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Item 5.4 of the provisional agenda*

INDICATORS FOR ASSESSING PROGRESS TOWARDS THE 2010 TARGET: TRENDS IN EXTENT OF SELECTED BIOMES, ECOSYSTEMS AND HABITATS

Note by the Executive Secretary

I. SUMMARY

1. Based on currently available trend information, the extent of the following major ecosystem types are considered ready for immediate indicator implementation: (i) forests (including different forest types, notably mangroves), (ii) peatlands (as a component of inland waters or forests), (iii) coral reefs (as a component of marine and coastal ecosystems), (iv) croplands (as a component of agricultural systems), (v) grasslands/savannahs (as a component of dry and sub-humid lands), (vi) polar/ice.

2. The world's forest cover in the year 2000 was about 3.9 billion hectares, with more than 60 per cent of tropical land and approximately 30 per cent of non-tropical land being classified as forests. About 95 per cent of the forest cover was considered as natural forest. The loss of natural forest in the 1990s was estimated at 16.1 million hectares (equivalent to 0.42 per cent) per year. This loss was partially offset by natural expansion of forests amounting to 3.6 million hectares per year. In tropical areas, the loss of natural forests in that decade was equivalent to 0.73 per cent per year (see figure 1 below).

Figure 1. Trends in natural forest area (in million hectares)

* UNEP/CBD/SBSTTA/10/1.

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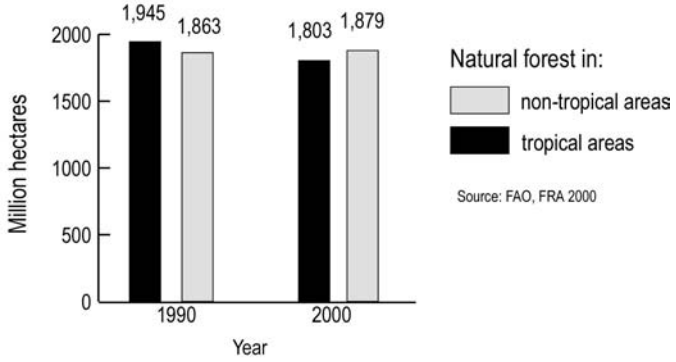


3. The rate of loss of some important forest types with high conservation value—such as mangroves—exceeded that of tropical forests. Over 35 per cent of mangrove forests has been lost between 1980 and 2000. 1/ 2/

4. Peatlands cover about 50 per cent of all the world's wetlands (over 4 million km^2), or 3 per cent of the land and freshwater surface of the planet. Conversion of peatlands for intensive agriculture has resulted in the loss of natural peatlands in large parts of western Europe (with less than 10 per cent remaining), and a significant reduction in central and eastern Europe (with less than 50 per cent remaining). In South-East Asia most of the once extensive (over 40 million ha) tropical peat swamp forests have been heavily degraded and large extents have been lost over the last four decades (remaining area 25-30 million ha).

5. Coral reefs are among the most ecologically complex ecosystems on Earth and are home to over 4,000 different species of fish, 700 species of coral, and hundreds of thousands of other animals and plants. Human activities threaten coral reefs the world over and continue to degrade coral reefs through sedimentation, coastal development, destructive fishing practices and pollution. In the Caribbean, the average hard coral cover declined from about 50 per cent to 10 per cent in the last three decades.

6. Croplands cover about 30 per cent of the Earth's surface. The extent of cropland has significantly increased in Asia, Africa and North America. The increase has been less pronounced in Europe, Australia, Central and South America.

7. There was a widespread retreat of mountain glaciers in non-polar regions during the twentieth century, and decreases of about 10 per cent in the extent of snow cover since the late 1960s. There was also a reduction of about two weeks in the annual duration of lake- and river-ice cover in the mid- and high-latitudes of the northern hemisphere, over the twentieth century. Northern hemisphere spring and summer sea-ice extent has decreased by about 10 to 15 per cent since the 1950s. It is likely that there has been about a 40 per cent decline in Arctic sea-ice thickness during late summer to early autumn in recent decades and a considerably slower decline in winter sea-ice thickness.

II. RELATION OF INDICATOR TO FOCAL AREA

8. In accordance with Article 2 of the Convention, biological diversity includes living organisms from all sources and the ecological complexes of which they are part. This includes diversity within species, between species and of ecosystems.

1/ Valiela, I., J. L. Bowen, and J. K. York. 2001. Mangrove forests: One of the world's threatened major tropical environments. BioScience 51: 807-815.

2/ *State of the World's Forests* (SOFO) 2003, FAO, Rome. available at http://www.fao.org/documents/show_cdr.asp?url_file=/DOCREP/005/Y7581E/y7581e00.htm

9. This indicator provides information on trends of biome, ecosystem and habitat areas. The reduction in size of natural ecosystems and habitats reflect the result of land use change, one of the recognized major threats to biodiversity. The indicator on species trends, trends in threatened species, the occurrence of invasive alien species and fragmentation/connectivity provide complementary information on the quality of these ecosystems. The integrity of specific ecosystems is assessed through the marine trophic index and the indicator on water quality in aquatic ecosystems. The indicator on protected area coverage provides trends in the percentage of each major biome for which conservation measures are in place.

