04 July 2008

Workshop on Influencing Biofuels Research for
Positive Biodiversity Outcomes
The Hague, 7-8 July 2008

Background paper on existing biodiversity-related criteria for biofuels

Ecofys (ed.) 2008

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04 July 2008

1 Introduction

The development of international markets for biofuels – originally promoted as a sustainable alternative to fossil fuels for transport – is increasingly being challenged on actual greenhouse gas savings as well as potential direct and indirect environmental impacts of feedstock production and the associated social impacts.

On the one hand, biofuel feedstock developments may add to existing agricultural impacts, which are already a leading cause of biodiversity loss. On the other hand, if well planned and managed, biofuel markets may create positive incentives for landscape restoration, such as developing abandoned lands, reinstating ecosystem services – including the sequestering of carbon – and providing habitat for biodiversity.

As more advanced biofuels are being developed to address yield and resource issues, new feedstock's are being considered for the first time for which adequate assessments have not been carried out. Knowledge on the negative and positive impacts that biomass production can have on biodiversity is needed as background for an assessment of the sustainability of biofuels. To make sustainability assessment operational, criteria representing the full range of possible risks as well as opportunities of biomass production on biodiversity and associated social impacts is required.

In the framework of their co-operation IUCN and Shell agreed to scope out a full inventory of criteria that could be useful for assessing the risks and opportunities of potential feedstock options on biodiversity and shaping future research in biofuels. To develop such an inventory, a joint workshop is organised on 7-8 July, 2008 in The Hague (Netherlands) to build on the expert knowledge and expertise in IUCN and Shell. Ecofys, a consultancy with much experience in the energy and biofuels sector, will facilitate and moderate the workshop.

1.1 Objectives of the workshop

The objective of the workshop is to identify criteria to assess the full range of risks and opportunities of biofuels production on biodiversity and associated social impacts that are not yet covered by existing criteria. The expectation is that during the workshop knowledge gaps are identified and recommendations are formulated for future research with the view that a full inventory of criteria could guide researchers, NGOs, governments and business to make decisions on biofuel development that minimise risk and maximise opportunities of biofuel development for biodiversity.

1.2 Biodiversity

Biological diversity (biodiversity) comprises diversity of species and habitats as well as the genetic diversity within the individual species of fauna and flora. All three areas are closely interconnected and interact with each other. This network of biodiversity makes the Earth a unique, habitable place for human beings.

The UN Convention on Biological Diversity (CBD) defines biodiversity as: "biological diversity means the variability among living organisms from all sources… - terrestrial, marine and other aquatic ecosystems – this includes diversity within species, between species and of ecosystems".

Biodiversity is vital to the supply of services provided by ecosystems, such as food production, pollination, seed dispersal, carbon sequestration and pest control. The Millennium Ecosystem Assessment identified the main direct causes of current and future biodiversity loss as habitat change and overexploitation of natural resources, or indirectly causes, such as climate change, introduction of invasive species, and nutrient overloading. Biodiversity is not distributed equally across the Earth. Approximately 70% of all species can be found in the 17 so-called megadiversity countries – tropical and subtropical regions which are extremely rich in species diversity (Facts on Biodiversity, 2007).

1.3 Biofuels

The term "biofuel" generally refers to any fuel derived from biomass, such as alcohols, biogas, fuel wood, 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. For ethanol, the most common biomass sources are sugar cane, sugar beet, wheat and maize (or "corn") while rapeseed, soybean and palm oil are the major feedstock's used in the production of biodiesel. However 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. 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 feedstock's, for biofuel production. These materials would include grasses, woody plants and residues from the agriculture and forestry sectors (CBD, 2008). Algae are a potential future source for oils that can be processed to biodiesel.

Business perspective and trade

The trade in biofuels has been increasing in recent years 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. 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 (CBD, 2008)

Recent developments on biofuels

More than 50 countries worldwide 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 (CBD, 2008)

2 The potential impacts of biofuels on biodiversity

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 feedstock) can be used in the production of biofuels. The dominant factors determining the environmental impacts of biofuels are the types of lands used for producing biofuel feedstock (forestland, cropland, marginal or degraded lands), the feedstock production practices employed and the kind of plant species (e.g. food crop, grass, trees) used. Depending on the feedstock used, where and how it is grown and the manner in which it is processed, the greenhouse gas balance, energy yields and environmental impacts of biofuels may differ greatly. Many aspects of the biofuel debate correspond to similar points made on the environmental impacts of (modern) agriculture generally.

One of the driving forces behind the increasing use and development of biofuels is that they offer a convenient alternative to petroleum-derived gasoline and diesel as well as a potential to reduce greenhouse gas emissions thereby mitigating the impacts of climate change. Since climate change has been highlighted as one of the main drivers of biodiversity loss, the mitigation of greenhouse gas emissions would contribute to reducing the rate of biodiversity loss in the future.

