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Expert meeting on

Biodiversity Standards and Strategies for Sustainable Cultivation of Biomass for non-food Purposes

- Final Report -

Darmstadt, May 2008

prepared for BfN

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Content

Executive Summary of the Expert Meeting

The cultivation and trade of biomass for non-food purposes – especially bioenergy and liquid biofuels for transportation - is a matter of controversial debate which urges responsible institutions to an answer.

The biodiversity implications of the increasing cultivation of biomass will be discussed at the 9th CBD Conference of the Parties (COP 9) in Bonn/Germany in May 2008, in the context of the negotiations on the CBD Programme of Work on Forest Biodiversity and the Programme of Work on Agrobiodiversity.

In that regard, an expert meeting on "**national biodiversity standards and strategies for the sustainable cultivation of biomass for non-food purposes**" took place from March 12 – 15, 2008 on the Isle of Vilm, Germany, organized by the German Federal Agency for Nature Conservation (**BfN**) in collaboration with the German Federal Environment Agency (**UBA**) and financial support from the German Federal Ministry for Environment, Nature Conservation and Nuclear Safety (**BMU**).

The meeting was held to provide **advice and recommendations** to decision-makers concerning the responsible and sustainable production of biomass for non-food purposes.

The workshop comprised presentations from various countries on sustainability issues of bioenergy production with respect to biodiversity, and held intense discussions in two sub-working groups which critically reviewed the draft decisions prepared by the CBD Secretariat on biofuels (UNEP/CBD/COP/9/26 - draft).

Based on this, the following main recommendations were derived in the final plenary session:

- It is necessary to mainstream biodiversity concerns in energy policies by developing biofuel strategies to be set within an energy framework which, as a first priority, seeks to reduce energy and transport fuel demand and improve energy efficiency
- The text needs to explicitly mention direct and indirect land-use change
- It is vital to Identify and appropriately manage areas where biodiversity conservation and biofuel production are incompatible with biodiversity purposes
- Policies and technologies should be developed and promoted that consider in particular waste products and residuals from agriculture, forestry and habitat management of protected areas, if their extraction does not negatively impact on biodiversity and ecosystem functions
- A monitoring and reporting system on the impact of biofuels on biodiversity should be established
- A new Programme of Work (PoW) on Sustainable Biofuels and Biodiversity was proposed, or key issues should be included into the existing PoWs, which consists of the following items:

a) to develop, most urgently, criteria for identifying and mapping areas applicable on different spatial scales, according to their degree of suitability for biofuel production with regard to compatibility with biodiversity concerns and the aim of minimizing indirect land-use change, including across national borders, which shall serve as guidance for national policies, and which should include

- a traffic light system being based on ongoing work of initiatives dealing with sustainable production of biofuels, such as RSB and RSPO;
- the concept of high conservation value (HCV) areas and, biological corridors and buffer zones;
- the World Database on Protected Areas (WDPA) managed by UNEP-WCMC and would be in support of the CBD Programme of Work on Protected Areas, and other sound databases on biodiversity and environment,

b) to commission a feasibility study, exploring financial mechanisms such as a biofuel charge to fund incentives for good agricultural/ forestry and biodiversity conservation practice outside biofuel crop production areas, as one measure to limit indirect land-use change and to reduce biodiversity loss;

c) to commission a study on the availability and suitability of degraded and abandoned land for bioenergy production as one option to reduce indirect land-use change, taking into account the possible positive and negative effects on biodiversity, socioeconomic issues and greenhouse gas balances, and comparing these to those of natural regeneration or reforestation;

d) to develop and promote ecologically and socially sound practices for biofuel cultivation, especially with regard to GMOs, and plant species not previously cultivated on a large scale, also looking at issues of invasiveness and taking account of different spatial scales;

e) to investigate broadening the range of available feedstocks and farming systems (e.g. no till organic farming) for biofuels to enhance agrobiodiversity and climate change resilience;

f) to develop a framework for spatial (GIS-based) datasets that is able to process information from global to local scale in order to

- identify and to map areas according to their degree of suitability for biofuel production, considering results from items a) and c);
- identify sound local advices for practices for biofuel cultivation, considering results from items d) and e);

combine these information with other spatial databases on biodiversity (e.g., Ecoregions, Alliance for Zero Extinction, Important Bird Areas and Important Plant Areas) and environmental indicators (e.g., agro-environmental zones);

f) to identify needs for capacity building and research that aim at enhancing and ensuring the sustainability of biofuel production.

These key recommendations – and some minor ones – were included in track-mode into the draft decision proposals of the CBD Secretariat for the COP9 (see CBD-COP9 Vilm March 2008 Expert Meeting Recommendations final.doc).

In the follow-up to the expert meeting, all participants and invitees had the opportunity to comment on the recommendations on the draft decision prepared during the expert meeting until end of March 2008.

Several participants responded with suggestions which were integrated into the final workshop document which was sent to the CBD Secretariat for publication on the CBD website, as well as to all participants and invitees, in April 2008.

The organisers also prepared a CDROM documentation which was distributed during the workshop to all participants.

1 Introduction

The expert meeting on national biodiversity standards and strategies for the sustainable cultivation of biomass for non-food purposes took place from March 12 – 15, 2008 on the Isle of Vilm, Germany. It is was organized by the German Federal Agency for Nature Conservation (**BfN**), in collaboration with the German Federal Environment Agency (**UBA**) and with financial support from the German Federal Ministry for Environment, Nature Conservation and Nuclear Safety (**BMU**).

The cultivation and trade of biomass for non-food purposes is a matter of controversial debate which urges responsible institutions to an answer. The biodiversity implications of the increasing cultivation of biomass will be discussed at the 9th CBD Conference of the Parties (COP 9) in Bonn/Germany in May 2008, in the context of the negotiations on the CBD Programme of Work on Forest Biodiversity and the Programme of Work on Agrobiodiversity.

Therefore, the expert meeting was held to provide **advice and recommendations** to decision-makers concerning the responsible and sustainable production of biomass for non-food purposes. This workshop was the first international meeting to discuss approaches for assessing the sustainability of biomass production with respect to biodiversity and to elaborate respective recommendations.

On the first day of the workshop, participants presented national, regional and global experiences related to the cultivation of non-food biomass and required sustainability standards and strategies. The presentations are documented in the Appendix on the CD.

In the evening of the first day, a “Round Table on Policy Perspectives: Bioenergy and Biodiversity” was held.

On the second day, the participants met in two working groups (WG1 and WG2):

WG1 focused on the topic “How to address/prevent negative biodiversity effects of direct and indirect land use change caused by biomass cultivation?”,

WG2 dealt with “Biodiversity sound practices for biomass cultivation”.

After a brief introduction to these topics in a plenary session, both working groups carried out an in-depth review of the current draft decisions prepared by the CBD-secretary on biofuels (UNEP/CBD/COP/9/26 - draft), including detailed proposals to enhance the decision. Finally, the proposals on the draft decisions of both WG were merged during a final plenary session. This result is the main output of the workshop.

On the third day, participants took the opportunity to participate in a guided tour through the exciting nature of Vilm Island.

This report gives a brief overview of the discussions during and the outcomes of the expert meeting, and should be read in parallel with the **Issue Paper** prepared by Oeko-Institut for the meeting, and the final recommendations from the meeting.

2 Documentation of the Working Groups

2.1 Results from the Open Discussion in Working Group 1 (WG1)

WG1 dealt with the topic “How to address/prevent negative biodiversity effects of direct and indirect land use change caused by biomass cultivation?”

The work started with a presentation on “Brief Inputs on Biodiversity and Land Use” by Klaus Hennenberg (see CDROM). The presentation summarized the main points from the Issue Paper “Biodiversity and Land Use” (see CDROM). After that, the following main aspects were discussed:

1. *Is the identification of no-go areas the right approach?*

Direct and especially indirect effects from land-use change caused by biomass cultivation have been identified to be most crucial for biodiversity. Four approaches were proposed to address/prevent negative biodiversity effects of direct and indirect land-use change, whereof the latter two options had been considered to be risky:

- No-go areas representing a percentage of each of the natural community types used in national conservation planning;
- go-areas (go-areas available for biomass production form the biodiversity perspective must not produce negative impacts in other fields, e.g., negative carbon impacts);
- establishment of offset-schemes,
- and - in areas where land colonization schemes are under way - the allowance of the cultivation of a certain percentage of a smallholding with biofuels.

2. *What are adequate criteria for the definition of go areas and no-go areas?*

It is strongly recommended that The World Protected Area (PA) Database managed by WCMC contribute to an initial categorization of go-/no-go areas, as part of a broader assessment process that takes into account that neither all no-go areas are in PAs nor are all go areas outside PAs.

Results from initiatives like the Roundtable on Sustainable Biofuels and the High Conservation Value (HCV) Network have been mentioned to be good basis for further development of internationally acceptable criteria. E.g., a framework based on FSCs Principle 9 for identification of HCV lands could be applied to areas outside PAs.

3. *Who should set the criteria on the definition of suitable areas for biomass cultivation? (International organization, national institutions?)*

CBD is strongly recommended to develop procedures for the identification of no-go areas, but it needs to be recognised that biodiversity conservation is just one criterion for the delimitation of no-go areas. Others are, e.g., greenhouse gas emissions, soil, water and social aspects. It would be a large step forward if internationally acceptable criteria and a related “toolbox” would be developed especially under the roof of the CBD to identify the location of HCV areas.

4. *Is mapping the right approach and feasible (who, how, financial resources….)?*

Each country will be expected to identify no-go areas using procedures adapted from the above mentioned global approach, that is, however, still missing. SBSTTA should determine whether or not a fast-track approach using criteria adapted from existing procedures for the certification of forest and agricultural production can be applied at the local scale (i.e. by farmers that are proceeding with biomass production) before national legislation is in place.

At regional, national and landscape scales incentives for the consolidation of no-go areas should be proposed, and could be provided both to national governments for purposes of more effective management of HCV lands, as well as to landowners.

