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REPORT ON HOW TO IMPROVE SUSTAINABLE USE OF BIODIVERSITY IN A LANDSCAPE PERSPECTIVE

Note by the Executive Secretary

EXECUTIVE SUMMARY

Pursuant to paragraph 4 (b) of decision X/32, the present note outlines possible ways to improve the sustainable use of biodiversity, in particular agriculture and forestry, in a landscape perspective. The note is based on input received from relevant organizations, and on results from the *International Symposium on Ecosystem and Landscape-Level Approaches to Sustainability* held in March 2011 in Burgos, Spain. The note provides an overview of existing guidance and guidelines which could complement existing decisions of the Convention on Biological Diversity, including: a rationale for addressing the landscape perspective in land-use planning; information about linkages to the *Satoyama Initiative* and other international and multilateral efforts to improve sustainable use of biodiversity at the landscape level; and a proposed new set of combined principles under development by the International Union for Conservation of Nature (IUCN) and the Center for International Forestry Research (CIFOR).

SUGGESTED RECOMMENDATIONS

The Subsidiary Body on Scientific, Technical and Technological Advice may wish to recommend that the Conference of the Parties adopt a decision along the following lines:

The Conference of the Parties

Invites Parties and other Governments and organizations to use the existing guidance in the note by the Executive Secretary on how to improve sustainable use of biodiversity in a landscape perspective (UNEP/CBD/SBSTTA/15/13) as a complement to existing guidance including the Addis Ababa Principles and Guidelines for the Sustainable Use of Biodiversity.

* UNEP/CBD/SBSTTA/15/1/Rev.1.

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I. INTRODUCTION

1. In decision X/32, the Executive Secretary is requested to '*compile information on how to improve sustainable use of biodiversity in a landscape perspective, including on sectoral policies, international guidelines, and best practices for sustainable agriculture and forestry, including a review of relevant criteria and indicators, and report on the results to the Subsidiary Body on Scientific, Technical and Technological Advice at a meeting prior to the eleventh meeting of the Conference of the Parties. This work should be carried out in collaboration with relevant organizations, including but not limited to: the Food and Agriculture Organization of the United Nations and its Committees on Forestry and on Agriculture, the Commission on Genetic Resources for Food and Agriculture, the secretariat of the International Treaty on Plant Genetic Resources for Food and Agriculture, the United Nations Forum on Forests, the Wildlife Trade Monitoring Network (TRAFFIC), the International Union for Conservation of Nature (IUCN), and the members of the Collaborative Partnership on Forests'*.

2. The Secretariat of the Convention on Biological Diversity invited input from relevant organizations listed in decision X/32, and compiled the information based on input received from the Secretariat of the United Nations Convention to Combat Desertification (UNCCD), United Nations Food and Agriculture Organization (FAO), the Center for International Forestry Research (CIFOR), the International Union for Conservation of Nature (IUCN), the Secretariat of the International Tropical Timber Organization (ITTO), the International Treaty on Plant Genetic Resources for Food and Agriculture (PGDFA), and the Secretariat of the International Partnership for the Satoyama Initiative (IPSI).

3. The present note also contains results from the International Symposium on Ecosystem and Landscape-Level Approaches to Sustainability, which the Secretariat of the Convention on Biological Diversity co-organized with the International Model Forest Network (IMFN), FAO, the Regional Government of Castilla y Leon (Spain), and the Spanish Ministry of the Environment and Rural and Marine Affairs. The Symposium was held in Burgos, Spain, from 21 to 26 March 2011. It was attended by around 350 participants from over 60 countries, mostly forest practitioners from more than 50 world-wide model forests in the IMFN. The symposium addressed landscape-level sustainability approaches across four key topics: 1) Ecosystem Services, 2) Inventory and Monitoring, 3) Governance, and 4) Future Directions. The full report of the symposium is available at http://www.globalforum2011.net/.

4. This note also incorporates comments received from the SBSTTA Bureau at a face-to-face meeting held on 11 and 12 June 2011 in Montreal. An earlier draft of this note was posted for review from 28 June 2011 to 19 July 2011 in accordance with notification 2011-123, and the comments received have been incorporated as appropriate.

Link to the Strategic Plan for Biodiversity 2011-2020

5. Efforts to improve sustainable use of biodiversity in a landscape perspective are directly linked to the Strategic Plan for Biodiversity for 2011-2020 (decision X/2). Strategic Goal B of the plan is to "reduce the direct pressures on biodiversity and promote sustainable use." Six of the Strategic Plan's twenty targets, explicitly aim at improving sustainable use of biodiversity (Targets 1, 3, 4, 6, 7 and 18). Target 7 is perhaps the most relevant in this regard. It states: "By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity." As sustainability can only be achieved at an appropriate spatial and temporal context, the landscape level is arguably the most important spatial scale to improve and assess the sustainable management of agricultural and forest ecosystems.

Link to other decisions of the Convention on Biological Diversity

6. The sustainable use of components of biodiversity is the subject of Article 10 of the Convention, including the provision '(c) Protect and encourage customary use of biological resources in accordance with traditional cultural practices that are compatible with conservation or sustainable use requirements'.