Biofuel production has multiple environmental impacts that might affect biodiversity and depending on the context of their production and use the impacts of biofuels could either be positive or negative. Chief among these impacts is land-use change, which also greatly influences the extent to which biofuels contribute to the mitigation of greenhouse-gas emissions. Other environmental impacts concern water consumption, the use of fertilizers and pesticides, and the possible invasiveness of some species used in biofuel production. In addition large-scale biofuel production also has socio-economic impacts (CBD, 2008).

Depending on the species and agricultural methods chosen, opportunities exist for positive impacts on biodiversity, such as the restoration of abandoned farmlands, soil improvement and providing a financial mechanism for developing buffer zones and biological corridors.

2.1 Development of international sustainable biofuels criteria

One potential measure to further promote the positive impacts and reduce the negative impacts of biofuel production is the development of biodiversity-related sustainability criteria, standards and certification schemes. Such schemes can promote the sustainable production, conversion, use, and trade of biofuels. Several Parties and international organizations, including the Global Bioenergy Partnership, the United Nations Environment Programme, the Food and Agriculture Organization (International Bioenergy Platform) and the International Energy Agency, as well as the International

Biofuels Forum and the Roundtable on Sustainable Biofuel, are currently developing guidelines related to this subject. Further several international non-governmental organizations such the World Wide Fund for Nature, Friends of the Earth and Greenpeace have already proposed criteria or certification models.

Initially, the reporting obligation of the RTFO (Renewable Transport Fuel Obligation in the U.K.) and later the Roundtable on Sustainable Biofuels (RSB) have adopted a "meta-standard" approach to learn from existing criteria, standards and certification schemes such as the Round Table on Sustainable Palm Oil or the Forest Stewardship Council. One lesson is that while such schemes can be effective in promoting sustainable production in markets that are sensitive to environmental issues, their overall beneficial effect can be undermined if goods from unsustainable production can still be sold in other markets. There is thus a need for such criteria, standards and certification schemes to be developed and adopted globally. Moreover, given the global effects of biofuel production as mediated through commodity prices and consequent land-use change, such criteria, standards and certification schemes would need to fully account for such indirect effects on biodiversity. This would be a very challenging task.

The certification of biofuels cannot be the only vehicle to translate effective sustainability standards into practice however. Due to the restrictions to biofuel production, displacement effects can still occur, even if full compliance with standards is achieved in the certification scheme. As explained above, specific support policies may also generate indirect negative environmental and biodiversity effects, possibly in other countries. Therefore, additional policies and policy reforms are needed to safeguard against negative environmental and socio-economic impacts (CBD, 2008).

3 Existing criteria to assess the impact of biofuels production on biodiversity

Several initiatives have developed standards with specific biodiversity principles and criteria for sustainable biomass[1]. Often these standards include principles and criteria on other topics and issues as well, like environmental aspects (e.g. soil, water and air quality) and social aspects (e.g. working conditions, land rights). The criteria on these topics might also have an indirect impact on biodiversity.

There is value to each of the approaches taken by these initiatives to addressing the protection of biodiversity and environmentally-sensitive areas within their specific sectors. Yet no one set of principles or criteria is complete. Most are short on specifics on how to achieve the principles, with guidance provided only in general lines. The indirect impacts of production – those which are not related directly to production, but to the chain of changes caused by this production – are missing entirely.

[1] An overview of existing criteria related to biodiversity and examples can be found in the Annexes.

Beyond this, and perhaps because of this, no set of principles and criteria has become an international standard for biodiversity or habitat conservation, and none has garnered widespread acceptance across sectors. This generates confusion, especially in a relatively new area such as biofuels that crosses traditional commodity and industry lines (OEKO, 2008).

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Annex I: Examples of existing criteria to assess the impact of biofuels production on biodiversity

Several initiatives have developed standards with specific biodiversity principles and criteria for sustainable biomass. Often these standards include principles and criteria on other topics and issues as well, like environmental aspects (e.g. soil, water and air quality) and social aspects (e.g. working conditions, land rights). The criteria on these topics might also have an indirect impact on biodiversity.

In most sustainability standards principles form the basis. They are formulated as objectives and determine in general what the standard (or sometimes certification scheme) wants to accomplish. Criteria are the translation of the principles into concrete requirements that have to be fulfilled. Criteria are already more specific than principles, which are more abstract and non-quantifiable. Often, indicators are used to work criteria out into measurable and verifiable specifications. Other standards further detail criteria in technical guidance, verifiers, responsibilities, requirements or recommendations. Indicators are measurable and can be both of a qualitative as quantitative nature. Indicators need to be remarkably clear, so there is no room for different interpretations. Auditors use indicators in the field to check whether inspected objects/locations meet the requirements for certification.