III. GENERAL DESCRIPTION

10. To make a global assessment of the rate of loss of biomes, ecosystems and habitats, it is important to obtain complete coverage of all major types of biomes/ecosystems, even if data quality varies. Data sources include global remote-sensing data and national land-cover maps and statistics. For some biome/ecosystem types, the identified datasets will yield sufficient datapoints to give trend information relevant to the 2010 target assessment. For others, appropriate global datasets are yet to be identified or need to be acquired.

11. Based on current and short-term future availability of trend information, the following major ecosystem types are considered ready for immediate indicator implementation:

(a) Forests (including different forest types, notably mangroves);

(b) Peatlands (as a component of inland waters or forests);

(c) Coral reefs (as a component of marine and coastal ecosystems);

(d) Croplands (as a component of agricultural systems);

(e) Grasslands/savannahs (as a component of dry and sub-humid lands);

(f) Polar/ice.

12. In the future efforts need to be made to apply the indicator to the following ecosystem types to ensure coverage of all thematic areas recognized by the Convention:

(a) Inland wetlands (other than those already covered as peatlands);

(b) Tidal flats/estuaries (as an additional component of coastal ecosystems);

(c) Seagrass beds (as an additional component of coastal ecosystems);

(d) Dry and sub-humid lands (other than grasslands/savannahs);

(e) Urban areas.

13. Identified datasets relevant to these habitats are shown in grey tint in the table contained in annex I below**.** Annex II compares different land-class classifications in relation to the thematic programmes of work of the Convention.

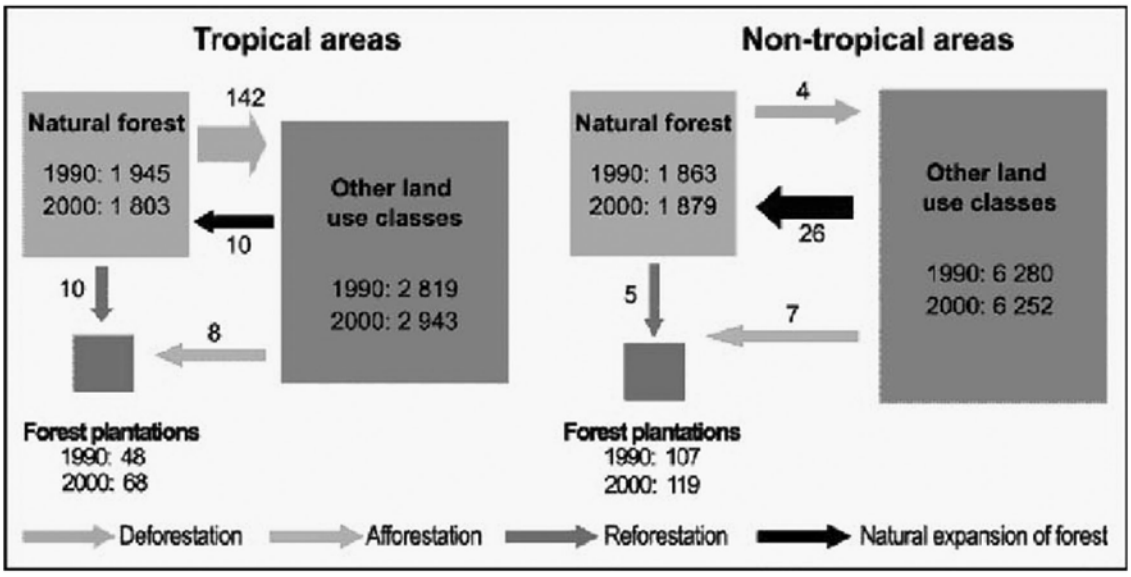
14. Currently, the most comprehensive and most easily accessible datasets are available for the extent of forest cover and trends in the coverage of live corals.

1. Forests

15. The rapid loss of tropical forests remains a main feature and concern, contributing to losses of biological diversity, increases of atmospheric carbon and land degradation. FAO 3/ has estimated that the world's forest cover in the year 2000 was about 3.9 billion hectares: more than 60 per cent of tropical land and approximately 30 per cent of non-tropical land was classified as forests. About 95 per cent of the forest cover was considered as natural forest. The loss of natural forest in the 1990s was estimated at 16.1 million hectares (equivalent to 0.42 per cent) per year. This loss was partially offset by natural expansion of forests amounting to 3.6 million hectares per year. The net change in natural forest cover was a loss of 14.2 million hectares annually in tropical forests, and an expansion of 1.7 million hectares annually in non-tropical areas (see figure 2).

3/ FAO 2001. *Global Forest Resources Assessment 2000*. Main Report. FAO Forestry Paper 140, 479 pp. Rome.

Figure 2. Forest area changes (1990-2000 (million hectares) 4/



16. Among the forest types under threat and with usually a high conservation value—such as mangroves, cloud forests and dry tropical forests—only information on the trends in the extent of mangrove coverage is currently available. The rate of loss of these forests may be higher than the average forest loss, though it should be noted that this information is still preliminary. A more comprehensive report will be made available at the end of 2005, as a special study within the framework of the *Global Forest Resources Assessment Update 2005* (FRA 2005).