The group also discussed the idea of a biofuel tax to fund incentives for good agricultural/forestry practice and biodiversity conservation as one measure to limit indirect land use change impacts. Also benefits from potential carbon emissions reductions due to bioenergy use may be used as a financing tool for strengthening existing protected areas. Feasibility studies of this concept would be useful. However, the lack of an energy/environmental economist on the group was regretted.

5. *Degraded land/abandoned land: How to assess the conservation value, and how to prevent indirect effects/leakage?*

Today, there is still substantial lack on knowledge on this issue. It is recommended that the CBD should liaise with UNCCD to make a study of many aspects of the assumption that degraded or marginal lands will be available and appropriate for biofuel production. However, it was questioned that terms like degraded or marginal land can be defined in such a way as to permit practical application. Some of these lands may be HCV lands, and farmers or agro-industry may be reluctant to accept this.

It is likely, that market forces support the use of prime agricultural land for bioenergy production, leading to the displacement of food production to other areas and, in consequence, to possibly increasing pressure on HCV lands. However, some bioenergy crops may be more suitable for less productive sites than many food crops, and they can be cultivated on degraded land reducing the risk of indirect effects.

On the other hand, the extent of degraded lands is unlikely to be sufficient to supply projected biofuel needs.

The use of abandoned lands rather than degraded lands as a target category is a possibility, though it has to be recognized that not all land is abandoned because it has lost productivity, but because of market forces. Such land may have a high value for natural regeneration which can be preferable to bioenergy production from a carbon balance point of view.

2.2 Results from the Open Discussion in Working Group 2 (WG2)

WG2 dealt with the issue of "biodiversity sound practices for biomass cultivation", i.e., the question of agrobiodiversity as a key concern of non-food biomass feedstock production. Following brief presentations from Uwe Fritsche (see 9_Fritsche_OEKO (2008) Bio EEA.ppt on the CDROM), Rainer Krell and Jorge Hilbert (the latter two made oral inputs), the group discussed the following key questions:

1. *Guidelines favoring specific feedstocks (e.g., residues and waste products, woody biomass, native grass mixtures or perennial oil plants on degraded land)*
2. *How to draw a line between food and feed crops and bioenergy crops?*

Good agricultural practice (GAP) is linked to the final destination of the feedstocks, so that e.g. cellulose crops and residues use are not part of current GAP. The main sources of biofuel feedstocks come from “dual use” crops (food – non-food purposes), which must obey GAP, disregarding the final use of the crop, as farmers do not know the final destination of the production before their harvest is sold.

There is a need to integrate agricultural and agro-industrial practices through a life-cycle approach and to continue the study of agricultural practices. It was concluded that GAP is not sufficient for biodiversity conservation.

3. *Different practices depending on the cultivation in protected or non-protected areas*

Biomass extraction rate from the fields is a delicate matter affected by climate and soil interaction (no overall recipe can be delivered).

Globally there is a lack of knowledge on the principal consequences of the farming systems, and it is important to clearly define GAP with specifically defined data to evaluate the agricultural production, especially regarding energy efficiency, water (use) efficiency, and land-use efficiency.

These are generic elements of GAP that could be enforced disregarding the country or ecosystem, while other relations must be considered at a local level. Therefore, there is a need for specific research on adequate GAP for biofuel feedstocks.

Special attention is needed for new crops with respect to associated species (pests), their invasiveness, and agrobiodiversity impacts. Conservation (no till) and organic farming are specially linked to biodiversity (soil, crop species and natural diversity).

GHG balance must be considered in agriculture as a whole. More information has to be gathered, taking into account different agricultural practices (e.g., conservation and organic agriculture). Indirect impacts of increasing biofuel feedstock demand affect all socio-economic aspects.

4. *Possible implementation paths of guidelines*

It must be acknowledged that subsidies and taxes generate different agro-economic and agro-ecological systems. Guidelines are needed to consider the impacts of subsidy/tax schemes before they are implemented. Decision-makers need information on “bad”, “good” and “best” agricultural practices.

3 Draft Recommendations from the Expert Meeting

Considering the discussions in WG1 and WG2 which critically reviewed the draft decisions prepared by the CBD secretary on biofuels (UNEP/CBD/COP/9/26 - draft), the following main recommendations were derived in the final plenary session:

- The text needs to explicitly mention direct and indirect land-use change
- Identification and appropriate management of areas where biodiversity conservation and biofuel production are incompatible with biodiversity purposes
- Development of policies that consider in particular waste products and residuals from agriculture, forestry and habitat management of protected areas, if their extraction does not negatively impact on biodiversity and ecosystem functions
- Establishing a monitoring and reporting system on the impact of biofuels on biodiversity
- Focusing on the dependence of scale on biofuel-driven impacts
- Proposing a new Programmes of Work on Sustainable Biofuels and Biodiversity, or to include the key issues into the existing PoWs.

These key recommendations – and some minor ones – were included in track-mode into the draft decision proposals of the CBD Secretariat for the COP9 (see CBD-COP9 Vilm March 2008 Expert Meeting Recommendations final.doc).

In addition, a list of key elements for a Programme of Work on Sustainable Biofuels and Biodiversity was prepared as an Annex to the draft. These elements could also be integrated into existing CBD Programmes of Work.

4 Final Recommendations from the Expert Meeting

In the follow-up to the expert meeting, all participants and invitees had the opportunity to comment on the recommendations on the draft decision prepared during the expert meeting.

Several participants responded with suggestions which were integrated into the final workshop document (see following pages).

CBD
DRAFT

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CONFERENCE OF THE PARTIES TO THE CONVENTION ON BIOLOGICAL DIVERSITY
9 meeting
Bonn, Germany, 19-30 May 2008
Item 3.1 of the provisional agenda*

THE POTENTIAL IMPACTS OF BIOFUELS ON BIODIVERSITY

Matters arising from SBSTTA recommendation XII/7

Note by the Executive Secretary

I. BACKGROUND

1. Pursuant to paragraph (d) of appendix A to annex III of decision VIII/10, and following the recommendation of its Bureau, the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA), at its twelfth meeting, considered the interlinkages between biodiversity and liquid biofuel production as a new and emerging issue related to the conservation and sustainable use of biodiversity. To this end a pre-session document entitled "New and emerging issues relating to the conservation and sustainable use of biodiversity: Biodiversity and liquid biofuel production" was prepared (UNEP/CBD/SBSTTA/12/9).

2. In recommendation XII/7, the SBSTTA requested the Executive Secretary (i) to invite Parties and other Governments to provide relevant information on the impacts on biodiversity along the full life cycle of the production and use of biofuels and how these are being addressed; (ii) to compile, in collaboration with relevant organizations, additional relevant information on this subject; (iii) to identify options for consideration of this emerging issue in the programmes of work of the Convention, including the programme of work on agricultural biodiversity and the expanded programme of work on forest biodiversity; and (iv) to synthesize and submit the information resulting from the above activities for consideration at the ninth meeting of the Conference of the Parties.

3. The present note has been prepared on the basis of information submitted by Parties in response to notification 2007-082 as well as findings from scientific studies, reports and other documents, as well as contributions from relevant organizations.

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* UNEP/CBD/COP/9/1.

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4. After an overview of recent developments on biofuels (Section II) this document examines the potential positive and negative impacts of biofuels on biodiversity over their entire life cycle including the end use of biofuels (Section III), the production of feedstocks for biofuels (Section IV) and the processing and conversion of feedstocks (Section V). Section VI of this document explores possible options for considering biofuels and biodiversity through the expanded programme of work on forest biodiversity and the programme of work on agricultural biodiversity as well as other relevant components of the Convention on Biological Diversity. This is followed by conclusions (Section VII) and suggested elements for a possible decision by the Conference of the Parties (Section VIII).

II. INTRODUCTION (WITH ADDITIONS SUGGESTEST BY THE PARTICIPANTS IN THE VILM EXPERT MEETING, MARCH 2008)

5. The term "biofuel" generally refers to any fuel derived from biomass, such as alcohols, biogas, fuelwood, vegetable oil and animal fats, which can be used as a substitute for fossil fuels. Though a variety of biofuels exist it is liquefied biofuels, such as ethanol and biodiesel, which have garnered the greatest attention as they can be used in the transportation sector. It is estimated that ethanol alone currently accounts for approximately 90% of biofuel use globally (13). For ethanol, the most common biomass sources are sugar cane and maize (or "corn") while rapeseed and palm oil are the major feedstocks used in the production of biodiesel. However soybean, peanuts, jatropha, castor bean and coconut oil are also used for the production of biodiesel and wheat, sugar beet, sweet sorghum and cassava are used for ethanol (2, 30). It has been postulated that in the future it will be possible to use a greater range of lignocellulose materials, or so called second generation feedstocks, for biofuel production (37). These materials would include grasses, algae, woody plants and residues from the agriculture and forestry sectors.

6. Biofuel (ethanol and biodiesel) production exceeded an estimated 53 billion litres in 2007, representing a 43 percent increase from 2005 (27). Among the renewable energies, biofuels dominated venture capital and private equity investment activity in 2006 with US $2.9 billion flowing into the sector – twice as much as the next strongest technology, solar, with $1.8 billion (45). This recent increase in biofuel production and financing has been spurred by the desire for greater energy security and policies purported to respond to the growing concern over climate change (35).

7. The trade in biofuels has been increasing but it remains modest when compared to the total amount of biofuel produced globally. It was estimated that in 2005 10% of the world's biofuel consumption was covered by trade (8, 9). The trade in biofuels is expected to grow as the consumption mandates, which some countries have set, will require that biofuels be imported from other countries (8). However currently there are no trade regimes specifically related to biofuels and tariff and non-tariff barriers may limit the amount of trade which occurs (9, 15).

8. Several countries have introduced policies to promote biofuel use, such as requiring that traditional fuels be blended with biofuels. A number of countries have also introduced policies which promote the domestic production of biofuels, such as the establishment of production subsidies or the introduction of import tariffs. Many of these policies do not take into account the type of biomass or production methods used in creating biofuels, nor the potential negative environmental or social impacts resulting from their production and use (8).