To illustrate this; a standard might include a principle that states that the production of biomass may not be at the cost of protected or vulnerable biodiversity. Where possible, the production of biomass should even contribute to and strengthen biodiversity (Project Group "Sustainable Production of Biomass, 2007). Subsequently, this is further elaborated into (one or more) criteria. One of the criteria might state that there may be no violation of national rules and legislations that are applicable for the production and production area. Whether this is the case can be determined by the use of the indicator that states that as a minimum requirement, there has to be compliance with relevant national and local rules, with regard to (amongst others) landownership and land use rights, forest and plantation management and exploitation, and national rules stemming from international conventions

The existing criteria for biodiversity that focus on the sustainability of biofuels, agriculture, forestry and fishing are mentioned below (based on OEKO, 2008). For each criterion an example is given from existing standards (FSC, MSC, RSB, RSPO, and SAN). Some of these criteria are already operational and are used in existing certification systems. Other criteria are not operational yet and need to be worked out in further detail.

Environmental assessment

Some existing standards include criteria that require environmental (impact) assessments.

E.g. “An environmental assessment must occur before the production starts.” (criterion 7.a, RSB)

The identification of important areas (e.g. HCV areas, native ecosystems, ecological corridors and conservation areas) must be performed prior to any exploitation of the area of concern. No exploitation can occur before the formal identification of the area. After the identification of ecosystem functions and services these need to be evaluated and appropriately dealt with.

Often producers are required to collect and provide elements of information about a potential production area through an environmental impact assessment and land management plan appropriate to the scale and intensity of the production. This might include maps of HCV areas, native ecosystems, ecological corridors and other public/private biological conservation areas, as well as information about local ecosystem functions and services.

Native species

The following five criteria deal with native species:

- Endangered/ vulnerable species

E.g. “The status of rare, threatened or endangered species […], if any, that exist in the plantation or that could be affected by plantation or mill management, shall be identified and their conservation taken into account in management plans and operations.” (Criterion 5.2, RSPO)

- Illegal hunting and fishing

E.g. “Hunting, capturing, extracting and trafficking wild animals must be prohibited on the farm. Cultural or ethnic groups can hunt or collect fauna in a controlled manner and in areas designated for those purposes under [specific] conditions” (criterion 3.3, SAN)

- Wildlife (general)

E.g. “An inventory of wildlife and wildlife habitats found on the farm must be created and maintained.” (criterion 3.1, SAN)

- Population stocks

E.g. “The fishery is conducted in a manner that does not threaten biological diversity at the genetic, species or population levels and avoids or minimises mortality of, or injuries to endangered, threatened or protected species.” (criterion 1.2, MSC)

- Exotic species

E.g. “The use of exotic species shall be carefully controlled and actively monitored to avoid adverse ecological impacts.” (criterion 6.9, FSC)

Biodiversity relevant areas

The following four criteria deal with biodiversity relevant areas:

- Protected areas

E.g. “Production areas must not be located in places that could provoke negative effects on national parks, wildlife refuges, biological corridors, forestry reserves, buffer zones or other public or private biological conservation areas.” (criterion 2.3, SAN)

- High Conservation Value areas

E.g. “The status of […] high conservation value habitats, if any, that exist in the plantation or that could be affected by plantation or mill management, shall be identified and their conservation taken into account in management plans and operations.” (criterion 5.2, RSPO).

- Native Ecosystems

E.g. “Representative samples of existing ecosystems within the landscape shall be protected in their natural state and recorded on maps, appropriate to the scale and intensity of operations and the uniqueness of the affected resources.” (criterion 6.4, FSC)

- Biological conservation areas

E.g. “Ecosystems that provide habitats for wildlife living on the farm, or that pass through the farm during migration, must be protected and restored. The farm takes special measures to protect threatened or endangered species.” (criterion 3.2, SAN)

Landscape elements

The following four criteria deal with landscape elements:

- Buffer zones

E.g. “Buffer Zones (BZ) must be protected or created.” (criterion 7.d, RSB)

Buffer zones can be set between production site and HCV areas, native ecosystems, ecological corridors or other public and private biological conservation areas in order to protect these. Buffer Zones can also be required between production locations and roads or dwellings of workers.

- Ecological corridors

E.g. “Ecological Corridors (EC) must be protected or restored.” (criterion 7.e, RSB)

- Forest/natural habitat conversion

e.g. “Assessment of environmental impacts shall be completed -- appropriate to the scale, intensity of forest management and the uniqueness of the affected resources – and adequately integrated into management systems. Assessments shall include landscape level considerations as well as the impacts of on-site processing facilities. Environmental impacts shall be assessed prior to commencement of site-disturbing operations.” (criterion 6.1, FSC)

- Use of degraded lands

E.g. “Prioritization of degraded and already-cleared lands as areas for expansion soy cultivation” (criterion 11.2, RTRS)

Direct expansion onto suitable degraded and already cleared and open lands agricultural lands might be preferred over new clearings or other locations.