2. Peatlands

17. Peatlands cover about 50 per cent of all the world's wetlands (over 4 million km^2), or 3 per cent of the land and freshwater surface of the planet, and store 10 per cent of all freshwater and over 30 per cent of the earth's surface soil carbon (or up to 70 per cent of all carbon stored in biotic systems). Peatlands dominate the landscape in northern Europe, north Siberia, Alaska and Canada, and also form extensive landscapes in the tropics (e.g. lowlands of south-east Asia, low and high-mountain wetlands of New Guinea, high mountain wetlands in southern, eastern and central Africa and in the Andes) as well as on the southern hemisphere (e.g. Patagonia). Conversion of peatlands for intensive agriculture has resulted in the loss of natural peatlands in large parts of western Europe (with less than 10 per cent remaining), and a significant reduction in central and eastern Europe (with less than 50 per cent remaining). In south-east Asia most of the once extensive (over 40 million ha) tropical peat swamp forests have been heavily degraded and large extents have been lost over the last four decades (remaining area 25-30 million ha).

3. Coral reefs

18. Coral reefs are among the most ecologically complex ecosystems on Earth and are home to over 4,000 different species of fish, 700 species of coral, and hundreds of thousands of other animals and plants: according to conservative estimates, one quarter of all marine species occur in coral reefs. 5/ The health and biodiversity of coral reefs are critical to the cultural values and economic livelihoods of millions of people living in coastal environments. Unfortunately, human activities threaten coral reefs the

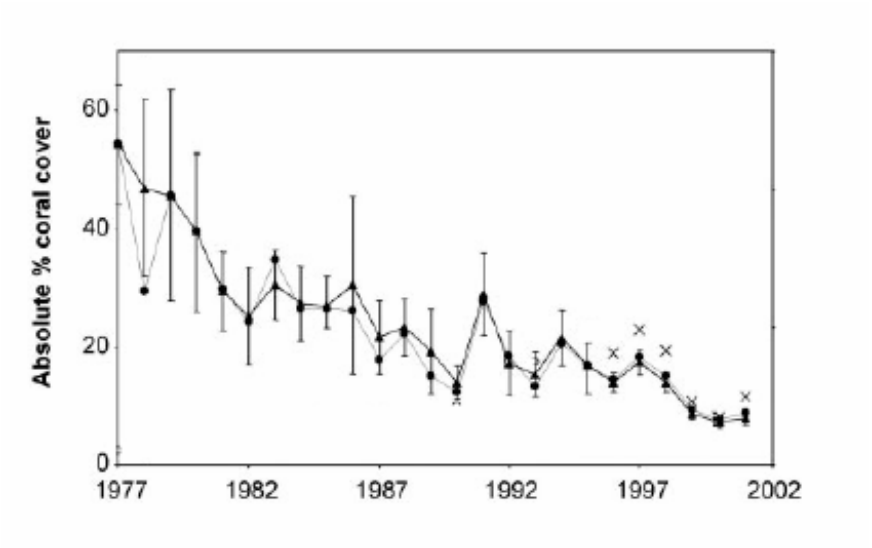
4/ Ibid.

5/ Groombridge B, Jenkins M (2002) *World Atlas of Biodiversity*. California University Press, Berkeley and Los Angeles.

world over 6/ and continue to degrade coral reefs through sedimentation, coastal development, destructive fishing practices and pollution. A host of small-scale studies have recorded the coverage of live corals on reefs worldwide, and recently methods were tested statistically to combine these disparate studies into a regional indicator:7/ changes in absolute percentage coral cover. This research demonstrated a region-wide decline in average hard coral cover from about 50 per cent to 10 per cent in three decades (see figure 2).

Figure 2

Total observed change in per cent coral cover across the Caribbean basin during the past 2.5 decades: *absolute per cent coral cover from 1977 to 2001. Annual coral cover estimates (◢) are weighted means with 95 per cent bootstrap confidence intervals. Also shown are unweighted mean coral cover estimates for each year (•) and the unweighted mean coral cover with the Florida Keys Coral Monitoring Project (1996–2001) omitted (x). Source: Gardner et al. (2003).*



4. Croplands

19. Based on satellite information, croplands cover about 30 per cent of the Earth's surface (defined as areas with at least 10 per cent of croplands within each pixel). Around 40 per cent of the cropland class is located in Asia; Europe accounts for 16 per cent and Africa, North America and South America each account for 13 per cent. At least two data sets cover the whole cropland class and 3 or 4 data sets cover 40 per cent, especially in Europe, Russia, Australia and the United States. Some 6.4 per cent of the cropland class has experienced major cropland decrease while 9.5 per cent of the cropland class has experienced major cropland decrease. Nearly 60 per cent of the main areas of cropland increase are located in Asia. Africa and North America account for 13 per cent of the main areas of cropland increase.

6/ Bryant D, Burke L, McManus J, Spalding, M (1998). *Reefs at Risk: A Map-Based Indicator of Potential Threats to the World's Coral Reefs*. World Resources Institute, Washington; International Center for Living Aquatic Resource Management, Manila; United Nations Environment Programme-World Conservation Monitoring Centre, Cambridge.

7/ Toby A. Gardner, Isabelle M. Côté, Jennifer A. Gill, Alastair Grant, Andrew R. Watkinson (2003). Long-Term Region-Wide Declines in Caribbean Corals, Science 301, 958-960.