9. With the rising use of biofuels has also come debate regarding the potential positive and negative impacts of these products. While proponents of biofuels point to the potential for cleaner fuels, greater economic opportunities for farmers and rural communities, and a renewable source of energy, detractors argue that biofuels risk damaging biodiversity, marginalizing indigenous and local communities and creating more greenhouse gas emissions than they prevent. This debate is complicated by the fact that numerous types of biomass (or feedstocks) can be used in the production of biofuels. The dominant factors determining the environmental and biodiversity impacts of biofuels are the types of lands used for

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Potential environmental impacts: land-use-change and climate change impacts on biodiversity

15. One of the most commonly noted environmental impacts of biofuel production is land-use change. The amount of biofuel produced per unit area of cultivated land differs noticeably among feedstocks (17, 26). Given the rising demand for biofuels globally and that this demand is expected to continue to increase over the next ten years (35), increasing amounts of land will likely be devoted to biofuel production. For example it is estimated that a 10% substitution of petrol and diesel fuel would require that 43% and 38% of current cropland in the United States and Europe, respectively, be devoted to feedstock production (14), or that the production of feedstocks increases overseas. The choice of feedstock, the place where it is grown and the cultivation practices used all play a significant role in determining if the production of a certain biofuel will have negative or positive impacts on the environment, and the magnitude of those impacts.

16. If crops are grown on degraded or abandoned land, such as previously deforested areas or degraded crop- and grasslands, and if soil disturbances are minimized, the production of feedstocks for biofuels could potentially have positive impacts on biodiversity by restoring or conserving habitat and ecosystem function. Further the use of degraded land for biofuel production is not likely to adversely affect carbon emissions. If multiple species are grown or if perennial species, such as grasses or trees are used the production of feedstocks could also have positive impacts on biodiversity in comparison to annual monocultures on arable land. For example short rotation coppice willow can be beneficial for some bird, butterfly and flowering plant species (37). In situations where energy crop plantations replace other monocultures the direct impacts on biodiversity are not likely to be significant. If the production of biomass for biofuel production replaces other land uses however the net impacts on biodiversity could be negative.

17. Conversion of uncropped/marginal land needs to be carefully assessed as these areas often provide ecosystem goods and services such a fuel wood and medicines. Where such areas are considered for biofuel production impact assessments should be undertaken to assess if the land use change would negatively affect the provision of these services and benefits to local people who are dependent on them.

18. Habitat loss is one of the major causes of biodiversity decline globally (21, 31, 44). The increasing demand for bioenergy could lead to both direct and indirect expansions of cultivated areas, resulting in further habitat loss and negative impacts on biodiversity, especially if forest, grassland, peatland and wetlands are used for feedstock production and if large monoculture plantations are created. In some cases land use change might not be directly for biofuel production but be caused by a shift in agricultural areas. This could lead to previously unused areas being cropped having both an impact on biodiversity and the ecosystem good and services provided from these areas that are not agricultural (eg timber/fuel, medicines and bush meat). It has been noted that, in some Organisation for Economic Co-operation and Development (OECD) member countries, the increasing demand for oilseed has already begun to put pressure on areas designated for conservation (35). Similarly the rising demand for palm oil has contributed to extensive deforestation in parts of South East Asia (43). Further, as biomass feedstocks can be produced most efficiently in tropical regions, there are strong economic incentives to replace natural ecosystems with high biodiversity values with energy crop plantations (8).

19. Land use change associated with the production of energy crops would also affect carbon dioxide emissions. If energy crop plantations are established on degraded sites, the sequestration of carbon could be increased, thereby mitigating the impacts of climate change. Similarly if perennial crop species with large root structures were used and if these root systems remained in the soil after harvesting, the amount of carbon stored in soils could potentially be increased. Tilman et al. (2006) note that the use of low input agricultural practices and high diversity systems on degraded lands, could result in carbon being sequestered as a result of rising soil organic matter. Similarly biofuels derived from residues and waste products could have an overall positive effect on climate change and on biodiversity as no significant land

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need to be couched in sound policy frameworks that include transport and land use change policies, and broader approaches to renewable energy and increasing energy efficiency.

55. The application of tools and guidance already developed under the Convention, including the ecosystem approach, strategic environmental assessment, and proposals for the application of ways and means to remove or mitigate perverse incentives, could inform a coherent approach to the formulation of biofuel policies.

56. Criteria, standards and certification could be developed to help identify and promote biodiversity-friendly biofuels and these could draw on existing approaches and efforts.

VIII. DRAFT DECISION (WITH ADDITIONS SUGGESTEST BY THE PARTICIPANTS IN THE VILM EXPERT MEETING, March 2008)

The Conference of the Parties at its ninth meeting may wish to adopt decision along the following lines:

The Conference of the Parties to the Convention on Biological Diversity,

Taking into account the high importance and complex nature of the issue of biofuel production for biodiversity and the difficulties of separating biofuel production from other agricultural uses;

Recognizing the potential positive and negative impacts of biofuels on biodiversity along the full life cycle of production and use, including indirect effects of land-use change, depending, inter alia, on the mode and place of production, the agricultural practices involved and the policies in place;

Welcomes the High Level Conference on World Food Security and the Challenges of Climate Change and Bioenergy of the Food and Agriculture Organization of the United Nations, to be held from 3 to 5 June, 2008, that will address issues related to inter alia biofuels;

Noting recommendation XII/7 of the Subsidiary Body on Scientific, Technical and Technological Advice which provides a preliminary analysis of the potential positive and negative impacts of biofuels on biodiversity and human well-being, and

Recalling decision 13/CP8 of the United Nations Framework Convention on Climate Change and decision 12/COP6 of the United Nations Convention to Combat Desertification on enhanced cooperation between the Rio Conventions;

1. *Urges* Parties and other Governments, in consultation with indigenous and local communities, and relevant organizations and stakeholders to:

(a) mainstream biodiversity concerns in energy policies by developing biofuel strategies to be set within an energy framework which, as a first priority, seeks to reduce energy and transport fuel demand and improve energy efficiency,

(b) develop sound policy frameworks for bioenergy and especially liquid biofuel production, that contribute to both the mitigation of greenhouse-gas emissions and the conservation and sustainable use of biodiversity,taking into account the full life cycle of biofuel production and use, including direct and indirect land use change and impacts on commodity prices, as well as environmental impacts on water and soil, making use of relevant tools and guidance developed under the Convention on the ecosystem approach, sustainable use, invasive alien species, impact assessment and incentive measures,

(c) identify and appropriately manage areas where biodiversity conservation and biofuel production are incompatible, and, where appropriate;

(d) review, and if indicated, adjust, existing policies related to biofuels, with a view to promote only those biofuels that show clear positive benefits for the mitigation of greenhouse-gas emissions, and which have either positive or neutral impacts on biodiversity and local livelihoods, including biodiversity and livelihoods in other countries and likewise, minimise impacts on other natural resources (water, soil) and human health; policies should consider in particular waste products and residuals from agriculture, forestry and habitat management of protected areas, if their extraction does not negatively impact on biodiversity and ecosystem functions;

(e) monitor, on an annual (if cost are excessive: biannual) basis, the areas used for biofuel production and land-use change, with the view to adapt the policies concerned, and to facilitate on-the-ground management action to correct and revert undesirable impacts on biodiversity values;

(f) report within the context of the CBD reporting framework, on measures undertaken and results obtained from items a) to e).

2. *Requests* - the Subsidiary Body on Scientific, Technical and Technological Advice to integrate the key items listed in the Annex into the existing Programmes of Work .

3. *Encourages* Parties and other Governments, indigenous and local communities, smallholder organizations and relevant stakeholders and organizations, to

- contribute to ongoing efforts to develop criteria, standards and certification schemes appropriate to different scales and intensities of production and consumption of sustainable biofuels in order to prevent and minimize potential negative impacts on biodiversity along their full life cycles,

- include land use change and indirect effects through displacement and impacts on commodity prices and markets in the respective criteria, standards and certification schemes

and *requests* the Subsidiary Body on Scientific, Technical and Technological Advice, as a potential contribution to efforts to develop criteria, standards and certification schemes, to develop specific elements as related to the objectives and relevant provisions of the Convention on Biological Diversity (see also suggested items for inclusion in the existing Programmes of Work in the Annex) and to report to the Conference of the Parties at its tenth meeting;

4. *Invites* the United Nations Framework Convention on Climate Change and the United Nations Convention to Combat Desertification, the Food and Agriculture Organization of the United Nations and the United Nations Environment Programme as well as other relevant organizations and partners to collaborate, especially on the suggested additions to the existing Programmes of Work, including joint activities regarding item 1e) with the Convention on Biological Diversity on the issue of biofuel production and consumption, in order to ensure the consistency between the conventions and to enhance respective synergies) .