Ecosystem Functions and Services

E.g. “Ecosystem Functions (EF) and Services (ES) must be preserved.” (criterion 7.c, RSB)

Mitigation of negative environmental impacts (general)

E.g. “Aspects of plantation and mill management, including replanting, that have environmental impacts are identified, and plans to mitigate the negative impacts and promote the positive ones are made, implemented and monitored, to demonstrate continuous improvement.” (criterion 5.1, RSPO)

Annex II: Existing criteria for biodiversity

Name of Standard	Main principle(s) dealing with biodiversity[2]
FSC	Principle 6: Environmental impact Principle 9 Maintenance of HCV forests FSC International Standard
Globalgap	Principle 5: Environment and Conservation GLOBALG.A.P. Integrated Farm Assurance
MSC	Principle 1 Principle 2 MSC Principles and Criteria for Sustainable Fishing
RSB	Principle 7: Conservation and Biodiversity Principles on Sustainable Biofuel Production
RSPO	Principle 5: Environmental responsibility and conservation of natural resources and biodiversity RSPO Principles and Criteria for Sustainable Palm Oil Production
RTFO	Principle 2: Biodiversity Conservation Sustainability reporting within the RTFO
RTRS	Principle 9: Protection of biodiversity Draft RTRS Principles and Criteria
SAN	Principle 2: Ecosystem Conservation Principle 3: Wildlife Protection Sustainable Agriculture Standard

FSC = Forest Stewardship Council, GLOBALGAP (previously EUREPGAP), MSC = Marine Stewardship Council, RSB = Roundtable on Sustainable Biofuels, RSPO = Roundtable on Sustainable Palm Oil, RTFO = Renewable Transport Fuels Obligation, RTRS = Roundtable on Responsible Soy, SAN = Sustainable Agriculture Network

[2] The relevant principles dealing with biodiversity of FSC, RSB, RSPO and SAN are included in Annex III.

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Annex III: Relevant chapters of standards dealing with biodiversity

A number of existing initiatives have developed biodiversity-related criteria which have been incorporated into their standards. Below are the most relevant international standards with biodiversity criteria that may be relevant to biofuel feedstock production.

Forest Stewardship Council (FSC)

The best known certification program for forestry is the Forest Stewardship Council (FSC). The FSC was established in 1993 and aims at certification of sustainable forestry management. It was one of the first standards to combat unsustainable forestry practices. Today, it also includes criteria for plantations.

FSC is an independent, not for profit, non-government organisation based in Germany. Its mission is to support environmentally appropriate, socially beneficial, and economically viable management of the world's forests. The Forest Stewardship Council develops, supports and promotes international, national and provincial standards in line with its mission. It also evaluates, accredits and monitors certification bodies which verify the use of FSC standards and provides training for and information on sustainable forest management.

FSC International is the coordinating body, and is represented by a network of National Initiatives in 45 countries. These representatives take care of national adaptations, guidance, elaborations and interpretations of the international standard. Since its founding 90 million hectares in over 70 countries was certified under the FSC label (Van de Staaij, 2008).

FSC Principles 6 and 9 are directly relevant to biodiversity. Principle 5, Benefits from the Forest, could have some impact on these areas as well.

Forest Stewardship Council (FSC)

Principle #6: Environmental impact

Forest management shall conserve biological diversity and its associated values, water resources, soils, and unique and fragile ecosystems and landscapes, and, by so doing, maintain the ecological functions and the integrity of the forest.

6.1 Assessment of environmental impacts shall be completed -- appropriate to the scale, intensity of forest management and the uniqueness of the affected resources – and adequately integrated into management systems. Assessments shall include landscape level considerations as well as the impacts of on-site processing facilities. Environmental impacts shall be assessed prior to commencement of site-disturbing operations.

6.2 Safeguards shall exist which protect rare, threatened and endangered species and their habitats (e.g., nesting and feeding areas). Conservation zones and protection areas shall be established, appropriate to the scale and intensity of forest management and the uniqueness of the affected resources. Inappropriate hunting, fishing, trapping and collecting shall be controlled.

6.3 Ecological functions and values shall be maintained intact, enhanced, or restored, including:
a) Forest regeneration and succession.
b) Genetic, species, and ecosystem diversity.
c) Natural cycles that affect the productivity of the forest ecosystem.

6.4 Representative samples of existing ecosystems within the landscape shall be protected in their natural state and recorded on maps, appropriate to the scale and intensity of operations and the uniqueness of the affected resources.

6.5 Written guidelines shall be prepared and implemented to: control erosion; minimize forest damage during harvesting, road construction, and all other mechanical disturbances; and protect water resources.

6.6 Management systems shall promote the development and adoption of environmentally friendly non-chemical methods of pest management and strive to avoid the use of chemical pesticides. World Health Organization Type 1A and 1B and chlorinated hydrocarbon pesticides; pesticides that are persistent, toxic or whose derivatives remain biologically active and accumulate in the food chain beyond their intended use; as well as any pesticides banned by international agreement, shall be prohibited. If chemicals are used, proper equipment and training shall be provided to minimize health and environmental risks.

6.7 Chemicals, containers, liquid and solid non-organic wastes including fuel and oil shall be disposed of in an environmentally appropriate manner at off-site locations.

6.8 Use of biological control agents shall be documented, minimized, monitored and strictly controlled in accordance with national laws and internationally accepted scientific protocols. Use of genetically modified organisms shall be prohibited.