The remaining 15 per cent of the main areas of increase in cropland extent are situated in Europe, Australia, Central and South America. 8/

5. Grasslands/savannahs

20. Several major studies have presented estimates of the extent of the world's grassland area. These estimates vary, in part, because of differences in land-cover characterizations of grasslands and range from approximately 41 to 56 million km^2, or 31 to 43 per cent of the Earth's surface. 9/ 10/ 11/

21. An analysis which compared grassland major habitat types with current land cover found that a significant percentage of each type of grasslands has been lost, due mostly to conversion to agriculture (table 1). 12/ Loss of grasslands is partially offset by the reconversion of agricultural land to grasslands after political reforms in countries such as Mongolia and Tajikistan.

Table 1. Trends in extent of grassland major habitat types (from White et al. 2000)

Grassland major habitat types	**Percentage remaining**
Tropical and subtropical grasslands, savannahs and shrublands	71.3
Temperate grasslands, savannahs and shrublands	43.4
Flooded grasslands and savannahs	48.2
Montane grasslands and shrublands	70.6
Mediterranean shrublands	48.0
Tundra	71.2
North American tallgrass prairie	9.4
South American Cerrado woodland and savannah	21.0
Central and eastern Mopane and Miombo woodlands	73.3
South-west Australian shrublands and woodlands	56.7

6. Polar/ice

22. There was a widespread retreat of mountain glaciers in non-polar regions during the twentieth century, and decreases of about 10 per cent in the extent of snow cover since the late 1960s and a reduction of about two weeks in the annual duration of lake- and river-ice cover in the mid- and high-latitudes of the northern hemisphere, over the twentieth century. Northern-hemisphere spring and summer sea-ice extent has decreased by about 10 to 15 per cent since the 1950s. It is likely that there has been about a 40 per cent decline in Arctic sea-ice thickness during late summer to early autumn in recent decades and a considerably slower decline in winter sea-ice thickness. 13/

23. Climate change in the polar region is expected to be among the greatest of any region on Earth. Twentieth century data for the Arctic show a warming trend of as much as 5°C over extensive land areas (very high confidence), while precipitation has increased (low confidence). In the Antarctic, a marked warming trend is evident in the Antarctic Peninsula, with spectacular loss of ice shelves (high

8/ Pilot analysis of Global Ecosystems: Grassland Ecosystems; White et al., 2000 http://pdf.wri.org/page_grasslands.pdf

9/ Whittaker, R.H., and E. Likens. 1975. The Biosphere and Man. In *Primary Productivity of the Biosphere*, Ecological Studies No. 14, ed. H. Lieth and R. H. Whittaker, 306, Table 15-1. Berlin: Springer-Verlag.

10/ Atjay, G.L., P. Ketner, and P. Duvigneaud. 1979. Terrestrial primary production and phytomass. In *The Global Carbon Cycle*, ed. B. Bolin et al., 129–181. Chichester: John Wiley & Sons.

11/ Olson, J.S., J.A. Watts, and L. J. Allison. 1983. Carbon in Live Vegetation of Major World Ecosystems. Report ORNL-5862. Tennessee: Oak Ridge National Laboratory.

12/ Pilot analysis of Global Ecosystems: Grassland Ecosystems; White et al., 2000 http://pdf.wri.org/page_grasslands.pdf

13 / IPCC, 2002: *Climate Change 2001: Synthesis Report*. Cambridge University Press, Cambridge.

confidence). The extent of higher terrestrial vegetation on the Antarctic Peninsula is increasing (very high confidence). 14/

7. Other types of biomes, ecosystems and habitats

24. While some information on the extent of other types of biomes, ecosystems and habitats exists this does currently not permit to derive reliable trends. It is anticipated that reassessments of land cover data prior to 2010 will allow statements to be made on the rate of loss of some of these ecosystems.

IV. POLICY RELEVANCE

25. The United Nations Conference on Environment and Development, held in Rio de Janeiro in 1992, aimed to outline an agenda for future action on environmental and developmental issues through integrating and balancing environmental, social and economic concerns. Each of the five multilateral agreements signed at the Rio (the Convention on Biological Diversity and some agreements resulting from Rio, in particular the Convention to Combat Desertification) promote—directly or indirectly—the minimization of the loss of biomes, ecosystems and habitats. The Plan of Implementation of the World Summit on Sustainable Development, held in Johannesburg in 2002, is designed as a framework for action to implement the commitments originally agreed at the Rio Conference, including the achievement by 2010 of a significant reduction in the current rate of biodiversity loss.

26. Most countries have adopted policies to promote the sustainable management of ecosystems and have strategies to minimize their loss.

27. The indicator informs progress towards target 1.1 of decision VII/30 (At least 10 percent of each of the world's ecological regions effectively conserved), which is equivalent to target 4 of the Global Strategy for Plant Conservation (decision VI/9). By distinguishing different ecosystem types and areas of particular conservation value, the indicator can also be a measure for target 1.2 of the same decision (Areas of particular importance to biodiversity protected). The indicator also provides information for target 5.1 (Rate of loss and degradation of natural habitats decreased) and potentially 8.2 (Biological resources that support sustainable livelihoods, local food security and health care, especially of poor people maintained).

28. The indicator also relates to target 9 of the Millennium Development Goals (Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources), indicator 25 (Proportion of land covered by forest).

29. It also relates to paragraphs 24 to 46 of the Plan of Implementation of the World Summit on Sustainable Development, on protecting and managing the natural resource base of economic and social development. In those paragraphs, the Plan sets out actions needed to maintain the integrity of ecosystems that provide essential resources and services for human well-being and economic activities and to managing the natural resources base in a sustainable and integrated manner.

