands and have a high productive potential in dry and sub-humid areas. The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) manages an entire research theme on agro-ecosystems including the sustainable management of agricultural biodiversity.

32. Endemism in grassland and savannah ecosystems can be extrapolated from centres of plant diversity data since, in order to qualify as a centre of plant diversity, an area must have at least 10 per cent endemism amongst vascular plants. <sup>24/</sup> Of the 234 identified centres of plant diversity, at least 40 are located entirely within grasslands or savannahs with an additional 70 encompassing some grassland habitat. Amongst Endemic Bird Areas, grassland or savannah is the principle habitat type in 24 of the 217 identified areas. <sup>9/</sup> Furthermore, given their global coverage and relatively high levels of biodiversity, grassland and savannah ecosystems are scattered throughout many of the world's 34 biodiversity hotspots.

33. *Trends:* The IUCN Red List of threatened species identifies 1,378 near threatened, threatened and endangered species within grassland and savannah ecosystems. Of these 1,378 species, 575 have declining population trends while increases in population have been noted for only 14 species.

34. The WWF Living Planet Report (2004) reveals that temperate grassland vertebrate populations have declined by more than 10 per cent in the period 1970-2000 while tropical grassland populations have declined by approximately 80 per cent over the same time period. <sup>25/</sup>

35. Within the southern Africa region, the average fraction of original population sizes of plant and vertebrates remaining today (when compared to original/historical extents) is reported as 74 per cent in grasslands and 87 per cent within savannahs. <sup>26/</sup> Among herbivores in sub-Saharan Africa, steady increases in populations are observed within protected areas however key populations are declining beyond the borders of formal conservation sites. <sup>12/</sup>

#### 4. *Mediterranean landscapes*

36. *Baseline:* Mediterranean landscape vegetation is characterized by a high level of endemism and some of the most biologically diverse regions in the world (such as the Cape Floral Kingdom). Notable species include, *inter alia*, the Argan tree (*Argania spinosa*), the Giant Sequoia (*Sequoiadendron giganteum*) and the King Protea (*Protea cynaroides*). Notable mammals include, *inter alia*, the Kit Fox (*Vulpes macrotis*) and the Barbary Macaque (*Macaca sylvanus*).

37. Mediterranean landscapes include almost 25,000 endemic plant species. Of these approximately 90 species are threatened.

38. *Trends:* Amongst the broader categorization of dry and sub-humid lands, Mediterranean landscapes generally have the highest proportion of threatened species because of high human use and conversion pressure. Ten species once inhabiting Mediterranean landscapes are now extinct and many more are threatened. In particular, the Cape Floral Kingdom, which accounts for only 4 per cent of the land area of southern Africa, accounts for nearly 70 per cent of the region's threatened species. Furthermore, approximately 10 per cent of the California Floristic Province flora is considered threatened. <sup>6/</sup>

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<sup>24/</sup> Information available at: [http://www.nmnh.si.edu/botany/projects/cpd/about\\_project.htm](http://www.nmnh.si.edu/botany/projects/cpd/about_project.htm).

<sup>25/</sup> WWF. Living Planet Report, 2004.

<sup>26/</sup> Millennium Ecosystem Assessment. Ecosystem Services in Southern Africa: A Regional Assessment, 2004 [www.millenniumassessment.org/en/index.aspx](http://www.millenniumassessment.org/en/index.aspx).

#### **D. Coverage of protected areas <sup>27/</sup>**

39. Overall there are approximately 1,300 IUCN Category I-IV protected areas in dry and sub-humid lands. Every continent contains some type of conservation area designated within dry and sub-humid zones although Endemic Bird Areas and centres of plant diversity are poorly represented in Africa, Canada, the United States, and much of Asia. Conversely, South America and Australia are the best represented areas in terms of conservation areas in dry and sub-humid lands. <sup>28/</sup> As with the assessment of the distribution of species, there are many national reporting mechanisms available for the evaluation of protected areas in dry and sub-humid lands (see box 3 below).