7. The main implementation tool for the landscape perspective, and one which aims to ensure sustainability of agriculture, forestry, and other land-uses, is the ecosystem approach (decision V/6, Section A) with its twelve principles and guidelines (table 1 of decision VII/11). The principles and implementation guidelines of the ecosystem approach are applicable also at landscape level. Indeed, the ecosystem approach already broadly reflects much of the more specific guidance listed in this document. However, the landscape level usually combines several ecosystems (agricultural, inland waters, coastal, forest, etc.) and planning at the landscape scale can support decision-making with regard to trade-offs between different elements of sustainability, while taking into account the effects (actual or potential) of management activities on adjacent ecosystems (Principle 3 of the ecosystem approach).

8. Other important decisions in this respect include the Addis Ababa Principles and Guidelines for Sustainable Use of Biodiversity (decision VII/12), and the relevant thematic programmes of work of the Convention, as well as provisions of Articles 10 of the Convention, and Article 8(j).

II. RATIONALE FOR FOCUS ON THE LANDSCAPE LEVEL[1]

9. 'Landscape' is defined by the European Landscape Convention as part of the land, as perceived by local people or visitors, which evolves through time as a result of being acted upon by natural forces and human beings. It is a spatial scale which is important in terms of a continuous flow of key ecosystem services.

10. The Convention on Biological Diversity defines sustainable use as the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations (Article 2). This requires, *inter alia*, the maintenance of ecological processes (such as pollination, seed dispersal, decomposition), and of genetic diversity.

11. The review of the Strategic Plan for Biodiversity 2002-2010 concluded that lack of coherent land-use planning, and lack of mainstreaming of biodiversity aspects into relevant economic and policy sectors was a major obstacle for achieving the 2010 Biodiversity Target (UNEP/CBD/WG-RI/3/2). The landscape level is an appropriate spatial scale for improving the coordination between relevant policies and sectors, as multiple land-use forms such as settlements, transport infrastructure, agriculture, forestry, mining, hunting, and conservation often co-exist (and compete for limited natural resources) within the same landscape.

12. At the same time, the landscape level is an important planning framework to avoid the displacement of pressures on biodiversity from one area to another. For example, a reduction in hunting pressure in one area might drive up unsustainable exploitation of fish; or a successful reduction of hunting inside a national park might increase hunting pressure in the buffer area. Ensuring that the adoption of the proposed alternative effectively leads to a reduction of pressure on wildlife in the project area overall, and without leakages (e.g. increasing pressure on wildlife elsewhere or on other natural resources) is key to the implementation of any alternative. As a result, landscape approaches are often necessary to ensure that successes in some landscape units do not lead to negative and unintended consequences in others.

13. The planet's biomes have changed dramatically over the last three centuries and terrestrial areas can more and more be described as landscapes shaped by humans. Humans eat animals from all trophic levels, use currently nearly half of the Earth's land surface to raise livestock, and capture more than a quarter of terrestrial net primary productivity for food. In the process of transforming almost 39 per cent of Earth's total ice-free surface into agricultural land and settlements, an additional 37 per cent of global land without such use has become embedded within agricultural and settled ecosystems. At present, and ever more in the future, the form and process of terrestrial ecosystems in most biomes will be predominantly anthropogenic, the product of land use and other direct human interactions with

[1] The basic data and background information for this section was provided by the Center for International Forestry Research (CIFOR).

ecosystems. Ecological research and conservation efforts in all but a few biomes would benefit from a stronger focus on the novel, remnant, recovering and managed ecosystems embedded within used lands.[2] [3]

14. People are a part of most ecosystems, not just those that are intensively managed but including those where human influences are hard to detect. Humans have a vested interest in managing their impacts to maintain the availability of goods and services, and the biodiversity and ecological process on which these flows depend. But we have not been able to adequately adapt ecosystem management to population growth and development. Increasing the productivity of agricultural and forest landscapes, while at the same time ensuring that biodiversity and the flow of ecosystem services can be maintained, remains arguably the most important challenge for reaching the Millennium Development Goals and achieving sustainable development.

15. While protected areas are a cornerstone of biodiversity conservation strategies, coverage will always be incomplete. Much biodiversity of conservation significance persists in human dominated landscapes. Furthermore, many threatened species (and the ecological processes on which they depend) require areas too large to be conserved in protected areas alone. Thus, biodiversity goals of protected areas need to be supplemented with "conservation-friendly" landscape-management practices. The scale of these opportunities is impressive. For example, half of Borneo's remaining forests (approximately 200,000 km²) that have active forestry concessions maintain significant wildlife conservation value and appear better staffed and controlled than protected areas, and some willingly incorporate conservation-friendly practices because they bring market benefits such as eco-tourism.

16. Many of the world's protected areas are encroached upon for agricultural production. It could be argued that the clear disaggregation of conservation goals with those of agricultural production has led to limited outcomes for either food security or biodiversity. In order to achieve biodiversity conservation and food security goals, better integrated and inclusive approaches need to be more actively pursued, for example through integrating protected areas into the wider landscape and seascape (cf. CBD Technical Series No. 44). Agriculture within complex and diverse landscape mosaics is regarded as one way to integrate the need for biodiversity conservation and food production, while agricultural practices that build on a knowledge of biodiversity and the interaction between species can considerably increase productivity[4] (FAO, 2011).

17. A landscape approach integrates ecological patterns and processes with socioeconomic and institutional values in defined geographical territories and, as such, is similar to the ecosystem approach. On the one hand, it is based on specific ecosystem management technique, and on the other hand, it is generally linked to national policies and implies social learning processes that intend to promote better governance. A landscape approach can be used to describe attempts to intervene in landscapes to achieve some stated objective to reconcile the trade-offs between improving the livelihoods of poor people and conserving biodiversity. The terms landscape and landscape approach can be applied at any scale depending upon the nature of the problem being addressed but, in reality, the terms are generally used at spatial scales of several thousand square kilometres or more[5]. Ideally landscape approaches are based on broadly negotiated scenarios and consensus about goals and approaches to change[6].