V. TECHNICAL INFORMATION

30. Available data sources, their quality and the periodicity of assessments vary among ecosystems. While the FAO Forest Resources Assessment (FRA) is conducted once every ten years the Global Coral Reef Monitoring Network continuously updates information on the extent and health of coral reefs

14/ IPPC 2001. Climate Change. Working Group II: Impacts, Adaptation and Vulnerability http://www.grida.no/climate/ipcc_tar/wg2/047.htm

through online information system (Reefbase). For other biomes/ecosystem types, global assessments have been carried out only once to date (e.g., seagrass beds) or are currently being conducted (e.g., peatlands). The availability of trends information, at least a baseline trend, will depend on a reassessment of the respective ecosystems. Table 2 lists data sources for the biomes/ecosystems to be assessed.

31. For several biomes/ecosystem types satellite imagery is the main source of information. The different classification systems used, different algorithms and varying levels of ground-truthing create difficulties in comparing land cover data from different sources. The FRA process overcomes these difficulties by combining different data sources, types and qualities. Data collection is based on active participation in information-gathering by 160 countries and supplementary information from various sources, including satellite imagery and primary technical documents as sources of statistical information for the assessment, to yield a global coverage. However, because national forest inventories differ in their methodologies and data quality, and depend on the statistical set-up and inventory methods used in the national surveys the national data need to be converted to a common definition and baseline. This may introduce an element of inaccuracy.

Table 2. Data sources for assessing trends in major biomes, ecosystems and habitats

Biome/ecosystem/ habitat type	Data available now?	Methodology available now?	Sources of data
Forests, and forest types (e.g., mangroves)	Yes	Yes	FRA (FAO); EU-JRC, NASA Modland; Corine land cover (see annex I)
Peatlands	Yes	Yes	Various national data sets and remote sensing (see annex I)
Coral reefs	Yes	Yes	Global Coral Reef Monitoring Network/Reefcheck
Croplands	Yes	Yes	National regional datasets and remote sensing (see annex I), Millennium Ecosystem Assessment (MA)
(Natural) grasslands	Yes	Yes	Remote sensing (see annex I), MA
Polar/ice	Yes	Yes	Remote sensing (see annex I), MA
Inland wetlands	No	No	Remote sensing (see annex I), MA
Tidal flats/esturies	No	No	Remote sensing (see annex I), MA
Seagrasses	No	No	Seagrass Atlas, MA
Dry & sub-humid lands	No	No	FAO-LADA, Remote sensing (see annex I), MA
Urban	No	No	Remote sensing (see annex I), MA

VI. APPLICATION OF THE INDICATOR AT NATIONAL/REGIONAL LEVEL

32. The indicator is fully scaleable for all types of biomes, ecosystems and habitats. It is already widely applied, including through the FRA reporting process, regional and national land use/land cover assessments and ongoing efforts of volunteer networks (e.g. Reefcheck) or projects (e.g. LADA).

VII. SUGGESTIONS FOR THE IMPROVEMENT OF THE INDICATOR

33. The indicator could be improved by applying a common biogeographic classification system as the unit of scale for comparison and analysis for all biomes and ecosystem types (e.g. the WWF ecoregion approach complemented by the Ramsar classification of wetlands).

34. Data coverage could be improved by sampling those biomes and ecosystem types for which data do not yet exist to achieve full coverage of the entire globe. The extent of some ecosystem types changes at a fast rate: these require frequent re-assessments. For others, ten-year cycles complemented by more detailed analyses of 'hotspots of change' will be sufficient. To date, only forests and coral reefs have ongoing periodic assessments.

35. Data quality could be improved by promoting the standardization of sampling and aggregation of information. The systematic use of satellite images combined with field verification and expert interpretation for all biome types could complement and verify national/regional statistics.

36. Data on ecosystem extent could be complemented by information on the quality of these ecosystems. Information on species trends, trends in threatened species, the occurrence of invasive alien species and fragmentation/connectivity could serve as qualifiers for each biome/ecosystem unit.

Annex I

POSSIBLE DATA SOURCES FOR THE APPLICATION OF THE INDICATOR ON TRENDS IN SELECTED BIOMES, ECOSYSTEMS AND HABITATS TO THE THEMATIC PROGRAMMES OF WORK OF THE CONVENTION ON BIOLOGICAL DIVERSITY

(Identified datasets relevant to these habitats are shown in grey tint in the table)