##### **Box 3: Protected area status and trends reporting: Morocco ~~Error! Bookmark not defined.~~**

Morocco contains 39 defined ecosystems many of which are amongst the 92 per cent of Morocco's total land area that is classified as drylands. Morocco also contains 40,000 km<sup>2</sup> of protected areas representing approximately 9 per cent of total area. <sup>1/</sup> A 1996 National Study on Protected Areas identified 160 sites of biological and ecological interest (SBIE) in addition to 10 national parks representing all Moroccan ecosystems. In 2004 a national workshop on Important Plant Areas (IPA) identified 57 IPAs including recommendations for their protection. The national workshop further reported an increase of protected areas from 14,150km<sup>2</sup> to 47,950km<sup>2</sup> from 1990 to 2004.

Morocco's clearing-house mechanism centralizes reports and data from 10 national agencies and ministries, 6 national research institutes and 2 NGOs. It provides information on status and trends of Morocco's biodiversity including ecosystems, flora and fauna, endemic and threatened species, genetic diversity as well as agrobiodiversity. The clearing-house also makes available a list of categorized protected areas as well as the endemic and threatened species they host and the threats faced by them.

#### *1. Arid and semi-arid ecosystems*

40. *Baseline:* The United Nations List of Protected Areas estimates that the percentage of protected areas in desert and semi-desert landscapes is 10.3 per cent.

41. *Trends:* The estimate presented in the United Nations List of Protected Areas (2003) represent a significant increase over the initial report delivered in 1997 at which point only 4.8 per cent of warm deserts and semi-deserts were afforded protection. It should be noted, however, that although the 10 per cent target alluded to in the 2010 biodiversity targets has been reached in arid and semi-arid areas, biodiversity continues to be threatened, thus implying that the 10 per cent target may be insufficient within arid and semi-arid ecosystems or that the management of such areas should be improved.

#### *2. Grasslands and savannah ecosystems*

42. *Baseline:* Only 4.6 per cent of temperate grasslands are protected. Within tropical grassland and savannah ecosystems, however, protected area coverage reaches 15.3 per cent. <sup>2/</sup>

43. Globally, almost half of the centres of plant diversity identified are located in grasslands or savannahs. Grassland and savannah ecosystems also account for 23 of the 217 global Endemic Bird Areas and 35 of the 136 terrestrial ecoregions identified as examples of global ecosystem diversity. <sup>12/</sup>

44. *Trends:* The current extent of protected grassland and savannah ecosystems represents a significant increase from 1997 at which point less than 1 per cent of temperate grasslands and 7.4 per cent of tropical grassland and savannah ecosystems were protected.

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<sup>27/</sup> Information presented in this section has been garnered from the United Nations List of Protected Areas unless otherwise specified.

<sup>28/</sup> WRI. 2002. Drylands People and Ecosystem Goods and Services: A Web-Based Geospatial Analysis. [http://biodiv.wri.org/pubs\\_description.cfm?PubID=3813](http://biodiv.wri.org/pubs_description.cfm?PubID=3813)

### 3. *Mediterranean landscapes*

45. *Baseline:* Excluding the Mediterranean landscape of the Chilean Matorral (for which specific information is not available), slightly less than 250,000 km<sup>2</sup> of Mediterranean landscapes are protected. This represents almost 9 per cent of the total original extent of Mediterranean landscapes. Protected area categories I-IV account for slightly more than 100,000 km<sup>2</sup> (40 per cent) of this total.