6.9 The use of exotic species shall be carefully controlled and actively monitored to avoid adverse ecological impacts.

6.10 Forest conversion to plantations or non-forest land uses shall not occur, except in circumstances where conversion:
a) entails a very limited portion of the forest management unit; and
b) does not occur on high conservation value forest areas; and
c) will enable clear, substantial, additional, secure, long term conservation benefits across the forest management unit.

Principle #9: Maintenance of high conservation value forests

Management activities in high conservation value forests shall maintain or enhance the attributes which define such forests. Decisions regarding high conservation value forests shall always be considered in the context of a precautionary approach.

9.1 Assessment to determine the presence of the attributes consistent with High Conservation Value Forests will be completed, appropriate to scale and intensity of forest management.

9.2 The consultative portion of the certification process must place emphasis on the identified conservation attributes, and options for the maintenance thereof.

9.3 The management plan shall include and implement specific measures that ensure the maintenance and/or enhancement of the applicable conservation attributes consistent with the precautionary approach. These measures shall be specifically included in the publicly available management plan summary.

9.4 Annual monitoring shall be conducted to assess the effectiveness of the measures employed to maintain or enhance the applicable conservation attributes.

Roundtable on Sustainable Biofuels (RSB)

The Roundtable on Sustainable Biofuels (RSB) is a multi-stakeholder initiative to develop standards for the sustainability of biofuels. The Roundtable is an initiative of the Swiss EPFL (École Polytechnique Fédérale de Lausanne) Energy Center.

In June 2008, the RSB Steering Board has validated a simplified version of the Principles and Criteria for sustainable biofuel production. Later in 2008, it aims to continue developing draft standards in conjunction with non-governmental organizations, companies, governments and inter-governmental groups from all over the world. The objective is to create a tool that consumers, policy-makers, companies, banks, and other actors can use to ensure that biofuels deliver on their promise of sustainability.

Within the standard of the RSB, biodiversity is addressed under Principle 7. Additional Principles, including those on Water (8), Soil (9), Air (10) and Technologies - including GMOs - (11), may also indirectly affect biodiversity. The principle and criteria referenced here are from the May 6 working draft, which has not been formally approved by the Steering Board, and will likely undergo additional revisions (OEKO, 2008).

Roundtable on Sustainable Biofuels (RSB)

7. Biofuel production shall avoid net negative direct and indirect impacts on biodiversity and areas of High Conservation Values		
Requirements	**Responsibilities**	**Guidance for implementation**
7.a An environmental assessment must occur before the production starts.		
• HCV areas, native ecosystems, ecological corridors and other public/private biological conservation areas shall be adequately identified and mapped through a participative and multi-stakeholder consultation process. This identification must be performed prior to any exploitation of the area of concern. No exploitation can occur before the formal identification of the area. • Ecosystem functions and services shall be locally evaluated.	• The producer is responsible for collecting the necessary elements of information about a potential production area through an environmental impact assessment and land management plan appropriate to the scale and intensity of the production. • Maps of HCV areas, native ecosystems, ecological corridors and other public/privatebiological conservation areas, as well as information about local ecosystem functions and services may be provided by competent authorities and/or producersappropriate to the scale and intensity of the production.	• Producers or cooperatives unable to perform an environmental impact assessment and/or a land management plan will need support. • Governments and conservation organisations should support and coordinate national identification of High Conservation Values (HCV) Areas, native ecosystems, ecological corridors and other biological conservation areas to provide producers with maps and other relevant data. • Environmental Impact Assessments must involve local and/or indigenous communities, and be performed in accordance with national guidelines.
7.b HCV areas, native ecosystems, ecological corridors and other biological conservation areas must be protected.		
• **No direct conversion** of HCV areas, native ecosystems and other public and private biological conservation areas into plantation or production site after the 1st of January 2008. • **No net loss** of any High Conservation Value. • Indirect conversion and loss must be assessed and mitigated. • No use of exotic invasive species.	• The producer is responsible for not converting HCV areas, native ecosystems and other biological conservation areas and not degrading any of the High Conservation Values. • Government, inter-governmental agencies, NGOs, producers, and the private sector to monitor and mitigate indirect impacts on HCV areas, native ecosystems and public and private biological conservation areas.	• Limited exploitation, consistent with appropriate management plan can occur so long as HCVs are maintained. • Conversion of areas having irreversibly been degraded after the 1st of January 2008 is allowed. • Indirect effects are less likely to occur if the biomass comes from waste products, degraded land, or from a significant improvement in yield compared to the regional average. • The RSB work with government, inter-governmental agencies, NGOs, producers, and the private sector to monitor and mitigate indirect impacts on HCV areas, native ecosystems and public and private biological conservation areas