Habitat type(s)	*CBD Ecosystem theme(s) relevant*	*Scale*	*Dataset/source*	*Data available?*	*Analysis available?*	*Mapped?*	*Spatial Resolution*	*Periodicity/ future assessments*	*Limitations/ Future improvements needed/ or possible*	*Other comments/ Notes – incl. robustness of result/storyline?*
(1) All forests	Forests	Global	FAO: Global Forest Resources Assessment (FRA) 2000	Yes	Yes	No	-	Updates every 5 years: 1990, 2000, Next in 2005, then 2010	Sample based, no maps provided.	FRA 2005 does not include a remote sensing component. 2010 may be based on sample of 10km X 10 km windows of satellite change detection (30m) at each 1deg X 1deg intersection.
(2) All forests	Forests	Global	EU JRC: GLC2000	Yes	Yes	Yes	1km	2000, next TBD		Update should be possible to estimate change. Next estimate may be done with newer data at 300m resolution however.
(3) All forests	Forests	Global Tropical	EU JRC: Achard et al 2002	Yes	Yes	No	-	1990, 1998, Next TBD	Sample based, no maps provided.	Based on random sample of satellite change detection (30m)
(4) All forests	Forests	Global	NASA MODLAND: Modis Land Cover Product	Yes	Yes	Yes	1km	2002, Next TBD		Wall-to-wall global 1km map. Funded to produce global change estimates
(5) All forests	Forests	Global	NASA MODLAND: Modis %Tree Cover Product	Yes	Yes	Yes	0.5km	2002, Next TBD		Wall-to-wall global 1km map. Funded to produce global change estimates
(6) All forests	Forests	Global	NASA MODLAND: Modis %Land Cover Change Product	Yes	Yes	TBD	1km	2002, Next TBD		TBD whether will be wall-to-wall mapped or points of locations change w/out areas assigned to each point.
(7) All forests	Forests	Many entire countries	Various national agencies, NGO, academic	Yes	Yes	Yes	30m	~1990, ~2000, Next TBD	Based on wall-to-wall Landsat images that include up to	Much work has been done and will continue. Major efforts are supported by USAID and NASA, such as CARPE (Congo Basin), SERVIR (Central America), Brazil-INPE

Habitat type(s)	*CBD Ecosystem theme(s) relevant*	*Scale*	*Dataset/source*	*Data available?*	*Analysis available?*	*Mapped?*	*Spatial Resolution*	*Periodicity/ future assessments*	*Limitations/ Future improvements needed/ or possible*	*Other comments/ Notes – incl. robustness of result/storyline?*
			institutes						10% cloud cover.	(Amazonia), GFW (Indonesia, Boreal zome) and Conservation International (Biodiversity Hotspots, ie most of the tropical forest biome). Most based on free Landsat data provided by NASA for ~1990 and ~2000. High-resolution, wall-to-wall estimates will be the most precise available. Since large areas have already been mapped and by 2010 it is probable that deforestation across the entire tropics will have been mapped, these data should be somehow incorpoated into CBD. There remains the question of how much CBD wishes to incorporate such regional products to complement coarser-resolution or sample-based global products.
Can be dis-aggregated to several forest types, incl.:										
Boreal natural forest	Forests	Global	FAO: Global Forest Resources Assessment (FRA) 2000	Yes	Yes					From 1 (FRA)
Temperate natural forest	Forests	Global	ditto	Yes	Yes					Should be doable for: 1, 2, 4, 5, 6. All but 1 are mapped. Sample density of 1 should enable such a stratification.
Tropical natural forest	Forests	Global	ditto	Yes	Yes					Should be doable for: 1, 2, 3, 4, 5, 6. All but 1 are mapped. Sample density of 1 should enable such a stratification. 2 is only tropical coverage.
Sub-tropical natural forest	Forests	Global	ditto	Yes	No					
Tropical peatswamp forest	Forests; Inland waters	Global	ditto	Yes	No					No existing global estimate of swamp forest. Analysis should be possible with existing satellite imagery.

Habitat type(s)	*CBD Ecosystem theme(s) relevant*	*Scale*	*Dataset/source*	*Data available?*	*Analysis available?*	*Mapped?*	*Spatial Resolution*	*Periodicity/ future assessments*	*Limitations/ Future improvements needed/ or possible*	*Other comments/ Notes – incl. robustness of result/storyline?*
Mangroves	Forests; coastal & marine	Global	ditto	Yes	Yes					Only from 1. TBD if FRA will have a mangrove assessment that is independent of the 1deg. global sample. This is necessary b/c a 1deg sample is too coarse given the small size of mangrove patches
Montane forest	Forests; mountains	Global	ditto	Yes	Yes					Should be doable for: 1, 2, 4, 5, 6. All but 1 are mapped. Sample density of 1 should enable such a stratification. For 1 (FRA) data could be obtained from a mapping exercise, but is not currently available.
Other wooded land	Forests	Global	ditto	Yes	Yes					From 1 (FRA)
Other land with tree cover	Forests	Global	ditto	Yes	Yes					From 1 (FRA)
Bamboo	Forests	Global	Ditto (in collaboration with INBAR)	Yes	Yes					From 1 (FRA)
Stratified by ecological regions	Forests	Global	ditto	Yes	Yes					Sources such as WWF Ecoregions could be used to stratify 1,2,4,5,6.
Forests	Forests	Europe	Corine land-cover	Yes	Yes			2nd assessment (I&CLC 2000) in late 2004		
Peatlands	Inland waters	Europe	Corine land-cover	Yes	Yes			2nd assessment (I&CLC 2000) in late 2004		
Peatlands	Inland waters	Canada	Wildlife Habitat Canada	Yes	Yes				?Baseline only – or will trend assessment be later developed?	Mappable
Inland Wetlands	Inland waters	USA	1986-1997 Dahl (2000)	Yes	Yes			?are further assessments planned?		Dahl, T.E. 2000. Status and trends of wetlands in the conterminous United States 1986-1997. US Department of the Interior, Fish and