ANNEX (Prepared by the Participants of the Vilm Expert Meeting, March 2008):

List of key elements on Sustainable Biofuels and Biodiversity to be integrated into existing CBD Programmes of Work:

a) to develop, most urgently, criteria for identifying and mapping areas applicable on different spatial scales, according to their degree of suitability for biofuel production with regard to compatibility with biodiversity concerns and the aim of minimizing indirect land-use change, including across national borders, which shall serve as guidance for national policies, and which should include

- a traffic light system being based on ongoing work of initiatives dealing with sustainable production of biofuels, such as RSB and RSPO;
- the concept of high conservation value (HCV) areas and, biological corridors and buffer zones;
- the World Database on Protected Areas (WDPA) managed by UNEP-WCMC and would be in support of the CBD Programme of Work on Protected Areas, and other sound databases on biodiversity and environment,

b) to commission a feasibility study, exploring financial mechanisms such as a biofuel charge to fund incentives for good agricultural/ forestry and biodiversity conservation practice outside biofuel crop production areas, as one measure to limit indirect land-use change and to reduce biodiversity loss;

c) to commission a study on the availability and suitability of degraded and abandoned land for bioenergy production as one option to reduce indirect land-use change, taking into account the possible positive and negative effects on biodiversity, socioeconomic issues and greenhouse gas balances, and comparing these to those of natural regeneration or reforestation;

d) to develop and promote ecologically and socially sound practices for biofuel cultivation, especially with regard to GMOs, and plant species not previously cultivated on a large scale, also looking at issues of invasiveness and taking account of different spatial scales;

e) to investigate broadening the range of available feedstocks and farming systems (e.g. no till organic farming) for biofuels to enhance agrobiodiversity and climate change resilience in support of food security;

f) to develop a framework for spatial (GIS-based) datasets that is able to process information from global to local scale in order to

- identify and to map areas according to their degree of suitability for biofuel production, considering results from items a) and c);
- identify sound local advices for practices for biofuel cultivation, considering results from items d) and e);
- combine these information with other spatial databases on biodiversity (e.g., Ecoregions, Alliance for Zero Extinction, Important Bird Areas and Important Plant Areas) and environmental indicators (e.g., agro-environmental zones);

f) to identify needs for capacity building and research that aim at enhancing and ensuring the sustainability of biofuel production

Appendix

Agenda of the Expert Meeting

Umwelt Bundes Amt
Für Mensch und Umwelt

Bundesamt für Naturschutz

Expert meeting on biodiversity standards and strategies

for sustainable cultivation of biomass for non-food purposes

12-15 March 2008, Isle of Vilm, Germany

Wednesday, March 12, 2008

afternoon: Arrival of the participants at the Isle of Vilm

18.30 Dinner

20.00 Welcome to Vilm, technical announcements (Gisela Stolpe, BfN)

Introduction of participants

Thursday, March 13, 2008

08.00 Breakfast

1 INTRODUCTION

09.00 Introduction to the meeting (Kathrin Ammermann, BfN)

09.30 From SBSTTA-13 to COP9: Bioenergy in the CBD Process (Uwe Fritsche, Institute for Applied Ecology)

09.45 Questions and Brief Discussion

10.00 Systematic overview of potential biodiversity impacts of biomass production (Kathrin Ammermann, BfN)

10.30 Coffee/Tea Break

2 ONGOING GLOBAL ACTIVITES RELATED TO BIOENERGY AND BIODIVERSITY

11.0 IUCN Bioenergy Project (Zywia Wojnar, PACE Energy Project)

11.15 Roundtable on Sustainable Biofuels (Lera Miles, UNEP-WCMC)

11.30 Global Bioenergy Partnership (GBEP; Uwe Fritsche, Institute for Applied Ecology)

3 ONGOING WORK ON BIOENERGY AND BIODIVERSITY IN EUROPE

11.40 Relevant legal initiatives within the EU – incl. the provisions of the German Biofuels Sustainability Ordinance” and its need for operationalisation (Horst Fehrenbach, IFEU)

12.00 German research projects aiming at operationalisation of standards:

- UBA-Project „Development of strategies for the optimal use of biogenic industrial raw materials: Sustainability Standards and Indicators for the Certification of internationally traded biomass (Anne Miehe, Federal Environment Agency)

12.30 Lunch

14.00 - BfN Project "Nature protection standards for bioenergy cultivation" (Rainer Luick, University of Applied Forestry Sciences)

14.30 EEA Bioenergy Project (Uwe Fritsche, Institute for Applied Ecology)

4 ACTIVITIES IN DEVELOPING COUNTRIES WITH REGARD TO BIODIVERSITY STANDARD SETTING: EXPERIENCES AND NEEDS

14.50 Indonesia (Rudy Lumuru, Sawitwatch)

15.10 Compete Project Africa (Dominik Rutz, COMPETE)

15.30 Coffee/tea break

16.00 South America: Argentina (Jorge Hilbert, INTA), Brazil (Antonio Ramalho-Filho), Costa Rica (Bryan Finegan, CATIE - tbc)

5 PARALLEL WORKING GROUPS: DEALING WITH BIODIVERSITY IMPACTS OF BIOENERGY

16.45 Introduction to group work

16.55 Group 1: Biodiversity and Land Use: PA, HNCV, Forest/Wetlands: Definitions, mapping, zoning, restrictions and other standards

Brief Inputs:

- Klaus Hennenberg (Institute for Applied Ecology)
- Martina Otto (UNEP)
- Lera Miles (UNEP-WCMC)

16.55 Group 2: Agrobiodiversity: Which Crops and Farming Systems Where?

Brief Input:

- FAO Work on Agrobiodiversity (Rainer Krell, FAO)

18.30 Dinner

20.00 **ROUND TABLE ON POLICY PERSPECTIVES: BIOENERGY & BIODIVERSITY**

- Martina Otto, UNEP
- Jorge Hilbert, INTA
- Uwe Fritsche, Institute for Applied Ecology
- Rudy Lumuru, Sawitwatch
- Lera Miles, UNEP-WCMC

Moderator: Horst Fehrenbach, IFEU

Friday, March 14, 2008

08.00 Breakfast

9.00 **Parallel Working Groups** (cont.)

Coffee/tea break included

11.00 Reports from the working groups with discussion on open questions

6 RECOMMENDATIONS FOR CBD-COP 9

11.45 **Parallel Working Groups**

Group 1: Recommendations to CBD-COP9 on Bioenergy, Biodiversity and Land-Use

Group 2: Recommendations to CBD-COP9 on Bioenergy and Agrobiodiversity

12.30 Lunch

14.00 **Parallel Working Groups** (cont.)

15.30 Coffee / Tea break

16.00 **Plenary: WG Results and finalisation of recommendations to CBD-COP 9**

18.00 Next steps

18.30 Closure of the meeting

18.30 Dinner

Farewell party with traditional drinks, food, music or dances

<u>Saturday, March 15, 2008</u>

Departures of the ferry at 7.30, 9.30, 11.30 h

07.30 – 9.00 h Breakfast

9.00 – 10.30 **(optional) Guided tour in the nature reserve of the Isle of Vilm**

Issue Paper for the Expert Meeting

Öko-Institut e.V.
Institut für angewandte Ökologie
Institute for Applied Ecology

Expert meeting on biodiversity standards and strategies for sustainable cultivation of biomass for non-food purposes

Biodiversity and Land Use

– Issue Paper –

Darmstadt, 10.03.2008

prepared for BfN

Authors:

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Content

5 Introduction

The use of biomass for energy, and especially for the conversion into liquid biofuels, is rising world-wide, and ambitious target have been set for the future. Both the EU and the USA aim to significantly increase the use of biofuels in the transport sector. Biofuel blending targets have been set also by developing countries (e.g., Argentina, China, India, Indonesia, South Africa) in the range of 2.5-10% by 2010-2015.

This will require growing bioenergy production which bears the risk of unsustainable use of natural resources (CBD 2007 + 2008, SRU 2007, WBA 2008, Royal Society 2008), i.e. trade-offs may occur between achieving biofuel targets and the protection of biodiversity.

Several studies, e.g. for the EU, tried to identify sustainable biomass supply (EEA 2006 + 2007), using a risk mitigation strategy to minimize potential threads for biodiversity from bioenergy development.

Growing global demands for bioenergy (WWI 2007) will favour more international trade in bioenergy and biofuels (IEA 2008), and biofuel investments in emerging and developing countries.

In that regard, both national and international guidelines, criteria, and standards for the sustainable development of bioenergy must be actively researched, discussed, and implemented.

Besides net reductions in greenhouse-gas emissions from biofuels, food security and income generation, the **conservation of biodiversity** is a key concern of sustainable bioenergy development (UN Energy 2007).

The objective of this paper is to develop a framework which combines sustainable bioenergy production with biodiversity requirements.

It is meant to stipulate discussion at the international expert meeting, and should provide a base for further considerations with respect to the CBD COP9 in May 2008.

6 Risk Mitigation Strategies to Protect Biodiversity

To mitigate negative effects of biomass production for biofuels on biodiversity, three key issues must be considered:

- Protection of natural habitats (Protected Areas and Areas of High Natural Conservation Value, HNCV)
- Areas for preferential biomass production (degraded land and abandoned farmland)
- Sustainable cultivation of biomass

These issues are addressed within Section 6.1.1 – 6.4. The principal spatial relation and overlap of the related land categories are illustrated in Figure 6-1.

In addition to the three core land-use restrictions for sustainable bioenergy, it should be noted that the use of residuals and wastes is also beneficial **if** recovery rates for e.g. straw, wood residues etc. are acknowledged to protect soils, and local biodiversity (see Section 6.4).

6.1 Protection of Natural Habitats

6.1.1 Protected Areas

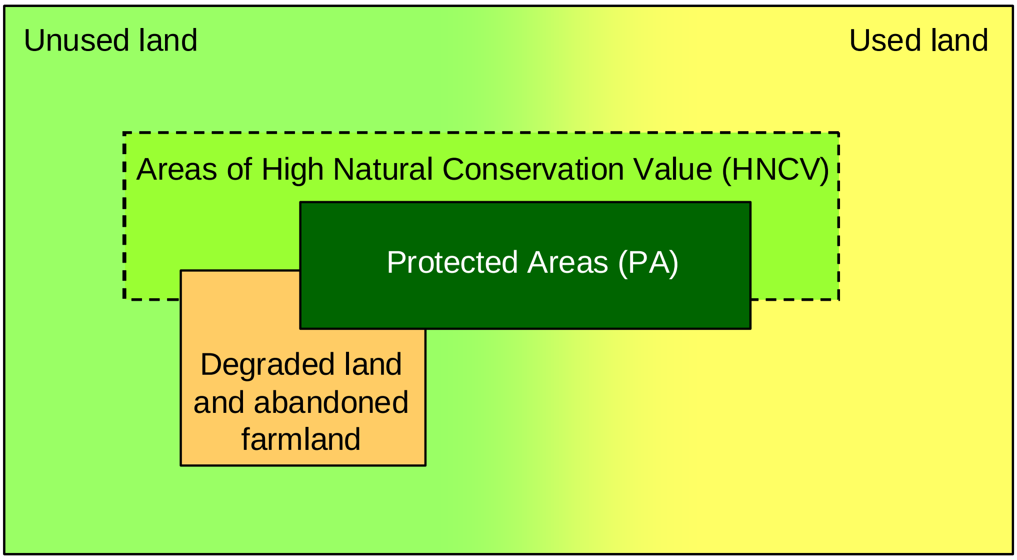
Biodiversity is directly linked to properties and quality of habitats (Strand 2007). The ongoing deforestation in the tropics is a prominent example of the loss of biodiversity-rich habitats (FAO 2006, Wassenaar 2007). Other prominent factors causing the decline of biodiversity are habitat fragmentation and isolation, land-use intensification and overexploitation, species invasions, and adverse climate change impacts[1].