7.c Ecosystem Functions (EF) and Services (ES) must be preserved.		
• Avoid, minimise or mitigate negative direct and indirect effects on EF and ES.	• The producer is responsible for the preservation of EF and ES.	• Impacts on local EF and ES and potential changes due to the production must be evaluated in accordance with the Millennium Ecosystem Assessment.
7.d Buffer Zones (BZ) must be protected or created.		
• The production site must not damage any existing BZ. • BZ must be set between production site and HCV areas, native ecosystems, ecological corridors or other public and private biological conservation areas. • Surrounding zones, including riparian areas and slopes, to be kept in their original state or restored if previously degraded.	• The producer is responsible for collecting the information on the existing Buffer Zones and to avoid damaging them. • The producer is responsible for setting BZ between the production site and surrounding areas, as well as keeping surrounding BZs in their original state or restore these whenever possible.	• Where necessary, BZ must be created on the production site, not outside. • Appropriate BZ must be set according to national requirements, the type of area that requests specific protection and/or the characteristics of the crop under cultivation (e.g. pesticide spray characteristics). • Clusters of individually-owned small agricultural parcels can be considered as a single production site.
7.e Ecological Corridors (EC) must be protected or restored.		
• No disruption of existing Ecological Corridors. • When possible, restoration of previously degraded Ecological Corridors. • On production site, habitat connectivity and wildlife movement should be enhanced	• The producer is responsible for collecting information about Ecological Corridors in the potential area of production. • Governments may provide necessary information and support/guide producers through a national ecological corridors management plan. • The producer is responsible for avoiding the disruption of ECs, restore previously degraded ECs when possible and enhance habitat connectivity and wildlife movement on production site.	• If an EC is identified in the production site, it must be maintained in its original state. • If habitat connectivity or wildlife movement is reduced on the production site, a significant area of the production site must be set aside to restore an equivalent connectivity. • A part of the production site may be dedicated to restore habitat connectivity and wildlife movement on a voluntary basis.
7.f Illegal hunting and fishing must not occur on the production site.		
• Hunting, fishing, ensnaring, poisoning and exploitation of endangered and protected species are prohibited on the production site. • Traditional access to flora and fauna of indigenous people is allowed in accordance with the UN Declaration on the Rights of Indigenous People.	• The producer is responsible for ensuring that no hunting, fishing, ensnaring, poisoning and exploitation of endangered and protected species happen on the production site.	• Hunting, fishing and use of flora can be allowed for local communities on the production site, if not of endangered or protected species, as per national laws and IUCN classification. • No endangered or protected species can be killed, damaged or harvested on the production site. • Traditional uses of fauna and flora by indigenous people are allowed in accordance with the UN declaration on the Rights of Indigenous People and/or national law.

Roundtable on Sustainable Palm Oil

The Roundtable on Sustainable Palm Oil (RSPO) is a not-for-profit global multi-stakeholder initiative that was established in Zurich in April 2004 as a reaction on growing concerns on palm oil production. Its overall objective is the promotion of growth and use of sustainable palm oil through co-operation within the supply chain and open dialogue with its stakeholders.

Members of the RSPO represent major stakeholders in the palm oil supply chain, such as oil palm growers, palm oil processors and traders, consumer goods manufacturers, retailers, banks and investors, and environmental and social NGOs. In November 2007 the RSPO certification system was accepted during the fifth roundtable meeting in Malaysia, after two years of pilots and testing of the principles and criteria. The first certified palm oil entered the market in 2008 (Van de Staaij, 2008).

RSPO's principle 5, which is related to the conservation of natural resources and biodiversity, is related to biodiversity. Other principles, such as Principle 4, Use of Best Practices by Growers and Millers, and Principle 7, Responsible Development of New Plantings, may also affect biodiversity.

Principle 5: Environmental responsibility and conservation of natural resources and biodiversity

Criterion	Indicators and Guidance
Criterion 5.1 Aspects of plantation and mill management, including replanting, that have environmental impacts are identified, and plans to mitigate the negative impacts and promote the positive ones are made, implemented and monitored, to demonstrate continuous improvement.	Indicators: • Documented impact assessment. • Where the identification of impacts requires changes in current practices, in order to mitigate negative effects, a timetable for change should be developed. Guidance: Environmental impact assessment should cover the following activities, where they are undertaken: • Building new roads, processing mills or other infrastructure. • Putting in drainage or irrigation systems. • Replanting or expansion of planting area. • Disposal of mill effluents (see criterion 4.4); • Clearing of remaining natural vegetation. Impact assessment may be a non-restrictive format e.g. ISO 14001 EMS and/or EIA report incorporating elements spelt out in this criterion and raised through stakeholder consultation. Documented management action plans addressing issues raised from the above impact assessment, which is monitored annually. Environmental impacts may be identified on soil and water resources, air quality (see