46. A majority of the total protected area within Mediterranean landscapes is contained within the California Floristic Province, although south-west Australia accounts for the largest area of category I-IV protected areas. Significant efforts are also being made in the Mediterranean basin where, for example, the Cinque Terra National Park is working to improve the effectiveness of protected areas through innovative management practices such as an environmental quality brand for approved accommodations and the Cinque Terra Card to control the number of tourists. <sup>29/</sup>

47. *Trends:* Although information on trends in protected areas within Mediterranean landscapes is not readily available, there are a number of targeted initiatives under implementation, which implies an upward trend in conservation. These initiatives include the Cape Action for People and the Environment (CAPE) project in the Cape Floral Kingdom, funded by the Global Environment Facility and the UNEP-supported Mediterranean Action Plan (MAP) for the Mediterranean basin.

#### *E. Threats to biodiversity*

48. Biological diversity in dry and sub-humid lands faces a number of natural and human induced threats. The greatest of these threats continues to be habitat loss as a result of: (i) land-use change; (ii) ecosystem degradation; and (iii) overexploitation, including overgrazing. Habitat loss in dry and sub-humid lands is intimately linked to desertification which is defined by the UNCCD as land

#### **Box 4: UNCCD national reports Error! Bookmark not defined./**

National reports on implementation of the UNCCD acknowledge interlinkages between desertification, biodiversity loss and poverty. In fact, a vast majority of reports identify biodiversity loss as one of the main impacts of desertification. In addition, the reports also highlight that threats to biodiversity are often concurrent with the causal factors of desertification. For example, the Central African Republic and Ethiopian national report mention the high dependency on biomass fuels for energy and intensive agriculture as primary causes of both land degradation and biodiversity loss. Other identified common causal factors of both biodiversity loss and desertification include land use change, climate change and decreases in water availability.

degradation in dry areas to the extent that ecosystem functions are negatively affected (see box 4 below).

49. Additional pressures on biodiversity occur as a result of direct factors such as pollution and fire, climate change, and competition from invasive alien species. <sup>30/</sup> These threats are described in more detail in the final report of the Ad Hoc Technical Expert Group on the Biological Diversity of Dry and Sub-Humid Lands (UNEP/CBD/SBSTTA/8/INF/2) and in the dry and sub-humid lands report presented at the fifth meeting of SBSTTA (UNEP/CBD/SBSTTA/5/9).

50. The underlying causes of the above threats to biodiversity include:

- (a) Poverty, especially amongst natural resource dependent populations who are often forced to counteract poverty through increased exploitation of natural resources;
- (b) The lack of appropriate incentive frameworks to encourage / reward sustainable use; and

<sup>29/</sup> Information is available at: <http://www.parconazionale5terre.it/>

<sup>30/</sup> IUCN. 2002. Biodiversity in Drylands: Challenges and Opportunities for Conservation and Sustainable Use. [www.undp.org/drylands/docs/cpapers/Biodiversity-in-the-Drylands-Challenge-Paper.pdf](http://www.undp.org/drylands/docs/cpapers/Biodiversity-in-the-Drylands-Challenge-Paper.pdf)

- (c) An incomplete understanding of the impacts of human actions on biodiversity.

1. *Arid and semi-arid ecosystems*

51. Some of the most critical threats to natural habitats in arid and semi-arid ecosystems include land degradation in the form of desertification, overgrazing, and agricultural conversion. Furthermore, rapid human population growth is placing increasing pressure on land in arid and semi-arid ecosystems. For specific examples of activities which are threatening arid and semi-arid ecosystems biodiversity, see table 1a below.

<b>Table 1a: Primary activities decreasing the extent of habitat in arid and semi-arid ecosystems</b>	
<b>Activity</b>	<b>Examples of available data</b>
Land degradation	At least 10% of global dry and semi-arid lands are suffering from some form of land degradation <sup>31/</sup>
Overgrazing	Grazing activities take place in over 90% of the Succulent Karoo hotspot resulting in about two thirds of the land being classified as overgrazed
Conversion to agricultural land	The Great Indian Bustard is facing declining population trends as a result of agricultural conversion due to increased irrigation infrastructure <sup>32/</sup>
Over exploitation of natural resources linked to human population growth	Burkina Faso (which is almost entirely classified as arid and semi-arid) has a 2.57% human population growth rate (2004). This is more than double the global growth rate of only 1.14%. <sup>33/</sup> Human population growth is linked to increased resource use.