Protection Areas (PA) are cornerstones of regional conservation strategies. They are dedicated to the protection of biodiversity, agrobiodiversity, and natural and associated cultural resources. PA are defined through their legal status (level of protection), and their preservation requires adequate land management, and enforcement of land-use restrictions. These areas should sample or represent the biodiversity of each region, and they should separate this biodiversity from processes threatening its persistence (Margules/Pressey 2000).

The latter necessity should be strongly emphasised in strategies to mitigate biodiversity risks of biomass production. This could effectively be achieved by prohibiting any biomass production (cultivation or unsustainable harvesting, or collection, respectively) in PA, unless the planned biomass extraction is in line with the PA's protection objectives.

1 See e.g., Groom et al. (2006), and Lindenmayer//Fischer (2006).

Figure 6-1 Illustration of the spatial relation between the area types Protected Areas (PA), Areas of High Nature Conservation Value, as well as degraded land and abandoned farmland within the continuum of used and unused land



Source: Öko-Institut

6.1.2 Areas of High Natural Conservation Value

Existing PA throughout the world contain only a (biased) **sample** of biodiversity, usually that of remote places and other areas unsuitable for commercial activities (Margules/Pressey 2000). Thus, they do not – as yet – come near to fulfilling global biodiversity commitments, nor the needs of species and ecosystems, given that a large number of these species, ecosystems and ecological processes are not adequately protected by the current PA network (Dudley/Parish 2006).

In this regard, gap analysis[2] is a method to identify biodiversity (i.e., species, ecosystems and ecological processes) not adequately conserved within a PA network or through other long-term conservation measures (Scott et al. 2001).

For example, CBD activities within the Programme of Work on Protected Areas (PoWPA) contribute to improve the situation[3].

Today, gap analysis is still an ongoing effort (Dudley/Parish 2006, Langhammer et al. 2007) and many areas that would need protection to assure e.g. the 2010 biodiversity target have not (jet) received PA status. To address these areas, the term Areas of High Natural Conservation Value (HNCV) is often used.[4]

HNCV areas are characterised by a significant conservation value due to their high amount of natural recourses (biodiversity, ecosystem functions, etc.).

In a biodiversity risk mitigation strategy for bioenergy, HNCV should receive the same strict protection status as PA in order to withstand additional land-use pressure occurring from biomass production.

For example, Europe's High Nature Value Farmlands are the most biodiversity-rich areas within agricultural landscapes. Such systems have long been threatened by two different trends: intensification and abandonment.

While intensification is clearly to be expected from high-input bioenergy cropping, careful design of "environmentally compatible" bioenergy production systems could help to conserve HNCV farmlands.

Outside of PA, this depends mainly on the application of instruments of Europe's Common Agricultural Policy (CAP), but various additional policy measures would be needed to avoid biodiversity decline on this farmland (EEA 2004-2007).

To protect HNCV areas, their classification and spatial identification is needed, and considerations of adequate buffer zones.

6.2 Cultivation Practice for Biomass Production

Today, it is widely accepted that the implementation of conservation goals for the protection of biodiversity requires systematic planning strategies for managing landscapes, including areas allocated to both production and protection (Margules/Pressey 2000, Benedict/McMahon 2006, Groom et al. 2006).

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2 According to Dudley/Parish (2006), gap analysis requires the following six steps: (1) Identify focal biodiversity and set key targets, (2) evaluate and map the occurrence and status of critical biodiversity, (3) analyse and map the occurrence and status of protected areas, (4) use the information to identify gaps, (5) prioritise gaps to be filled and (6) agree on a strategy and take action.

3 See as example the Eastern Europe Regional Workshop "Strengthening the Capacity of Governments to Implement Priority Activities of the CBD PoWPA", Isle of Vilm, 17-21 June 2007 (Gawler 2007).

4 See, e.g., definitions of High Nature Value Farmland (EEA 2005) as well as High Conservation Value Forests (HCVF, FSC 2000) in the Glossary.

The CBD recognises the limitations of PA as the sole tools for conservation, and promotes a parallel Ecosystem Approach[5] which seeks to mainstream biodiversity conservation into broader land- and seascape management (Smith/Maltby 2003, Dudley/Parish 2006).

Cultivation practices which respect biodiversity and agrobiodiversity require broad varieties of plants, adequate rotation schemes, low-erosion land-use (e.g. no-till systems), and minimal agrochemical application. Furthermore, the inclusion of specific landscape elements (e.g., stepping stones, corridors, buffer zones etc.) in the cultivation area must be considered.

In the European Union, the principles of “good agricultural practice” and rules of **Cross Compliance** (CC) are established, but mainly refer to traditional agricultural production. No specific adaptation of this land-use management regulation to bioenergy production is – yet – available. Furthermore, the monitoring and verification of compliance of EU Member States with CC requirements is a crucial issue.

Approaches for environmentally “compatible” biomass production systems in the EU which include biodiversity concerns have been suggested (EEA 2006+2007), but are still far from implementation.

6.3 Cultivation on degraded land and abandoned farmland

The cultivation of biomass on degraded land or abandoned farmland offers has been suggested as a safeguard against negative **indirect** land-use change effects from bioenergy development (Searchinger 2008; WWF 2006): As no displacement of previous cultivation occurs, no greenhouse-gas (GHG) leakage can occur.

In that regard, the use of these for bioenergy production could offer opportunities to reduce net GHG emissions. However, from a biodiversity point of view, at least **some** of these areas might be of high biodiversity which may be sensitive to cultivation, while others may not.

Therefore, to avoid trade-offs between, e.g., mitigation of GHG and loss of biodiversity, a risk mitigation strategy must include classification and spatial identification of biodiversity-relevant areas also for degraded land, and abandoned farmland.

---

5 The Ecosystem Approach is a strategy for the integrated management of land, water and living resources that advances conservation and sustainable use in an equitable way, including ecological, socioeconomic, cultural, and political issues (see overview in Smith/Maltby 2003, Groom et al. 2006, and Hartje/Klaphake 2006). Information on the principles of the Ecosystem Approach is available at: http://www.cbd.int/ecosystem/description.shtml and http://www.cbd.int/ecosystem/principles.shtml

6.4 Residues and Wastes

Biomass residues (e.g., manure, forest thinnings, rice husks, straw) and wastes (e.g., organic fractions in residential and industrial wastes) are another option for bioenergy feedstocks which have nearly no potential of leakage, and which could present opportunities of positive impacts, e.g., avoided nitrogen leaching, or reduced fire risks.

The change of natural decay chains in e.g., forests by extracting previously unused organic material such as thinnings could cause negative impacts for local biodiversity, and – in extreme cases – negatively affect soil quality, enhance erosion, and deplete nutrient levels.

Therefore, adequate management rules to safeguard against such negative potentials are needed, and have been suggested in various cases (e.g., EEA 2006 + 2007).

A special situation with win-win opportunities for bioenergy **and** biodiversity can be seen in the use of “surplus” organic material from land management activities in nature protection areas. In principle, the energy use of such material could become beneficial in terms of additional economic revenue which in turn could financially support continued operation of land management (see e.g., OEKO 2007).

Given the high costs of human labour in industrialized countries, the frequency and extensity of organic residue removal, the collection costs of low-density materials, and their restrictions in storability and applicability in conversion systems, however, lead to comparatively poor economics, so that respective revenues appear to be small in magnitude.

7 Suggested Framework

A risk mitigation strategy to ensure biodiversity-conscious bioenergy development needs a framework that requires three key activities:

1. **collecting** available data to characterise areas relevant for the protection of biodiversity, as well as information on environmentally “compatible” practices for biomass production, and
2. **identifying** PA and HNCV areas where biodiversity of high value occurs, and
3. **prioritizing** bioenergy cultivation systems (including landscape structure) with low negative impacts in biodiversity.

Figure 7-1 gives an overview on a framework which is currently under development (FAO 2008). Global data relevant for PA, HNCV, degraded land, abandoned farmland as well as cultivated areas should be stored in a comprehensive geographical information system (GIS), and the GIS data should offer the possibility to include further local data as well as to combine this information with requirements and impacts of cultivation practices.

The identification process for PA and HNCV, as well as for sustainable cultivation practices, can then be carried out by screening the data collection with (internationally accepted) criteria and indicators.

In the following sub-sections, an overview on available GIS data is given (Section 7.1), and requirements for the identification process are presented (Section 7.2).

7.1 Available Spatial and Georeferential Data

7.1.1 Country’s frontiers and Ecoregions

Due to the complex distribution of the Earth’s natural resources, both the specification of land-use practices as well as the development of strategies for conservation purposes require to distinguished land- and seascapes with a meaningful biogeographic and/or ecological resolution.