Habitat type(s)	*CBD Ecosystem theme(s) relevant*	*Scale*	*Dataset/source*	*Data available?*	*Analysis available?*	*Mapped?*	*Spatial Resolution*	*Periodicity/ future assessments*	*Limitations/ Future improvements needed/ or possible*	*Other comments/ Notes – incl. robustness of result/storyline?*
										Wildlife Service,
Inland wetlands	Seasonally-inundated grasslands	Major large wetlands of globe	USGS	Yes	No					Change map 1975 - 2000 has been produced for mesapotamia. Should be doable for Pantonal in Brazil and Okavanga in Africa. Change estimates for these 3 plus several other major ones would be very informative.
Wetlands (incl large water bodies)	Inland waters	Global	Remote sensing (-i delete b/c should be implicit throughout table. Actually would be good to add a sentence above requiring): Nat agencies, NFGOs, Universities	?Yes – prob. partly/ soon	No (additional funds needed)			Could be x3 for 2010	Only large waterbodies done so far. Assumes data continuity and low cost delivery to users. Next Landsat timing may be too late for 2010. Ramsar/CBD River Basin Initiative may help deliver new analyses	Source: London 2010 habitats & biomes group
Wetlands (incl large water bodies)	Inland waters	Global	Global Lakes and Wetlands Database							Lehner and Doll 2004. (see URL below). TBD if this is absed on direct observations that can be repeatable to estimate change.
Live coral cover	Coastal/ &marine	Caribbean	Gardner et al 2003,	Yes	Yes			?	Approach could be extended to other regions	
Coral reef extent?	Coastal/ &marine	Global	GCRM/Reefcheck, Reefbase?	Yes	No			? needs checking		Needs checking with data sources as to what's possible.
Coral bleached area?	Coastal/ &marine	Global	GCRM/Reefcheck, Reefbase? Another (or same?) paper on meta-analyses w/Isabel Coute as co-author. Check Royal Society	?Yes	?			?	?	Needs checking with data sources as to what's possible. Could be interesting in showing where any recovery occurs.

Habitat type(s)	*CBD Ecosystem theme(s) relevant*	*Scale*	*Dataset/source*	*Data available?*	*Analysis available?*	*Mapped?*	*Spatial Resolution*	*Periodicity/ future assessments*	*Limitations/ Future improvements needed/ or possible*	*Other comments/ Notes – incl. robustness of result/storyline?*
			meeting doc.							
Tidal flats/estuaries	Coastal/ &marine	?global (or selected regions)	Remote sensing. Corine land-cover	Yes?	No? (costs = ?)			Could be x3 for 2010. CLC: 2nd assessment (I&CLC 2000) in late 2004	Spatial resolution; data availability limiatations	Source: London 2010 habitats & biomes group
Seagrasses	Coastal/ &marine	Global	Remote sensing Potentially via NASA and NOAA projects such as SeaWIFS	Yes?					Spatial resolution; data availability limitations	Source: London 2010 habitats & biomes group
Mediterranean scrub	Dry & sub-humid lands	Europe	Corine land-cover	Yes	Yes			2nd assessment (I&CLC 2000) in late 2004		
?	Dry & sub-humid lands	Global – selected counties Argentina, China, Cuba, Senegal, South Africa and Tunesia	Website: Global Land Degradation Assessment of Drylands (LADA) Funded by GEF executed by UNEP - FAO	Yes, some data available from pilot studies, more data will become available	Yes	Yes	To be determined	1st assessment 2004 - 2009 (possibly updated Every 5 years)	Methodological approach is developed Indicators will be selected by countries with the view to develop a standard global assessment	The project will: • integrate biodiversity, land degradation and socio-economic assessment criteria • assess restoration and bright spots, as well as negative trends
Shrublands, grasslands & deserts	Dry & sub-humid lands	?Global	See Items 1,2,4,5,6.: Remote sensing: USA (MODLAND science team; EU (GEOLAND), FAO (Soil and land databases *i.a.* GTOS-TEMS, terrastat), LADA, NGO-Univ consortium. Corine Land-	?Yes – could be extracted	?No (additional funds needed)			2, possibly 3 by 2010. CLC: 2nd assessment (I&CLC 2000) in late 2004	Dryland classes not discrete; low resolution data, lack of validation; lack of in situ data integration	Might be doable for: 1, 2, 4, 5, 6. All but 1 are mapped. Sample density of 1 should enable such a stratification. But the difficulty is that natural, inter-annual variations in greeness and fire patterns can easily be mis-classified as 'change'. Mis-classification between natural grasslands and modified /improved permanent pasture are probable and should be distinguished in the medium term. A change in grasslands is usually a more gradual process compared to deforestation. Possibly could be addressed if based on a ~5year average estimate for one