52. With regard to direct factors threatening biodiversity in arid and semi-arid ecosystems, pollution and invasive alien species are placing increasing pressure on biodiversity. For examples of such threats, see table 1b.

<b>Table 1b: Primary activities directly threatening biodiversity in arid and semi-arid lands</b>	
<b>Activity</b>	<b>Examples of available data</b>
Pollution	The disappearance of frog species in eastern Australia is attributed to the direct and indirect effects of airborne pollutants particularly those used for agriculture and pest management. <sup>34/</sup>
Introduction of invasive alien species	The Global Invasive Species Database identifies 16 invasive species which are threatening native species within desert habitats alone.  Ostriches introduced into the Succulent Karoo area have degraded thousands of hectares of endemic plant biodiversity.

<sup>31/</sup> Millennium Ecosystem Assessment. 2005. Desertification Synthesis Report. [www.millenniumassessment.org/en/index.aspx](http://www.millenniumassessment.org/en/index.aspx)

<sup>32/</sup> Birdlife International. 2005. South Asian Arid Habitats. [http://www.birdlife.org/action/science/species/asia\\_strategy/grasslands.html#tag3](http://www.birdlife.org/action/science/species/asia_strategy/grasslands.html#tag3)

<sup>33/</sup> CIA. World Factbook, 2004. online at: <http://www.cia.gov/cia/publications/factbook/geos/uv.html>.

<sup>34/</sup> Government of Australia. 2001. State of the Environment Report. <http://www.deh.gov.au/soe/2001/heritage/>

## 2. *Grasslands and savannah ecosystems*

53. Perhaps the greatest threat to biodiversity in grassland and savannah ecosystems is habitat degradation as a result of the expansion of agriculture and overgrazing. Amongst grasslands in North America, urbanization is also a significant factor when considering habitat destruction (see table 2a below).

<b>Table 2a: Primary activities decreasing the extent of habitat in grassland and savannah ecosystems</b>	
<b>Activity</b>	<b>Examples of available data</b>
Conversion to agricultural land	Nearly half of the natural habitat within the Caucasus region has been transformed by human activities including agricultural production  Within North American grasslands 60% of bird species are showing negative population trends between 1980-1999 as a result of agricultural production activities. <u>35/</u>
Overgrazing	Since 1945, approximately 20% of the world's grazing lands, have been significantly degraded as a result of poor management and overgrazing. <u>36/</u>
Urbanization and human settlements	Urbanization of grasslands in the Midwestern United States has caused a reduction of barn owl numbers. <u>37/</u>

54. Regarding direct threats to biodiversity in grassland and savannah ecosystems, the introduction of invasive alien species is a critically significant factor (see table 2b below).

<b>Table 2b: Primary activities directly threatening biodiversity in grassland and savannah ecosystems</b>	
<b>Activity</b>	<b>Examples of available data</b>
Introduction of invasive alien species	The introduction, both purposeful and accidental, of 220 noxious non-native species into Australia has decreased the extent and abundance of many native flora. <u>28/</u>  The Global Invasive Species Database identifies 84 invasive species which are threatening native species within rangelands and grassland habitat worldwide.

## 3. *Mediterranean landscapes*

55. Habitat destruction within Mediterranean landscapes is a particular problem as a result of fragmentation, urbanization and forest fire (see table 3a below).

<b>Table 3a: Primary activities decreasing the extent of habitat in Mediterranean landscapes</b>	
<b>Activity</b>	<b>Example of available data</b>

35/ Birdlife International. 2004. State of the World's Birds. <http://www.birdlife.org/action/science/sowb/>

36/ IFPRI, FAO and ILRI. 1999. Livestock to 2020: the Next Food Revolution. IP Publishing Ltd.