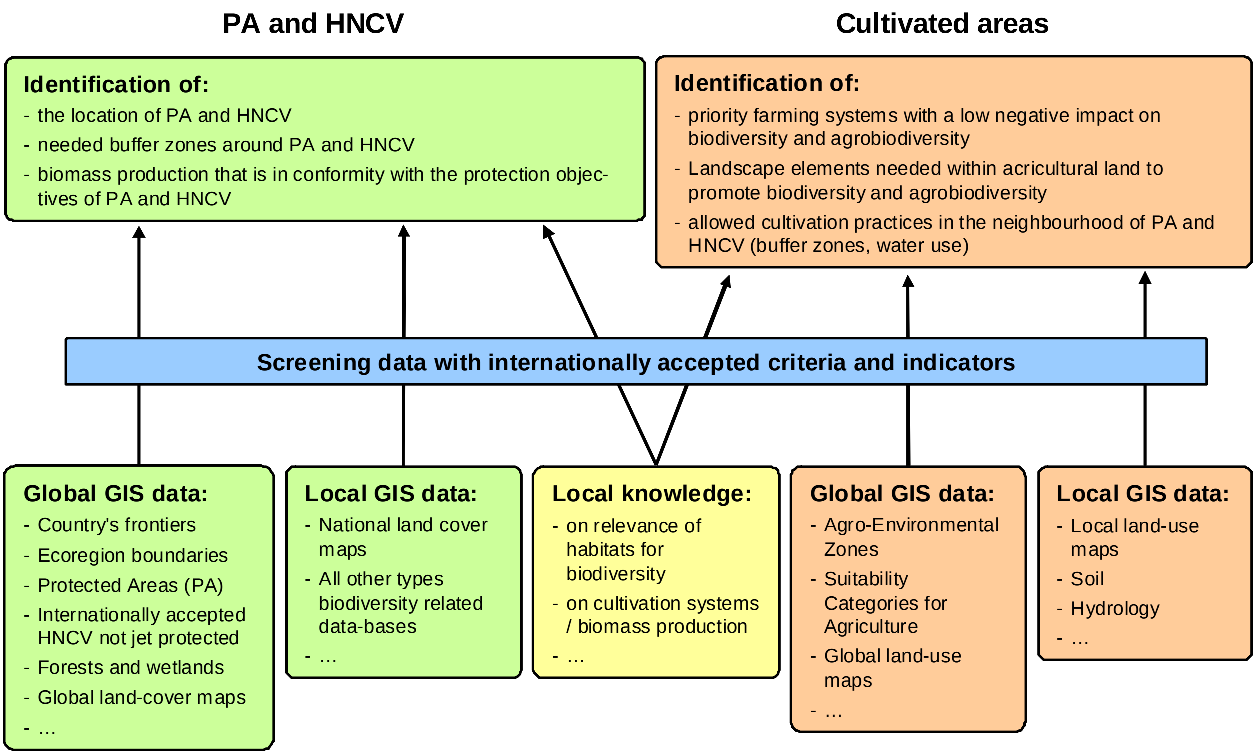
From the view point of biodiversity the **Ecoregion** approach (Olson et al. 2001, Olson/Dinerstein 2002) seems to be most adequate for down-scaling. For this approach, 867 distinct spatial units have been delineated through the combination of existing global ecoregion maps, global and regional maps of the distribution of selected groups of plants and animals, and vegetation types, and through consultation with regional experts.

Ecoregions reflect the distributions of a broad range of fauna and flora across the entire planet and they are classified within the familiar system of biogeographic realms and biomes. For several regions, detailed assessments of biodiversity as well as its thread has been carried out[6]

Implementation, however, is often restricted to political units represented by nations (or groups of nations). Therefore, we suppose to stratify the surface of each nation according to Ecoregions, and to carry out further differentiation on a **national scale** within each Ecoregion.

It should be kept in mind, though, that country territories do not necessarily coincide with the natural distribution of species and communities[7]. Thus, conservation of biodiversity will require cross-border planning.

Figure 7-1 Framework to identify the location of PA and HNCV as well as cultivation practices that are in line with the protection of biodiversity



Source: Öko-Institut

6 For example, North America: Ricketts et al. (1999); Mid- and South America: Dinerstein et al. (1995); Africa and Madagascar: Burgess et al. (2004); Asia: Wikramanayake et al. (2002). In addition, assessment of biodiversity within the Millennium Ecosystem Assessment used Ecoregions for regionalisation (Mace et al. 2005). WWF implemented a database for each Ecoregion regardinf (1) location and general description, (2) biodiversity features, (3) current status, (4) threats as well as (5) ecoregion justification (www.worldwildlife.org/science/ecoregions/biomes.cfm).

7 For example, large mammals in Africa, - see Burgess et al. (2004)

7.1.2 Protected Areas

An approximate 12% of the global land surface is currently protected in one or the other legal or customary arrangement designed to ensure the conservation of important ecosystem benefits (Dudley/Parish 2006).

The location of PA regulated under a range of legal and customary arrangements is in most cases well-known. The World Database on Protected Areas (WDPA)[8] based on the UN List of Protected Areas offers the globally most comprehensive GIS based platform which can be directly integrated into the suggested required geographical database (Strand et al. 2007).

However, Chape et al. (2003) refer to information gaps and limitations related to the UN List of Protected Areas from 2003. For instance, information on size is missing for 23 %, geographic coordinates are not complete for 20 %, and information on geographical borders is not complete for 73 % of the sites. Though this situation will have improved since 2003, the need to feed in complete data sets in the WDPA by countries on their PA that are consistent with the nomenclature in “The IUCN Protected Area Management Category System” (Dudley/ Phillips 2006)[9] is to be emphasised.

7.1.3 Internationally accepted HNVC, Forests and Wetlands

The identification of **HNCV** is more challenging, as no internationally accepted definition of the term HNCV exists[10]. It appears necessary to raise the significance of the term HNCV on the national scale in combination with addressing clear conservation targets and indicators[11] (e.g. Bubb et al. 2005). Concerning biodiversity, existing global databases on areas that are important for their conservation value may be useful to identify HNCV.[12]

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8 IUCN Protected Area Management Category System; http://www.unep-wcmc.org/wdpa/index.htm

9 The IUCN Protected Area Management Categories: http://www.iucn.org/themes/wcpa/wpc2003/pdfs/outputs/pascat/pascatrev_info3.pdf

10 see Oppermann et al. 2007

11 According to Bubb et al. (2005) indicators can be described as measures or metrics based on verifiable data that conveyed information about more than just themselves. Fundamental aspects of indicators are, that (1) they are only of any use if they address questions to which someone wants to know the answer, and (2) that they are only feasible if the data to generate them can be obtained.

12 Examples are databases on biodiversity-rich areas (e.g. Biodiversity Hotspots, Important Bird Areas = IBA, Important Plant Areas = IPA), data on biodiversity-rich habitat types such as specific forest types (e.g. Global Forest Resources Assessment, FRA 2000 and FRA 2005) and wetlands (e.g. Global Lakes and Wetlands Database GLWD) as well as data on areas of undisturbed wildlife (e.g. Biodiversity Wilderness Areas). A detailed list on online-data sources for identifying and delineating biodiversity relevant areas is given in Langhammer et al. (2007). See also the overviews in Kent et al. (2003), Redford et al. (2003), and Schmitt et al. (2007)

New biodiversity hotspot analyses carried out from Conservation International define 35 hotspots which should become conservation areas with priority. Based on the idea to protect HNCV several similar approaches have been proposed[13].

According to Langhammer et al. (2007) Alliance for Zero Extinction[14], Important Bird Areas[15] as well as Important Plant Areas[16] are the most useful site-scale datasets. Some of these data bases are already included in international biodiversity targets (e.g., the list of Important Plant Areas is addressed in the Global Strategy for Plant Conservation – CBD COP VI, decision VI/9).

Especially **forests** and **wetlands** often carry natural or near-nature ecosystems, and their importance for the protection of biodiversity is well known. Strand et al. (2007) give a comprehensive overview on the performance of remote sensing data with a focus on forests[17]. The protection of wetlands is already addressed within the Ramsar Wetland Convention. The currently most comprehensive database of wetlands on a global level is provided by Lehner/Döll (2004)[18], but also land-cover databases represent – to some extend – wetlands (e.g., GLC 2000).

In addition to the protection of biodiversity hotspots, Conservation International proposed the protection of Biodiversity Wilderness Areas (Mittermeier et al. 1998), areas of currently low human impact but harbouring lower biodiversity than hotspots.

However, these areas complete but not replace biodiversity hotspot protection within international conservation strategies (Mittermeier et al. 2003). Also, remote sensing may support the identification of further areas of undisturbed wildlife.[19]

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13 . A detailed list on online-data sources for identifying and delineating biodiversity relevant areas is given in Langhammer et al. (2007).

14 In 2005, a cooperation of large international organisations (such as WWF, Birdlife International, Conservation International and IUCN) formed an Alliance for Zero Extinction which identified 595 areas that worldwide harbour remaining populations of nearly 800 highly endangered species (Ricketts et al. 2005). Alliance for Zero Extinction (AZE) sites: www.zeroextinction.org/

15 Important Bird Areas www.birdlife.net/datazone/sites/index.html

16 Important Plant Areas: www.plantlife.org.uk/html/important_plant_areas/important_plant_areas_index.htm.

17 For example, The Global Land Cover 2000 (GLC2000, see Bartholomé/ Belward 2005): http://www-gvm.jrc.it/glc2000/interactive/glc2000_vgt_1280x1024.html); Global Forest Resources Assessment (FRA 2000 and FRA 2005, see FAO 2006): http://www.fao.org/forestry/en/ and http://www.fao.org/forestry/site/fra/en/; as well as local data sets.

18 Global Lakes and Wetlands Database (GLWD): http://www.wwfus.org/science/data.cfm

19 Global Cultivation Intensity Map (GCIM) from the NASA: http://data.giss.nasa.gov/landuse/cultint.html

7.1.4 Global and National Land Cover Maps

Land-cover maps of high quality are a fundamental requirement for many purposes. With regard to the identification of biodiversity-relevant areas, land-cover data are crucial, as biodiversity is directly link to habitats and their quality is reflected in land-cover classes.

Land-cover maps – combined on a regional, national or even sub-national scale within ecological meaningful units (e.g., Ecoregions) as well as existing data, knowledge of local stakeholders and, if necessary, collecting new data in the field – are the base for the identification of HNCV areas which are not yet covered in the above mentioned databases.

Overviews on different approaches and systems to classify land-cover and land-use change by remote sensing are given in Strand et al. (2007), Kniivila (2004) and NRC (2002). Most global approaches use data available with a high temporal resolution of e.g., 1 day, but low spatial resolution of e.g., 1 km². Examples are Global Land Cover-2000 (SPOT Vegetation), MODIS Land Cover as well as the Human Influence Index (HII).