18. The landscape level is also an important planning and management scale for indigenous peoples and local communities, in particular for customary sustainable use and traditional knowledge. The

[2] Ellis, E.C., et al., *Anthropogenic transformation of the biomes, 1700 to 2000.* Global Ecology and Biogeography, 2010. **19**(5): p. 589-606.

[3] GP, A., et al., *Grazing systems, ecosystem responses, and global change.* Annu. Rev. Environ. Resour, 2004. **29**: p. 261-299.

[4] FAO, 2001. '*Save and Grow. A policymaker's guide to the sustainable intensification of smallholder crop production*'. 102 pages. Food and Agriculture Organization of the United Nations, Rome.

[5] Pfund J-L. 2010 *Landscape-scale research for conservation and development in the tropics: fighting persisting challenges.* Current Opinion in Environmental Sustainability, 2: p. 117–126.

[6] Sandker, M., et al., *Exploring the effectiveness of integrated conservation and development interventions in a Central African forest landscape*. Biodiversity & Conservation, 2009. 18(11): p. 2875-2892.

International meeting on Article 10 (Sustainable Use of Biological Diversity) with a focus on Article 10(c) (Customary Use of Biological Diversity) held in May 2011 in Montreal, *inter alia* concluded that[7]:

(a) Customary sustainable use is an essential source for learning related to socio-ecological systems and possible innovations for productive landscapes and continued human well-being;

(b) Biodiversity, customary sustainable use and traditional knowledge are intrinsically linked. Indigenous peoples and local communities, through customary sustainable use constantly shape and reshape social and ecological systems, landscapes, plant and animal populations, genetic resources and related management practices, thereby adapting to changing conditions such as climate change, and contributing to maintaining biodiversity and ecosystem services, and strengthening of the resilience of the socio-ecological systems;

(c) Bio-cultural territories embody traditional indigenous land tenure, land use, ritual use, production and exchange systems, political organization and goals and cultural identity. Bio-cultural heritage expresses the indivisibility of indigenous peoples and local communities with their territories, biodiversity (genetic level to landscape level) and culture and includes traditional resource rights;

(d) Customary sustainable use provides not only for livelihoods of people and conservation of biodiversity but will also build resilience for climate change adaptation and a source for learning related to socio-ecological systems and possible innovations for productive landscapes and continued human well-being.

III. SUBMISSIONS FROM RELEVANT ORGANIZATIONS

19. *United Nations Convention to Combat Desertification (UNCCD).* The UNCCD Secretariat highlighted UNCCD's 10-year Strategy, and the role of coordination among Desertification, Land Degradation and Drought (DLDD) and biodiversity policies. The UNCCD is currently undertaking a process to develop and refine a set of impact indicators to measure progress against strategic objective 1, 2 and 3 of its ten-year strategic plan. These strategic objectives address the livelihood of the population, the status of the ecosystems and the generation of global benefits respectively. In this framework, a scientific peer-review of the relevance, accuracy and cost-effectiveness of a set of impact indicators is being undertaken. UNCCD's submission details the latest outcomes of this peer-review process, including with regards to criteria and indicators for sustainable use of biodiversity and examples for best practices. Further information on these indicators and related metrics can be found at http://www.unccd.int/cop/officialdocs/cst-s2/pdf/inf1eng.pdf. Examples of best practices can be found at http://www.unccd.int/knowledge/docs/CSD_Benefits_of_Sustainable_Land_Management%20.pdf.

20. *United Nations Food and Agriculture Organization (FAO).* FAO highlighted several of its activities to improve sustainable use of biodiversity in a landscape perspective, including its initiative on Globally Important Agricultural Heritage Systems (GIAHS). FAO's submission also emphasized the work of its Commission on Genetic Resources for Food and Agriculture and listed several guideline publications prepared by FAO to assist countries in implementing sustainable use of biodiversity. These guidelines include Breeding strategies for sustainable management of animal genetic resources (2010); Draft guidelines on phenotypic characterization (2010); Preparation of national strategies and action plans for animal genetic resources (2009); Guidelines for the management of tropical forests (1998); Responsible management of planted forests (2006); Fire management (2006); Guidelines on sustainable forest management in drylands of sub-Saharan Africa (2010); and Prise en compte de la biodiversité dans les concessions forestières d'Afrique centrale (2010). All guidelines are available at http://www.fao.org.

21. FAO also highlighted its works in cooperation with other international and regional organizations on the development of criteria and indicators. FAO has long been active in the development of indicators related to biodiversity. FAO is a partner in the Biodiversity Indicator Partnership (BIP) and, under a

[7] The report of the meeting (UNEP/CBD/8J/CSU/1/2) is available at http://www.cbd.int/doc/?meeting=8JCSU-01

project funded by the Global Environment Facility (GEF) and coordinated by the UNEP-WCMC, developed several indicators related to biodiversity and food and agriculture, detailed in CBD Technical Series No. 53. In the area of plant genetic resources for food and agriculture, a list of indicators has been developed by FAO and its partners for monitoring the implementation of the Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture (Global Plan of Action). After pilot testing and further revision, 83 core indicators and a reporting format for monitoring the 20 priority activity areas of the Global Plan of Action, were adopted in 2004. Finally, FAO is currently increasing its efforts to develop indicators on forest biodiversity to enhance FAO's Global Forest Resources Assessment (FRA).