Criterion	Indicators and Guidance
	criterion 5.6), biodiversity and ecosystems, and people's amenity (see criterion 6.1 for social impacts), both on and off-site. Stakeholder consultation has a key role in identifying environmental impacts. The inclusion of consultation should result in improved processes to identify impacts and to develop any required mitigation measures. It is important that where activities, techniques or operations change over time, identifications of impacts, and any required mitigation, are updated as necessary. For smallholder schemes, the scheme management has the responsibility to undertake impact assessment and to plan and operate in accordance with the results. Individual smallholders would not be expected to undertake formal impact assessments (unless there is a legal requirement) but should have a good understanding of the potential negative impacts of their activities and appropriate mitigation techniques. National interpretation should consider any national legal requirements together with any other issues that are not required by law but are nevertheless important, e.g. Independent SEIA for replanting may be desirable under specific situations .
Criterion 5.2 The status of rare, threatened or endangered species and high conservation value habitats, if any, that exist in the plantation or that could be affected by plantation or mill management, shall be identified and their conservation taken into account in management plans and operations.	Indicators: Information should be collated that includes both the planted area itself and relevant wider landscape-level considerations (such as wildlife corridors). This information should cover: • Presence of protected areas that could be significantly affected by the grower or miller.

Criterion	Indicators and Guidance
	• Conservation status (e.g. IUCN status), legal protection, population status and habitat requirements of rare, threatened, or endangered species, that could be significantly affected by the grower or miller. • Identification of high conservation value habitats, such as rare and threatened ecosystems, that could be significantly affected by the grower or miller. If rare, threatened or endangered species, or high conservation value habitats, are present, appropriate measures for management planning and operations will include: • Ensuring that any legal requirements relating to the protection of the species or habitat are met. • Avoiding damage to and deterioration of applicable habitats. • Controlling any illegal or inappropriate hunting, fishing or collecting activities; and developing responsible measures to resolve human-wildlife conflicts (e.g., incursions by elephants). Guidance: This information gathering should include checking available biological records, and consultation with relevant government departments, research institutes and interested NGOs if appropriate. Depending on the biodiversity values that are present, and the level of available information, some additional field survey work may be required. For individual smallholders, a basic understanding of any applicable species or habitats, together with their conservation needs, will be sufficient.

Criterion	Indicators and Guidance
	For national interpretation, appropriate sources of information include government or international lists of threatened species ('red data lists'), national wildlife protection legislation, authorities responsible for protected areas and species, or relevant NGOs.
Criterion 5.3 Waste is reduced, recycled, re-used and disposed of in an environmentally and socially responsible manner.	Indicators: • Documented identification of all waste products and sources of pollution • Safe disposal of pesticide containers. • Having identified wastes, a waste management and disposal plan must be developed and implemented, to avoid or reduce pollution. Guidance: The waste management and disposal plan should include measures for: • Identifying and monitoring sources of waste and pollution. • Improving the efficiency of resource utilisation and recycling potential wastes as nutrients or converting them into value-added products (e.g. through animal feeding programmes). • Appropriate disposal of hazardous chemicals and their containers. Surplus chemical containers should be disposed of or cleaned in an environmentally and socially responsible way (e.g. returned to the vendor or cleaned using a triple rinse method), such that there is no risk of contamination of water sources or to human health. The disposal instructions on manufacturer's labels should be adhered to.

Criterion	Indicators and Guidance
	Smallholders should adopt appropriate measures to dispose of hazardous chemicals and their containers. National interpretation could include, as appropriate: details of relevant national laws or policies, a list of waste types which must be considered, any types of disposal which are not acceptable (e.g. untreated waste water may not be discharged directly into streams or rivers – refer to criterion 4.4), existing best practice guidelines on recycling and re-use of nutrients, managing effluent ponds, increasing mill extraction efficiency and appropriate disposal of wastes.
Criterion 5.4 Efficiency of energy use and use of renewable energy is maximised.	Indicators: • Monitoring of renewable energy use per tonne of CPO or palm product in the mill. • Monitoring of direct fossil fuel use per ton of CPO (or FFB where the grower has no mill). Guidance: Growers and mills should assess the direct energy use of their operations, including fuel and electricity, and energy efficiency of their operations. This should include estimation of fuel use by contractors, including all transport and machinery operations. The feasibility of collecting and using biogas should be studied if possible.
Criterion 5.5 Use of fire for waste disposal and for preparing land for replanting is avoided except in specific situations, as identified in the ASEAN	Indicators: • Documented assessment where fire has been used for preparing land for replanting.

Criterion	Indicators and Guidance
guidelines or other regional best practice.	Guidance: Fire should be used **only** where an assessment has demonstrated that it is the most effective and least environmentally damaging option for minimising the risk of severe pest and disease outbreaks, and with evidence that fire-use is carefully controlled. Use of fire on peat soils should be avoided. Extension/training programmes for smallholders may be necessary. National interpretation should identify any specific situations where such use of fire may be acceptable, for example through reference to 'Guidelines for the implementation of the ASEAN policy on zero burning', or comparable guidelines in other locations.
Criterion 5.6 Plans to reduce pollution and emissions, including greenhouse gases, are developed, implemented and monitored.	Indicators: • An assessment of all polluting activities must be conducted, including gaseous emissions, particulate/soot emissions and effluent (see also criterion 4.4). Significant pollutants and emissions must be identified and plans to reduce them implemented. • A monitoring system must be in place for these significant pollutants which goes beyond national compliance. • The treatment methodology for POME is recorded. Note: RSPO needs to address all issues relating to Greenhouse Gas emissions, as set out in the Preamble to this document.