For the Global Land Cover 2000 (GLC2000) data-set, an update with a spatial resolution of 300 m per grid cell based on data from 2007 will become available in March 2008 from FAO[20]. For many regions in the world, local land-cover maps are available with even a higher spatial resolution (e.g., FAO data for selected countries).

Data with less spatial resolution may be useful for a global screening, but for the identification of HNCV and for the monitoring of land-cover changes on a local scale, reliable results can only be obtained with high resolution data sets, i.e. with grid cells in the order of 100 m or less.

Independently from the choice of data – and especially with respect of the generation of new data – it is necessary to select a classification scheme that has world-wide applicability and that can be further specified to capture local requirements. The hierarchical Land Cover Classification System (LCCS)[21] is a suitable example.

7.1.5 Cultivation Areas

Relevant global GIS database to identify the spatial distribution of cultivation practices could be found in Agro-Environmental Zones[22], Suitability Categories for

20 John Latham, FAO, personal communication, Jan. 18, 2008

21 Land Cover Classification System (LCCS): http://www.fao.org/DOCREP/003/X0596E/X0596E00.htm

22 Agro-Environmental Zones (e.g., FAO 2005): http://www.fao.org/ag/agl/agll/prtaez.stm and http://www.geo.ucl.ac.be/LUCC/lucc.html

Agriculture[23], as well as land-use maps[24]. Unfortunately, in most regions of the world, data on land-use are only available with low resolution insufficient for local applications.

7.2 Identification Process

The first and urgent step of the identification process within the proposed framework is to **specify definitions** (e.g., HNCV) and to agree on respective criteria, and indicators to indentify HNCV as well as "compatible" farming systems (including landscape elements). Definitions, criteria and indicators must be applicable globally, and should follow a hierarchical system.

Criteria and indicators would then be used to screen the (mainly) GIS-based data described in Section 7.1. Scientific evidence can and should support the decision-making process of identifying e.g. HNCV areas, but each decision will at least partially be subjective and politically motivated (e.g. width of buffer zones, see Box 1). In addition, the results from the identification process will strongly be limited by the resolution and quality of the available data, as well knowledge on, e.g., effects of cultivation practices.

As a result of the identification process, spatial restrictions[25] (where biomass production should be excluded), areas in which residual use might be suitable, and areas of potential but conditionalized biomass production will be known, so that the remaining areas with a potential for biomass cultivation in a given region or country are known as well[26].

In cases where no reliable land-use policy exists to adequately address the protection of biodiversity and agrobiodiversity, areas should be identified which could be used for biomass production without major direct risks of endangering biodiversity (e.g., degraded areas).

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[23] FAO and IIASA (unpublished data). According to Mirella Salvatore (FAO) the report including these data will be available end of February 2008 (see also van Velthuizen et al. 2007).

[24] For example, FAO data: Agro-MAPS (http://www.fao.org/landandwater/agll/agromaps/interactive/page.jspx); Data and Information center of LADA: (http://lada.virtualcentre.org/pagedisplay/search.asp?section=tsearch)

[25] loosely termed "no go" areas

[26] Note that remote sensing could also be used to monitor the areas, and – hence - check compliance of biomass growers with respect to PA and HNCV areas. Note also that indirect land-use change due to displacement effects will not be "captured" within the framework logic unless its coverage is extended to all relevant land-uses.

Box 1: The Need of Buffer Zones Surrounding PA and HNCV Areas

The occurrence of negative impacts from surrounding areas such as cropland on PA and HNCV areas is well known. In consequence, in several protection concepts buffer zones are considered surrounding the area that should be protected. However, the depth of edge influence – or so-called edge effects – can strongly differ between habitats, their surrounding, edge structures, etc.

For forests – the most frequent study object for edge effects during the last decades – most edge effects vary between 20-60m (Baker/Dillon 2000, Laurenace et al. 2002, Ries et al. 2004). But also edge effects that enter several kilometres into forests are described such as fire (Cochrane/Laurance 2002). Therefore, it is strongly recommended to decide for each type of protected area or HNCV within a geographic unit – such as an Ecoregion - how wide a buffer zone should be, and which activity could be allowed within a buffer zone.

However, defining a reasonable width of buffer zones is not simple, and should be carried out on a national or sub-national level involving knowledge from local stakeholders. If a width of a buffer zone is agreed upon, it is rather straight forward to calculate its geographical location with GIS tools.

7.3 Prioritizing bioenergy cultivation systems

The principal approach developed by EEA for Europe to derive a “risk matrix” for bioenergy cultivation systems which is spatially disaggregated needs further refinement and extension with respect to

- compatibility with globally available biophysical characterization systems, such as Agro-Environmental Zones;
- data compilation and analyses of environmental risk indicators for further cultivation systems, especially for tropical and semi-arid areas (e.g., cassava, jatropha, palm oil sugarcane); and
- inclusion of socio-economic factors (e.g., impacts on livelihoods, infrastructure requirements, food security links).

The applicability of this approach should be tested, and its function within a system of legal instruments to regulate and stipulate sustainable bioenergy development must be explored.

Last but not least, the approach might well be extended to cover environmentally “compatible” levels and practices of organic residue extraction and use.

8 Current Activities to Implement Biodiversity Safeguards into Sustainable Bioenergy Policies

Several countries are in the process to establish or have already started to implement legally binding sustainability standards for biofuel production, while other countries and bodies engage in voluntary schemes for ensuring sustainability of bioenergy development.

For example, Germany's Biofuel Sustainability Ordinance (BSO), and the recent EU Commission proposals for a Renewable Energy Sources (RES) Directive, and for a Fuel Quality (FQ) Directive, as well as proposals made in the Netherlands, and the United Kingdom, all include not only GHG reduction targets or reporting obligations for biofuel providers, but also (some) **biodiversity standards** for biofuel production. Those cover, e.g., the protection of high-nature value conservation habitats, forests, and wetlands, and requirements for cultivation practices to maintain agrobiodiversity, and soil quality.

In parallel to the development of governmental policies, civil society and research organizations as well as the private sector engage in the establishment of principles, codes, certification schemes, and related activities aimed to create a base for sustainable bioenergy development, including biodiversity[27].

In those (draft) policies, the importance of land-use change related GHG emissions is acknowledged in accounting rules for "sustainable" biofuels. The German BSO, and the EU RES and FQ Directive proposals, as well as the other activities mentioned above **all** consider carbon releases from direct land-use change.

This discussion is of importance for biodiversity also, as areas with carbon-rich vegetation, or carbon-rich soils are key areas for HNCV. Thus, comprehensive GHG reduction rules in bioenergy certification schemes can **implicitly** address biodiversity concerns.

However, it should be noted that certification of biofuels cannot be the **only** vehicle to translate effective sustainability standards into practice. If certification schemes for biomass are restricted to biofuel production, displacement effects can still occur, even if full compliance with standards is achieved in the certification scheme. Therefore, additional policies are needed to safeguard against negative environmental and socio-economic impacts. Discussions on extending certification schemes reflect this, and proposals were made to "hedge" the risks of indirect land-use change (Fehrenbach/Fritsche/Giegrich 2008).

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[27] Examples of these activities are the Round Table on Sustainable Biofuels (RSB), guidelines for bioenergy development form IEA, UNEP, and UN Energy, as well as voluntary certification initiatives such as the Round Table on Sustainable Palm Oil (RSPO), and the Forest Stewardship Council (FSC).

9 Perspectives for Further Work

With respect to the CBD and its subsidiary bodies, the policy initiatives mentioned before should be considered as **opportunities** for implementing core principles of biodiversity conservation, and respective interaction with the various actors should be envisioned.

Based on the framework presented in this paper, and the CBD Executive Secretariat Note on Biofuels prepared for the CBD-COP9 (CBD 2008), further considerations are required on a potential programme of work to define HNCV areas, and their respective indicators.

As regards classification and inventories of spatial data, as well as to access conditions for GIS databases, mechanisms need to be drafted which allow timely and regionally comprehensive coverage, and refresh cycles.

The prioritization of environmentally “compatible” bioenergy production systems needs agreement on biodiversity-relevant indicators for farming systems, and respective organic residue extraction and use schemes, both with spatial disaggregation.

As no comprehensive implementation of a “complete” framework seems possible in the near-term, pilot applications should be considered to identify to what extend the approach might work in practice, and which institutional arrangements are required.

In that regard, special attention should be given to pilot applications of GIS-supported mapping and screening on the country-level, and the potential of remote sensing (via satellites) for monitoring schemes should be evaluated.

For both, further collaboration with (pilot) certification and private sector activities might be needed.

In parallel to these practical steps, international organizations (e.g., FAO, UNEP), bi- and multilateral financial institutions, governments, civil and private sector bodies as well as research organizations need to collaborate in agreeing on and establishing a core set of sustainability principles relevant for bioenergy.

Besides food security concerns and net greenhouse-gas reductions, the conservation of biological diversity should receive adequate attention, and the potential benefits of sustainable bioenergy development for biodiversity should be underlined.

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Glossary

Abandoned farmland refers to unused areas within a cultural landscape where former agricultural activities have been given up (Schäfer 1992).

Agriculture comprises every systematic cultivation form of soil by crop crowing or creating of grassland for animal production (Schäfer 1992).

Agricultural biodiversity, sometimes called '**agrobiodiversity**', encompasses the variety and variability of animals, plants and micro-organisms which are necessary to sustain key functions of the agro-ecosystem, its structure and processes for, and in support of, food production and food security (FAO/CBD, Workshop 1998[28]). The term agro-biodiversity encompasses within-species, species and ecosystem diversity.[29]

Areas of high nature conservation value (HNCV) are not jet clearly defined. A definition should comprise but not exclusively high nature value farmland and high conservation value forests (see definitions below). The definition given within the BSO can be seen as a promising attempt to find a comprehensive definition (see Box 1).