22. *International Tropical Timber Organization (ITTO).* ITTO highlighted their guidelines as relevant for the work on how to improve the sustainable use of biodiversity in a landscape perspective, particularly referencing the ITTO guidelines for the restoration, management and rehabilitation of degraded and secondary forests in the tropics (2002); the revised ITTO criteria and indicators for the sustainable management of tropical forests, including reporting format (2005); and the ITTO/IUCN guidelines for the conservation of biodiversity in tropical timber production forests. These and all the other ITTO Policy and Guidelines documents are available at http://www.itto.int/policypapers_guidelines. A specific value of the ITTO-IUCN guidelines "*Guidelines for the Conservation and Sustainable Use of Biodiversity in Tropical Timber Production Forests*" is that roles and responsibilities are not soley attributed to the formal forest managers. While numerous landscape issues are summarized and noted, the text also ensures that other stakeholders, institutions and actors are asked to play roles to facilitate the maintenance of multiple forest values (including biodiversity) in managed forest landscapes. In December 2010, CBD and ITTO launched a Collaborative Initiative for Tropical Forest Biodiversity, aiming to improve biodiversity aspects of sustainable forest management in ITTO tropical member countries.

23. *International Treaty on Plant Genetic Resources for Food and Agriculture (PGRFA).* The Secretariat of the International Treaty highlighted the Treaty's importance to the sustainable use of PGRFA. In particular, Articles 5 and 6 of the International Treaty provide guidance to countries regarding measures and activities to be undertaken that promote the conservation and the sustainable use of crop diversity. An important component of the provisions contained in Article 5 (related to conservation) is the characterization and evaluation of crops and their potentially useful traits. This provision helps agricultural researchers and breeders to identify the particular characteristics they need for the development of new varieties. The article also puts forward a complementary approach to conservation of agricultural crops both in the fields as well as in gene banks. The provisions of Article 6 (related to sustainable use) focus, *inter alia*, on the importance that Contracting Parties shall develop and maintain appropriate policy and legal measures that promote the sustainable use of plant genetic resources for food and agriculture like diverse farming systems and on implementing participatory approaches to plant breeding – including collaborations between researchers and farmers for the development of locally adapted varieties. They also promote on-farm management of crop diversity to reduce genetic erosion and increase world food production in a sustainable way.

24. *Secretariat of the International Partnership for the Satoyama Initiative (IPSI).* The Satoyama Initiative (SI) takes a holistic approach, and focuses on maintaining and rebuilding human-influenced natural environments (so called socio-ecological production landscapes - SEPLs) which include villages, farmlands, adjacent woods, grasslands and coasts that have been formed and maintained through long-term interactions between humans and nature for the benefit of biodiversity and human well-being. To maintain and rebuild landscapes in which land and natural resources are used and managed in a more sustainable manner, The SI emphasizes (i) consolidating wisdom on securing diverse ecosystem services and values; (ii) integrating traditional ecological knowledge and modern science to promote innovations; and (iii) exploring new forms of co-management systems or evolving frameworks of "commons" while respecting traditional communal land tenure. In following this three-fold approach, the SI believes that the maintenance and rebuilding of SEPLs should entail adhering to five ecological and socio-economic

principles, namely (i) resource use within the carrying capacity and resilience of the environment, (ii) cyclic use of natural resources, (iii) recognition of the value and importance of local traditions and cultures, (iv) multi-stakeholder participation and collaboration in sustainable and multi-functional management of natural resources and ecosystem services, and (v) contributions to sustainable socio-economies including poverty reduction, food security, sustainable livelihood and local community empowerment. IPSI promotes collaborative activities amongst partners, enhancing understanding and raising awareness of the importance of SEPLs as well as supporting on the ground activities. Satoyama case-studies and other information are available at http://satoyama-initiative.org.

25. The Ecoagriculture Partners are a group of more than 60 international organizations, non-governmental organizations, government institutions and private sector companies, with the mission to support diverse individuals and organizations at the local, national and international levels to create and sustain ecoagriculture landscapes worldwide. 'Ecoagriculture' is a term coined in 2000 by Sara Scherr and Jeffrey McNeely, authors of the Future Harvest-commissioned report '*Common Ground, Common Future: How Ecoagriculture Can Help Feed the World and Save Wild Biodiversity'*. The term describes landscapes that support both agricultural production and biodiversity conservation, working in harmony together to improve the livelihoods of rural communities. It conveys a vision of rural communities managing their resources to jointly achieve three broad goals at a landscape scale — the "three pillars" of ecoagriculture: (i) Enhance rural livelihoods; (ii) Conserve or enhance biodiversity and ecosystem services; and (iii) Develop more sustainable and productive agricultural systems.

26. Ecoagriculture is both a conservation strategy and a rural development strategy. Ecoagriculture recognizes agricultural producers and communities as key stewards of ecosystems and biodiversity and enables them to play those roles effectively. It applies an integrated ecosystem approach to agricultural landscapes to address all three pillars, drawing on diverse elements of production and conservation management systems. Meeting the goals of ecoagriculture usually requires collaboration or coordination between diverse stakeholders who are collectively responsible for managing key components of a landscape.