37/ Fund for Wildlife. 2001. [http://www.fundwildlife.org/preybirds\\_barnowl.html](http://www.fundwildlife.org/preybirds_barnowl.html)



Habitat fragmentation	Much of the remaining natural habitat in the Cape Floristic Region exists in a very fragmented state amongst tracts of intensive agriculture.
Urbanization and human settlements	Human population density in the California Floristic Province has reached 121 persons per square kilometre. This increased density has reduced available habitat for wild biodiversity.
Forest fire	Every year, uncontrolled forest fires burn through an area equal to 1.3 – 1.7% of the total forest area in the Mediterranean Basin. <sup>38/</sup>

56. Direct threats to biological diversity within currently available natural habitats in Mediterranean landscapes include pollution and the introduction of invasive alien species (see table 3b below).

<b>Table 3b: Primary activities directly threatening biodiversity in Mediterranean landscapes</b>	
<b>Activity</b>	<b>Example of available data</b>
Pollution	The level of dioxin-like chemicals in Audouin's Gull ( <i>Larus audonii</i> ) eggs exhibit a concentration approximately six times higher than the level shown to induce mortality and developmental abnormalities. <sup>39/</sup>
Introduction of invasive alien species	Invasive species are found in about 70% of the mountain and lowland wildflowers in the Cape Floristic Kingdom.

### III. IDENTIFIED KNOWLEDGE AND INFORMATION GAPS

57. The operational objective of part A of the programme of work on dry and sub-humid lands is to “assemble and analyse information on the state 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”.

58. In support of the above objective, a number of informational and knowledge gaps have been identified throughout the analysis of the status and trends of biological diversity in dry and sub-humid lands:

(a) *Physical infrastructure:* there is currently a lack of permanent infrastructure such as computerized databases and monitoring stations with which to collect and distribute data in many countries;

(b) *Human resources:* The Global Biodiversity Assessment links many assessment gaps to limited human resource capacity with regards to both data collection and technical classification;

(c) *Communication:* The assessment in this note reveals that there are often inconsistencies between agencies and countries regarding the delineation of boundaries of dry and sub-humid lands. Additionally, the method by which data is classified varies between reports resulting in reporting difficulties on specific ecosystems. Improved communication mechanisms and processes could also support coordination efforts allowing for such transboundary trends to be better reflected.

59. The Global Taxonomy Initiative may help to address some of the above-mentioned knowledge and information gaps by working to reduce gaps in current taxonomic systems including the shortage of

<sup>38/</sup> WWF. 2003. Forest Fires in the Mediterranean.

<sup>39/</sup> UNEP. 2002. Regionally Based Assessment of Persistent Toxic Substances: Mediterranean.  
<http://www.chem.unep.ch/pts/regreports/Mediterranean.pdf>

trained taxonomists. However, the Global Taxonomy Initiative itself is subject to knowledge and information gaps as identified in the note by the Executive Secretary on the in-depth review of the programme of work for the Global Taxonomy Initiative prepared for the eleventh meeting of SBSTTA (UNEP/CBD/SBSTTA/11/5).

#### IV. CONCLUSIONS

60. Overall the amount of information available on the biodiversity of dry and sub-humid lands is limited and sporadic. Available data tends to be very general with minimal applications of results-based monitoring processes and indicators. Overall, while it is possible to generate an overview of the baseline status of biological diversity in dry and sub-humid lands based on a few general and localized information sources, concerted and targeted efforts will be required to fill remaining gaps particularly with regards to information on the extent of natural (viable) habitats and the impacts of threats to biodiversity within dry and sub-humid lands.

61. Available information does, however, indicate:

- (a) An overall increase in areas classified as dry and sub-humid lands but a decrease in natural habitat within these areas;
- (b) The presence of 2,311 threatened species in dry and sub-humid lands; and
- (c) An upward trend in the coverage of protected areas (although there is still a serious shortcoming with regards to protected area coverage in temperate grasslands).

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