Biological diversity (=biodiversity) means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems (CBD, article 2).[30]

Cultivated and Managed Terrestrial Areas refers to areas where the natural vegetation has been removed or modified and replaced by other types of vegetative cover of anthropogenic origin. This vegetation is artificial and requires human activities to maintain it in the long term. All vegetation that is planted or cultivated with an intent to harvest is included (e.g., wheat fields, orchards, rubber and teak plantations).[31]

Degraded land comprises former suitable (used) land that has been turned in unsuitable land by a degradation process that is not any more used for agriculture and other (land associated) human activities (Oldemann et al. 1991). Degraded land still has the potential to be restored by adequate measures.

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28 See http://iufro-archive.boku.ac.at/silvavoc/glossary/2_1en.html and further definitions on this web-site.

29 EEA Glossary: http://glossary.eea.europa.eu/EEAGlossary/A/agrobiodiversity

30 http://www.cbd.int/convention/articles.shtml?a=cbd-02

31 http://www.fao.org/DOCREP/003/X0596E/x0596e01f.htm#p381_40252

Ecoregions are relative large units of land containing a distinct assemblage of natural communities and species, with boundaries that approximate the original extent of natural communities prior to major land-use change.

Ecosystem means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.[32]

Fallow within the agricultural sector describe the interruption cultivation for one or several vegetation periods to achieve a refreshment/improvement of soil fertility (Schäfer 1992, see also abandoned farmland and shifting cultivation).

Forestry is the art, science, and practice of studying and managing forests and plantations, and related natural resources. Modern forestry generally concerns itself with: assisting forests to provide timber as raw material for wood products; wildlife habitat; natural water quality regulation; recreation; landscape and community protection; employment; aesthetically appealing landscapes; biodiversity management; watershed management; and a 'sink' for atmospheric carbon dioxide.[33]

Grassland refers to vegetation types characterised by a dominant and continuous grass layer and no or a low cover of trees and shrubs. Grassland comprises steppes, some savanna types, arid grassland as well as meadow and pasture (Schäfer 1992).

High nature value farmland comprises the core areas of biological diversity in agricultural landscapes. They are often characterised by extensive farming practices, associated with a high species and habitat diversity or the presence of species of conservation concern (EEA 2005).

High Conservation Value Forests (HCVF) are those that possess one or more of the following attributes: (1) Forest areas containing globally, regionally or nationally significant concentrations of biodiversity values (e.g. endemism, endangered species, refugia). (2) Forest areas containing globally, regionally or nationally significant large landscape level forests, contained within, or containing the management unit, where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance. (3) Forest areas that are in or contain rare, threatened or endangered ecosystems. (4) Forest areas that provide basic services of nature in critical situations (e.g. watershed protection, erosion control). (5) Forest areas fundamental to meeting basic needs of local communities (e.g.subsistence, health). (6) Forest areas critical to local communities' traditional cultural identity (areas of cultural, ecological, economic or religious significance identified in cooperation with such local communities) (FSC 2000).

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32 Article 2 of the Convention on Biological Diversity , see http://www.cbd.int/ecosystem/description.shtml

33 http://en.wikipedia.org/wiki/Forestry

Land use is series operation on land, carried out by humans, with the intention to obtain products and/or benefits through using land resources (de Bie 2002).

Marginal land is defined as an area where a cost-effective production is not possible, under given side conditions (e.g. soil productivity), cultivation techniques, agriculture policies as well as macro economic and legal conditions (Schroers 2006).

Natural vegetation is defined as areas where the vegetative cover is in balance with the abiotic and biotic forces of its biotope.[34]

Protected areas are defined by the IUCN as "an area of land and/or sea especially dedicated to the protection and maintenance of biodiversity, and of natural and associated cultural resources, and managed through legal or other effective means". This definition is similar to the one adopted by the Convention on Biological Diversity (CBD), which defines a protected area as "a geographically defined area that is designated or regulated and managed to achieve specific conservation objectives" (Dudley and Phillips 2006).

Shifting cultivation is an agricultural system in which plots of land are cultivated temporarily, and then abandoned. This system often involves clearing of a piece of land followed by several years of wood harvesting or farming until the soil loses fertility. Once the land becomes inadequate for crop production, it is left to be reclaimed by natural vegetation, or sometimes converted to a different long term cyclical farming practice.[35]

Semi-natural vegetation is defined as vegetation not planted by humans but influenced by human actions. It includes vegetation due to human influences but which has recovered to such an extent that species composition and environmental and ecological processes are indistinguishable from, or in a process of achieving, its undisturbed state. These may result from grazing; possibly overgrazing the natural phytocenoses, or else from practices such as selective logging in a natural forest whereby the floristic composition has been changed. Other examples are previously cultivated areas which have been abandoned and where vegetation is regenerating as well as secondary vegetation developing during the fallow period of shifting cultivation.[36]

Sustainable use means 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

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[34] http://www.fao.org/DOCREP/003/X0596E/x0596e01f.htm#p381_40252

[35] http://en.wikipedia.org/wiki/Shifting_cultivation

[36] http://www.fao.org/DOCREP/003/X0596E/x0596e01f.htm#p381_40252

maintaining its potential to meet the needs and aspirations of present and future generations (CBD, article 2).[37].

Used land and unused land refer more to a gradual change from intensely used land towards land that is not influenced by any land-use form. Agriculture and forestry (see definition above) as well as infrastructure can clearly be considered as **used land** to meet humans needs (food, fodder, fibre, and infrastructure), whereas for extensive land-use forms (e.g. collection of medicinal plants or sporadic hunting) it is difficult to decide up to which use-intensity land is still considered as unused land. The terms unused land and **idle land** can be used synonymously. **Unused land** comprises abandoned farmland, degraded, devastated and waste land as well as areas of undisturbed wildlife.

Waste land is characterised by natural physical and biological conditions that are per see unfavourable for (land associated) human activities (Oldemann et al. 1991).

37 http://www.cbd.int/convention/articles.shtml?a=cbd-02

Abbreviations

AZE	Alliance for Zero Extinction
BioKraftQuG	German Biofuel Quota Law
BSO	Biofuels Sustainability Ordinance (Verordnung über Anforderungen an eine nachhaltige Erzeugung von Biomasse zur Verwendung als Biokraftstoff, BioNachV)
CAP	Common Agricultural Policy
CBD	Convention on Biological Diversity
CDM	Clean Development Mechanism
EEG	Renewable Energy Sources Act (Erneuerbare Energien-Gesetz)
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FRA	Global Forest Resources Assessment (FRA 2000 and FRA 2005)
FSC	Forest Stewardship Council
GIS	Geographical information system (with digital spatial database)
GLC 2000	The Global Land Cover 2000
HNVC	Area of High Nature Conservation Value
IUCN	International Union for the Conservation of Nature and Natural Resources
NGO	Non-governmental organization
OEKO	Öko-Institut (Institute for applied Ecology)
PA	Protected Area
PoWPA	Programme of Work on Protected Areas
UBA	German Federal Environment Agency (Umweltbundesamt)
WCMC	UN World Conservation Monitoring Centre

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Evaluation of Workshop Questionnaires

The following gives a summary of participants' responses to a questionnaire distributed during the expert meeting. The quantitative ranking of possible responses was as follows:

1: No 2: Poor 3: Average 4:Very good 5: Excellent

Where appropriate, the average of the quantitative ranking is given below.

1. Did the workshop fulfil your expectations?

- Yes (11x)
- it surpassed my expectations
- but it also leaves expectations for follow up that I hope we can fulfil

2. Which parts were the most important, relevant and why?

- Exchange w/ other participants (4x), → updating, new info activities, future collaboration; sharing the experience from different countries, improve the knowledge of this issue; personal discussion; contacts.
- The working groups (4x), detailed, interactive informative discussion, inputs
- Presentations (4x):
  - bioenergy→ Important to place CBD-related activities into this context.
  - Presentations on global, EU and German activities on biodiv
  - Presentations on activities in DCs → important to involve perspective from DCs
  - Background presentations on the first day were key to the success of the group work
  - Some presentations
- Roundtable discussion (3x) – ideas were shown
- Inputs from representatives of other countries

3. What was missing in terms of content or methods?

- More discussion, first day too many talks, little interactive
- Some more time to read the concerning material delivered to participants
- Some more international participants
- More insight on ground technical aspects
- More dynamic working group

- Nothing (2x)
- Sunshine or at least no rain during lunch break

4. What topics should have been given less importance or ignored?

- The political issues
- Excessively European focus
- The definition on bioenergy and biofuel
- Balance was good
- None (3x)

5. What is needed in the future to incorporate biodiversity concerns into biomass cultivation strategies and practices? How to move forward from here?

- Feed in concepts and experience of biodiversity strategies into ongoing initiatives and forums on biomass/bioenergy production
- Correlate the final resolutions and form a network to deal with biofuel development
- Further communication and follow up work in practice
- We need further discussion, public discussion. That means maybe more press / newspaper activity interview
- More public discussions, a few spectacular examples (bioenergy improving bird sanctuary in UK etc.)
- Environment service is an important issue that should have been included and discussed as real benefit to biodiversity
- Involve stakeholders, via outreach
- Standards

6. Participation: To what extent do you feel you had an adequate opportunity to contribute your own views? ∅ **4.4**

7. Were you satisfied with the facilitation? ∅ **4.3**

8. Were you satisfied with the daily time schedule? ∅ **4**

Comments:

- It is important to have breaks, but the very fix time schedule is sometimes difficult to integrate…
- Tight time schedule
- Heavy lunch. No espesso

9. Were you satisfied with the organisation of the seminar? ∅ **4.8**

10. Were you satisfied with the venue, its facilities, service and food? ∅ **4.4**

Comments:

- Plastic raincoats would be very useful
- Great
- Housed like chicken sheds on an empty field, very windy need tree cover. No shampoo, slow wireless network, all houses look the same! Difficult to find at night + rain (supply umbrellas to guests), otherwise nature of island is Great

11. Any other comments:

- Thank you very much for the invitation. Hope to see you!!! again!!!
- Thank you for a wonderful and beautiful support environment and pleasant work experience
- Judith deserves thanks for working very hard
- Fantastic workshop