IV. REVIEWS AND EXPERIENCES OF LANDSCAPE-SCALE INITIATIVES

27. Little has been published in the way of synthetic assessment of relevant international conventions, and regional conventions and agreements, and how they impact sustainable use of biodiversity at the landscape level. However, the EcoLex database of environmental legislation (http://www.ecolex.org) is an essential contribution to disseminating information about relevant agreements, and promoting their understanding.

28. The concept of High Conservation Value (HCV) forests was originally designed in the framework of forest certification by the Forest Stewardship Council (FSC) and added to the FSC forest management principles in the late 1990's as Principle 9. HCVs include environmental and social values that are considered to be of outstanding significance or critical importance. Examples may include concentrations of endangered species, protection of a stream that is the sole source of water to a local community, or a site with special religious significance.

29. The objective of HCV 2.1 is to protect the ecological integrity of large intact landscapes where natural ecosystem processes have the potential to persist well into the future. A key element of the procedure is to identify and protect core areas of large landscapes, which are defined as interior portions of remnant forest fragments wherein natural ecological processes remain unperturbed by disturbances commonly associated with fragmentation and deforestation (edge effects). HCV 2.1 aims to protect the natural diversity of ecosystems, as well as the natural physical and biological interactions among them and their component species.

30. The idea behind HCV 2.2 is that areas supporting a variety of ecosystem types are capable of supporting higher levels of biodiversity and sustaining these levels over time. The objective of HCV 2.2 is to identify landscape areas containing a variety of ecosystem types and to ensure maintenance of their ecological integrity and continuity.

31. The objective of HCV 2.3 is to identify landscapes with a combination of attributes that permit maintenance of representative populations of most naturally occurring species and to guarantee that management practices inside a particular management unit are sufficient to maintain or enhance these values. In general, a large, non-fragmented area with diverse ecosystem types has a larger capacity to maintain a larger assemblage of naturally occurring species than does a smaller, fragmented area with limited diversity of ecosystem types.

32. Since its inception by FSC, HCV concepts have been widely applied outside the forestry sector and at larger geographic scales. The oil palm industry has incorporated aspects of HCV identification and management, as has the mining industry, while various assessments have been conducted for geopolitical areas such as provinces in Indonesia. This wide application of HCV suggests that its core concepts provide valuable input for the presently envisioned approaches to landscape level management of biodiversity.

33. The Man and Biosphere (MAB) Programme has been in existence for over 35 years and provides useful insights into how biodiversity could be managed at the landscape level. Biosphere reserves are areas of terrestrial and coastal/marine ecosystems that seek to achieve a sustainable balance between the goals of conserving biological diversity, promoting economic development, and maintaining associated cultural values. Each biosphere reserve is intended to fulfil three complementary functions: (i) a conservation function, to preserve genetic resources, species, ecosystems and landscapes; (ii) a development function, to foster sustainable economic and human development; (iii) and a logistic support function, to support demonstration projects, environmental education and training, and research and monitoring related to local, national and global issues of conservation and sustainable development.

34. Physically, each biosphere reserve should contain three elements: one or more core areas for conserving biological diversity, monitoring minimally disturbed ecosystems, and undertaking non-destructive research and other low-impact uses (such as education); a clearly identified buffer zone, which usually surrounds or adjoins the core areas and is used for co-operative activities compatible with sound ecological practices, including environmental education, recreation, ecotourism, and applied and basic research; and a flexible transition area, or area of co-operation, which may contain a variety of agricultural activities, settlements and other uses, and in which local communities, management agencies, scientists, non-governmental organizations (NGO), cultural groups, economic interests and other stakeholders work together to manage and sustainably develop the area's resources.

35. A 2010 review of the Asia-Pacific biosphere reserves found that even though biosphere reserves are a powerful concept for conservation and sustainable development that suits the present-day need of balancing environmental and economic factors, involving multiple stakeholders and developing holistic management approaches, they have functioned less than optimally. Among participating Governments and other organizations, there appears to remain a significant lack of understanding about what biosphere reserve are and are not meant to do. Often biosphere reserves are seen as protected areas, in which the multi-objective zoning principles of biosphere reserves cannot be legally implemented.

V. RECOMMENDED GUIDING PRINCIPLES

36. There are numerous guidelines, both voluntary and formal, for sustainable use of biodiversity. However, most of these guidelines do not make specific reference to the landscape level. The following examples highlight existing guidance for (i) landscapes focused on commodity production; (ii) governance issues at landscape level; followed by (iii) a combined set of proposed principles for landscape approaches to conservation and development.

37. For commodity production landscapes, Fischer et al.[8] suggest 10 principles within two groups of management strategies: those linked to pattern; and those related to process:

(I) Pattern oriented management strategies

1. Maintain and create large, structurally complex patches of vegetation
2. Maintain structural complexity throughout the landscape
3. Create buffers around sensitive areas
4. Maintain or create corridors and stepping stones
5. Maintain landscape heterogeneity and capture environmental gradients

(II) Process-oriented management strategies

6. Maintain key species interactions and functional diversity
7. Apply appropriate disturbance regimes
8. Control aggressive, over-abundant, and invasive species
9. Minimize threatening ecosystem-specific processes
10. Maintain species of particular concern

38. Governance questions are key to the success of sustainable use of biodiversity at any level, but arguably even more so at the landscape level, where usually many different needs and expectations of different stakeholder groups have to be considered. One lessons learned from the functioning of biosphere reserves is that their integrated approach to conservation and development is not always easily reconciled with local land use legislation that rarely recognizes multi-functionality in land use.[9] This might similarly become a major impediment to landscape level biodiversity management, requiring analysis of the alignment of landscape zoning with national legislation. The goal would be to identify areas of conflict between targets and legislation, guidelines on how to resolve this, and eventually develop a set of standardized management guidelines which can be used at the regional and global levels. Landscape management plans should be part of larger provincial and local development plans to ensure that their development objectives are in line with those developed at a regional scale. This prevents such landscapes from ending up as isolated management units rather than local conservation and development strategies integrated into the broader objectives for the landscape or region.