Habitat type(s)	*CBD Ecosystem theme(s) relevant*	*Scale*	*Dataset/source*	*Data available?*	*Analysis available?*	*Mapped?*	*Spatial Resolution*	*Periodicity/ future assessments*	*Limitations/ Future improvements needed/ or possible*	*Other comments/ Notes – incl. robustness of result/storyline?*
			cover (Europe)							epoch vs another ~5year average for another epoch..
Croplands (high nature value agric)	Agricultural lands	EU15	European Environment Agency (EEA): IRENA 15	Yes	Yes - soon			?		
Cropland – rainfed, irrigated, shifting	Agricultural lands	Global	See Items 1,2,4,5,6, plus LADA. Corine Lnd-cover. Agro-MAPS database 16	Yes (nearly)	Some (additional support needed)			2 existing (1 but old), prob 3 by 2010. CLC: 2nd assessment (I&CLC 2000) in late 2004	Only reliable for intensive agriculture	Agriculture area estimates available globally from: 1, 2, 4, 5, 6. Mis-classification between natural grasslands and modifed grazing lands are probable. Agro-MAPS database contains data on crop production, area harvested and crop yields
Polar/Alpine:										
Tundra	Dry and sub-humid lands	Europe	Corine land-cover	Yes	Yes			2nd assessment (I&CLC 2000) in late 2004		
Tundra	Dry and sub-humid lands	Global	See Items 1,2,4,5,6	Yes	No					Grass and Shrub classes from Items 1,2,4,5,6 could be overlaid with a map of the tundra biome to pull out this catagory.
Ice	None	Global	MODLAND Modis Snow-Ice product. Also Items 2 and 4.	Yes	Yes					MODLAND Modis Snow-Ice product is specifically to map these cover classes. TBD is truely global, ie includes temperate and tropical glaciers. Also Items 2 and 4 include a snow-ice class.

15/ Indicator reporting on the integration of environmental concerns into agricultural policy

16/ See`http://www.fao.org/landandwater/agll/agromaps/

Habitat type(s)	*CBD Ecosystem theme(s) relevant*	*Scale*	*Dataset/source*	*Data available?*	*Analysis available?*	*Mapped?*	*Spatial Resolution*	*Periodicity/ future assessments*	*Limitations/ Future improvements needed/ or possible*	*Other comments/ Notes – incl. robustness of result/storyline?*
Urban	None	Global	Items 2,4 and 6. Lights-at-night derived urban area maps.	Yes	Yes					Items 2,4 and 6 include an 'Urban/Built-up' class. Lights-at-night derived urban area maps.probably provide better detail and precision. TBD if plans are for regular update of products derived from these data.

Annex II

DIFFERENT CLASSIFICATION SCHEMES OF MAJOR GLOBAL LAND COVER MAPS

(*Italicized* classes potentially fall into two of the thematic areas under the Convention on Biological Diversity)

CBD Thematic area	***IGBP Classes (NASA MODLAND maps)***	***EU JRC GLC2000***	***U. Maryland Classes (NASA MODLAND maps)***	***U. Maryland %Tree Cover (NASA MODLAND product)***	***FRA***
Agricultural lands	Croplands	Cultivated and managed areas	Cropland		
	Forests / Agricultural lands				
	Forests / Agricultural lands	*Mosaic: Tree Cover / Other natural vegetation*			
		Mosaic: Cropland / Tree Cover / Other natural vege			
		Mosaic: Cropland / Shrub and/or grass cover			
Dry and sub-humid lands	Savannas	Herbaceous Cover, closed-open	Grassland		
	Grasslands	Sparse herbaceous or sparse shrub cover	Bare Ground		
	Barren or Sparsely Vegetated	Bare Areas	*Wooded Grassland*		
	Closed Shrublands	*Shrub Cover, closed-open, evergreen*	*Open Shrubland*		
	Open Shrublands	*Mosaic: Tree Cover / Other natural vegetation*			
	Woody Savannas				
Forests	Evergreen Needleleaf Forest	Tree Cover, broadleaved, evergreen	Evergreen Needleleaf Forest	High % tree cover (eg >50%). Could be calibrated with large sample of hgher-resolution maps.	Forest w/>10% tree-canopy cover and >5m height.
	Evergreen Broadleaf Forest	Tree Cover, broadleaved, deciduous, closed	Evergreen Broadleaf Forest		Tropical rain forest
	Deciduous Needleleaf Forest	Tree Cover, broadleaved, deciduous, open	Deciduous Needleleaf Forest		Tropical moist deciduous forest
	Deciduous Broadleaf Forest	Tree Cover, needle-leaved, evergreen	Deciduous Broadleaf Forest		Tropical dry forest
	Mixed Forest	Tree Cover, needle-leaved, deciduous	Mixed Forest		Tropical shrubland
	Closed Shrublands	Tree Cover, mixed leaf type	Woodland		Tropical desert
	Open Shrublands	Tree Cover, regularly flooded, fresh water	Closed Shrubland		Tropical mountain system
	Woody Savannas	Tree Cover, regularly flooded, saline water	*Wooded Grassland*		Subtropical humid forest
	Forests / Agricultural lands	Shrub Cover, closed-open, deciduous	*Open Shrubland*		Subtropical dry forest
		Regularly flooded shrub and/or herbaceous cover			Subtropical steppe

		Tree Cover, burnt			Subtropical desert
		Mosaic: Tree Cover / Other natural vegetation			Subtropical mountain system
		Shrub Cover, closed-open, evergreen			Temperate oceanic forest
		Mosaic: Cropland / Tree Cover / Other natural vege			Temperate continental forest
		Mosaic: Cropland / Shrub and/or grass cover			Temperate steppe
					Temperate desert
Inland Waters	Permanent Wetlands	Water Bodies	Water Bodies	Water	Temperate mountain system
Islands	IGBP Water Bodies				Boreal coniferous forest
Marine and Coastal Zones					Boreal tundra woodland
Mountains					Boreal mountain system
None	Snow and Ice	Snow and Ice			
	Urban and Built-up	Artificial surfaces and associated areas	Urban and Built-up		