39. Sustainable governance of commons is arguably more likely when "(i) the resources and use of the resources by humans can be monitored, and the information can be verified and understood at relatively low cost (e.g., trees are easier to monitor than fish, and lakes are easier to monitor than rivers); (ii) rates of change in resources, resource-user populations, technology, and economic and social conditions are moderate; (iii) communities maintain frequent face-to-face communication and dense social networks—sometimes called social capital— that increase the potential for trust, allow people to express and see emotional reactions to distrust, and lower the cost of monitoring behaviour and inducing rule compliance; (iv) outsiders can be excluded at relatively low cost from using the resource (new entrants add to the harvesting pressure and typically lack understanding of the rules); and (v) users support effective monitoring and rule enforcement". [10] Additional important factors include strong leadership at local level, and sufficient political will.[11]

40. In traditional systems, scale is a constraint both to the size of social groups and the extent of areas that can be jointly managed. As "groups of people who can identify one another are more likely than groups of strangers to draw on trust, reciprocity, and reputation to develop norms that limit use."

[8] Fischer, J., D.B. Lindenmayer, and A.D. Manning, *Biodiversity, ecosystem function, and resilience: ten guiding principles for commodity production landscapes.* Frontiers in Ecology and Environment, 2006. **4**: p. 80-86.

[9] Molnar, A., S.J. Scherr, and A. Khare, *Who Conserves the World's Forests? A New Assessment of Conservation and Investment Trends*. 2004, Forest Trends: Washington, D.C., USA.

[10] Dietz, T., E. Ostrom, and P.C. Stern, *The Struggle to Govern the Commons.* Science, 2003. **12**(302): p. 1907-1912.

[11] Gutiérrez, Nicolás L., Ray Hilborn, and Omar Defeo. 2011. "Leadership, social capital and incentives promote successful fisheries." Nature 470: 386-389

Disincentives are higher "when the resource is large and complex, users lack a common understanding of resource dynamics, and users have substantially diverse interests".[12] Under these circumstances (which are inevitable in multifunctional and hence diverse landscapes at larger scales), successful conservation and sustainable use become strongly correlated with the application of knowledge leadership and adaptive management,[13] which can be encouraged and enabled widely through modern information technology.[14]

Proposed principles for integrating biodiversity into production landscapes

41. Combining the principles and guidelines of the ecosystem approach with the broader landscape level planning scale, the following combined principles for landscape approaches to conservation and development have been proposed by CIFOR, with contributions of IUCN, Ecoagriculture Partners, Wageningen Centre for Development Innovation and Intercooperation experts:

- **Continual learning and adaptive management principle:** *A sound understanding of the social dynamics of the landscape and the ecological interactions of the multiple resources it contains is a necessary basis for negotiating, implementing and monitoring landscape management. But learning about these landscape dynamics is not a one-time requirement. Activities have to be adapted both to evolving or new negotiated objectives as well as to render the achievement of existing objectives more efficiently. The generation, sharing and management of information on landscape processes, changes and potentials are essential for a landscape approach.*
- **Common concern entry-point principle***: The entry point for an intervention should be people orientated. It is crucial , to be a motivating factor, that the choice of the entry point intervention is perceived by key stakeholders to be promising in terms of addressing common concerns concretely and in the short term. It can be a tentative or trial activity which it is anticipated will also provide valuable information pertinent to the other principles, and in particular encourage confidence and interest in stakeholders to address other related issues of common concern which may be more sensitive.*
- **Multiple scale principle:** *Stakeholders must pay close attention to the multiple scales at which ecological dynamics and socio-economic activity in a landscape originate, evolve and interact. This is essential for developing sound governance systems and management strategies that are coordinated across different scales and issues as well as different political and administrative entities.*
- **Multi-functionality principle:** *To support social and ecological objectives, landscapes must be deliberately managed for 'multi-functionality' to generate multiple outputs in a sustainable manner with least trade-off costs and where possible maximized synergies.*
- **Multi-stakeholder principle:** *Landscape-scale management requires engagement from a representative set of stakeholders, and negotiation towards a workable level of agreement among them about goals concerning issues and resources of common concern from the landscape and ways of reaching them. Developing a stakeholder platform requires a patient iterative process of identifying stakeholders, their interests, building trust, empowering weak stakeholders and for powerful stakeholders to accept new rights and roles for other stakeholders.*
- **Negotiated and transparent change logic principle:** *Negotiated change must be built on an agreed vision through building trust and setting priorities in a collaborative and transparent manner.* Even if *the logic of change models generally requires coping with a certain level of uncertainty, it must be clearly discussed and described how changes are expected to take place and what these are likely to be in order to adapt them if needed. A transparent logic of*

[12] Ostrom, E., *Self-governance and forest resources. CIFOR Occasional Paper No 20*. 1999, Center for International Forestry Research: Bogor, Indonesia.

[13] Kenward, R.E. et al. *Identifying governance strategies that support biodiversity, ecosystem services and resource sustainability*. Proceedings of the National Academy of Sciences 2011. P. 1007933108v1-201007933.

[14] Sharp, R.J.A., Ewald, J.A., Kenward, R.E. *Policy recommendations and guidelines*. Report to the European Commission from FP-7 project #212304 for a Transactional Environmental Support System. 24pages.

intervention should include underlying assumptions and expected pathways from interventions to develop and negotiate new directions.

- **Clarification of rights and responsibilities principle:** *Access and rights to resources of different stakeholders need to be locally clarified, especially for local and indigenous populations. Realistically, this does not necessarily involve formal/legal changes of tenure but the development of negotiated working institutional arrangements. These may be policy experiments which may lead to future legislative change. In relation to rights, the respective responsibilities of all stakeholders must be equitably agreed upon*.
- **Participatory and user-friendly monitoring principle**: *Participatory monitoring and evaluation of landscape changes and interventions should be designed to generate the information which is necessary for stakeholders to collaboratively assess and adapt their planned interventions to evolving needs, objectives, opinions and circumstances*.
- **Resilience principle:** *The resilience of landscapes, i.e. the capacity of their ecological and livelihood systems to absorb disturbances, must be maintained or improved so that these ecological and social systems can reorganize while undergoing change so as to still retain essentially the same functions, structure, identity and feedbacks.*
- **Strengthened stakeholder capability principle**: *Sustainable, resilient and multi-functional landscapes require that stakeholders develop the capability to manage both processes which are increasingly complex and lands which are often under growing pressure. Constraints lie in increased need for collaboration between landscape stakeholders over resources of common concern, in changes in policy framework conditions and in the globalisation of interest from external stakeholders on some of their landscape's resources (e.g. REDD and carbon sequestration, water flows).*
- **Knowledge transfer principle**: *Constraints also lie in transferring, from the few specialists to the millions of local stakeholders, the increasingly complex knowledge of how social, economic and environmental factors interact, and in transferring vast local knowledge to central policymakers. Open and transparent use of modern information technology is needed, for predictive modelling to support complex socio-environmental decisions, for mapping the results of decisions to facilitate local adaptive management, and for integration of the resulting data across wide areas to enable adaptive governance that motivates conservation*.

Resilience at landscape level

42. The landscape level is also an important planning scale for considerations of ecosystem resilience. A synthesis of over 400 peer-reviewed articles by the Secretariat of the Convention on Biological Diversity in 2009 concluded that resilience of forests depends on biodiversity, at multiple scales. Maintaining and enhancing resilience is a key risk mitigation strategy for any form of land use, in particular for agriculture and forestry.[15] The study recommended a set of forest management interventions to increase resilience, including:

(a) Maintain connectivity across landscapes by reducing fragmentation, recovering lost habitats (forest types), and expanding protected area networks, and establishing ecological corridors;

(b) Maintain functional diversity and eliminate conversion of diverse natural habitats to monotypic or reduced species plantations;

(c) Manage plantation and semi-natural forests in an ecologically sustainable way that recognizes and plans for predicted future climate. For example, 'hedge bets' by apportioning some areas of assisted regeneration with trees from regional provenances and species from climates of the same region that approximate expected conditions in the future, based on climate modelling;

[15] Thompson, I., Mackey, B., McNulty, S., Mosseler, A. (2009). *Forest Resilience, Biodiversity, and Climate Change. A synthesis of the biodiversity/resilience/stability relationship in forest ecosystems*. Secretariat of the Convention on Biological Diversity, Montreal. Technical Series no. 43, 67 pages.

(d) Maintain biodiversity at all scales (stand, landscape, bioregional) and of all elements (genetic, species, community) and by taking specific actions including protecting isolated or disjunct populations of trees, populations at margins of their distributions, source habitats and refugia networks. Among other things, these populations are the most likely to represent pre-adapted gene pools for responding to climate change and could form core populations as conditions change;

(e) Ensure that there are national and regional networks of scientifically designed, comprehensive, adequate, and representative protected areas. Build these networks into national and regional planning for large-scale landscape connectivity.

43. Additional strategies for promoting resilience and specific ways to promote each strategy (Chapin et al. 2006[16]) at landscape level are listed in table 1.

Table 1: Promoting resilience and specific ways to promote each strategy

Reduce vulnerability by: • Sustaining the slow variables (e.g. soil resources and the species pool) – the reserves in the system that accumulate slowly and provide buffers • Mitigating the stresses that drive change *Enhance adaptability by:* • Fostering ecological, economic, and cultural diversity, including diversity in space and diversity in management strategies – protecting the building blocks for change that will maximize future options • Creating capacity for learning and innovation at multiple scales *Enhance resilience by:* • Strengthening stabilizing feedbacks, particularly negative feedbacks and tight feedback loops, between actions and their consequences, but allowing sufficient disturbance so that systems can adjust to persistent changes in underlying controls • Sustaining ecological and cultural legacies, including cultural connections to the land, thereby retaining system memory • Building linkages across multiple scales, including adaptive governance and connectivity between parks and the surrounding landscape *Foster transformability (the ability to actively move to a desired novel system, as an alternative to passive degradation) by:* • Thinking outside the box • Treating crisis as an opportunity for constructive change

Monitoring at the landscape level

44. Five specific classes of activity are relevant for monitoring: ***identifying and assessing threats and problems*** for example assessing fire risk; ***implementation monitoring***, supervising and checking planned activities are implemented as prescribed; ***effectiveness monitoring***, checking interventions had the desired effect, and that threats have been dealt with; ***project monitoring,*** reviewing overall activities and achievements against stated targets; and ***research,*** answering questions that may or may not be of direct management relevance[17] [18].

45. The first is critical even when resources are extremely limited and can be carried out at minimum cost as long as people are willing. The second and third are also a regular part of normal management processes while the fourth is familiar to all project based activities. The fifth is emphasized in academia.

[16] Chapin III FS, Lovecraft AL, Zavaleta ES, *et al*. 2006. *Policy strategies to address sustainability of Alaskan boreal forests in response to directionally changing climate. P Natl Acad Sci USA* **7**: 16637–43.

[17] Sheil, D., *Why doesn't biodiversity monitoring support conservation priorities in the tropics?* Unasylva, 2002. 53(209): p. 50-54.

[18] Ludwig, D., M. Mangel, and B. Haddad, *Ecology, conservation, and public policy.* Annual Review of Ecology & Systematics, 2001. 32: p. 481-517.

Of all these, the first is probably the most valuable on a day-to-day basis. Good resource managers know that stocktaking is seldom the priority. It is far more valuable to identify threats quickly, and to ensure that adequate management interventions can be taken. Care must be exercised whenever research or monitoring activities are promoted at the possible expense of day-to-day conservation management. Managers should only be required to collect data that will help them be better managers.

46. Standardized sets of socio-economic and environmental indicators are needed, and cheap, simple methods to measure them. Not all types of management require equal levels of measures and evaluation. The highest level of evaluation effort should be directed towards programs where failure is most expensive or lessons learned most valuable. Evaluation results should feed into a national, regional, or global database on landscape-level management to track whether they are indeed contributing to the stated conservation, development, and logistical functions.[19]

Criteria and indicators

47. The Collaborative Partnership on Forests (CPF), chaired by FAO, leads the efforts of 14 international organizations and secretariats with substantial programmes on forests (CIFOR, FAO, IUCN, ITTO, IUFRO, CBD, GEF, UNCCD, UNFF, UNFCCC, UNDP, UNEP, ICRAF, World Bank). The CPF Task Force on Streamlining Forest-related Reporting (http://www.fao.org/forestry/cpf/mar/en/) has started a process to consider amendments to criteria and indicators and to advance a "common message on SFM", and entails to, *inter alia*, consider how sustainable use of biodiversity is better reflected and integrated in SFM (and *vice versa*). Progress was also made through the establishment of the CPF Joint Information Framework and the development and maintenance of the Reporting Portal (www.fao.org/forestry/cpf-mar) designed to help users find information related to national reporting on forests from various international organizations, institutions and instruments.

48. FAO is responsible, through the Global Forest Resources Assessment and Reporting Team and in collaboration with the members of the CPF, for the ongoing initiative on Assessment and Monitoring of Forest Degradation (http://www.fao.org/forestry/cpf/forestdegradation/en/), which involves harmonization of related definitions and identification of forest health parameters and indicators. Specifically, the guidelines for reporting on forest degradation include proposed biodiversity indicators to determine the amount of degradation in a local forest.

49. The State of the World's Forest Genetic Resources will be published in 2013, with a thematic study on "*Indicators of forest genetic diversity, erosion and vulnerability*". This should contribute to the development of qualitative indicators for monitoring forest biological diversity and the effectiveness of forest conservation measures.

50. The 2010 Biodiversity Indicator Partnership (BIP), a global partnership established to assist in the development of indicators to measure progress towards achieving the 2010 target, tabled a list of indicators that could be used to monitor biodiversity at the landscape level. Under a project funded by the Global Environment Facility (GEF) and coordinated by the UNEP-WCMC,[20] involving more than 40 partners of United Nations agencies, scientific research institutions, non-governmental organizations and international initiatives, FAO developed several indicators in cooperation with other partners, some of which are being used as indicated below in table 2.[21] The 2010 BIP GEF funded project ended in March 2011.

[19] Wilson, K.A., J. Carwardine, and H.P. Possingham, *Setting Conservation Priorities*, in *Year in Ecology and Conservation Biology 2009*. 2009. p. 237-264.
[20] UNEP-WCMC: United Nations Environment Programme – World Conservation Monitoring Centre
[21] Detailed indicator synopses, metadata and methodologies: CBD Technical Series Number 53 "Outputs, experiences and lessons learnt from the 2010 Biodiversity Indicator Partnership", Annex 1

Table 2: Possible indicators to monitor biodiversity at landscape level

Indicator	Headline indicator	Key indicator partner/s	Development status
Extent of forests and forest types	Trends in extent of selected biomes, ecosystems and habitats	FAO	Ready for global use
Extent of marine habitats	Trends in extent of selected biomes, ecosystems and habitats	UNEP-WCMC, FAO	Ready for global and national use
Ex situ crop collections	Trends in genetic diversity	FAO in cooperation with Bioversity International and CIRAD	Methodology under review
Genetic diversity of terrestrial domesticated animals	Trends in genetic diversity	FAO	Methodology under review
Area of forest under sustainable management: certification	Areas under sustainable management	FAO	Ready for global use
Area of forest under sustainable management: degradation and deforestation	Areas under sustainable management	FAO	Methodology under review
Area of agricultural ecosystems under sustainable management	Areas under sustainable management	FAO	Ready for sub-global use
Nutrition indicators for biodiversity	Biodiversity for food	FAO in cooperation with Bioversity International	Ready for global, regional and national use

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