Rainforest Alliance / Sustainable Agriculture Network (SAN)

The Rainforest Alliance is the international secretariat of the Sustainable Agriculture Network (SAN), a coalition of leading conservation groups that links responsible farmers with conscientious consumers by means of the Rainforest Alliance Certified seal of approval. Under the auspices of the Sustainable Agriculture Network (SAN), the Rainforest Alliance and their partner organizations work with farmers to bring their operations up to standard for protecting wildlife, wild lands, workers' rights and local communities. The SAN awards the Rainforest Alliance Certified eco-label to farms.

The Rainforest Alliance regards certification as a conservation approach. The certification seal acts as a guarantee, assuring consumers that the products they are buying have been produced and/or manufactured according to a specific set of criteria balancing ecological, economic, and social considerations.

RA/SAN certification includes criteria to protect wildlife. Certified farmers plant trees along roads, around housing, and in areas not suitable for crops. To control erosion and to limit the need for agrochemicals, they also plant buffer zones of native vegetation along rivers and springs and allow ground cover to grow. And they manage all pollutants, from tractor fuel to coffee mill wastewater. Its standard also contains extensive criteria to protect workers. Certified farms hire locally, pay fair wages, and ensure safe working conditions and access to clean drinking water and proper sanitary facilities. In all, more than 200,000 farm families are enjoying the benefits of the program (Van de Staaij, 2008).

The SAN standard includes a number of principles which indirectly relate to biodiversity, including principles on Social and Environmental Management Systems (1), Water Conservation (4), Integrated Crop Management (8) and Soil Management and Conservation (9). Principles 2 and 3 directly relate to these topics.

Rainforest Alliance / Sustainable Agriculture Network (SAN)

2. ECOSYSTEM CONSERVATION

Natural ecosystems are integral components of the agricultural and rural countryside. Carbon capture, crops pollination, pest control, biodiversity and soil and water conservation are just some of the services provided by natural ecosystems on farms. Certified farms protect these natural ecosystems and conduct activities to restore degraded ecosystems. Emphasis is placed on restoring natural ecosystems in areas unsuitable for agriculture, for example by reestablishing the riparian forests that are critical to the protection of water channels. The Sustainable Agricultural Network recognizes that forests and plantations are potent sources of timber and non-timber forest products that help to diversify farm incomes when they are managed in a sustainable manner.

2.1 *Critical Criterion.* All existing natural ecosystems, both aquatic and terrestrial, must be identified, protected, conserved and restored through a conservation program. The program must include the restoration of natural ecosystems or the reforestation of areas within the farm that are unsuitable for agriculture. The program must include the establishment and maintenance of shade trees for those crops traditionally grown with shade, in areas where the agricultural, climatic and ecological conditions permit.

2.2 *Critical Criterion.* The farm must maintain the integrity of aquatic or terrestrial ecosystems inside and outside of the farm, and must not permit their destruction or alteration as a result of management or production activities on the farm. The wood used for pallets or for posts to support greenhouses, cableways or similar infrastructure must come from legally approved sustainable sources, from the moment of the first contact made for the certification process.

2.3 Production areas must not be located in places that could provoke negative effects on national parks, wildlife refuges, biological corridors, forestry reserves, buffer zones or other public or private biological conservation areas.

2.4 Cutting, extracting or harvesting trees, plants and other non-timber forest products is only allowed in instances when the farm implements a sustainable management plan that has been approved by the relevant authorities, and has the all the permits required by law. If no applicable laws exist, the plan must have been developed by a competent professional. The harvesting of threatened or endangered plants or species is not permitted. The certification of farms that have areas that have deforested within the two years prior to the first moment of contact regarding certification is not permitted.

2.5 There must be a minimum separation of production areas from natural ecosystems where chemical products are not used. A vegetated protection zone must be established by planting or by natural regeneration between different permanent or semi-permanent crop production areas or systems. The separation between production areas and ecosystems is defined in Annex 1.

2.6 Natural water channels must be protected by establishing protected zones on the banks of rivers, streams, creeks, lakes, wetlands and around the edges of other natural water bodies, as indicated in the matrix in Annex 1 of this standard. Farms must not alter natural water channels to create new drainage or irrigation canals. Previously converted water channels must maintain their natural vegetative cover or, in its absence, this cover must be restored. The farm must use and expand vegetative ground covers on the banks and bottoms of drainage canals to reduce erosion and agrochemical drift and runoff towards water bodies.

2.7 As part of the conservation program, the farm must establish and maintain vegetation zones between the crop and areas of human activity, as well as between production areas and on the edges of public or frequently traveled roads passing through or around the farm. These zones must consist of permanent native vegetation with trees, bushes or other types of plants, in order to promote biodiversity, minimize any negative visual impacts and reduce the drift of agrochemicals, dust and other substances coming from agricultural or processing activities. The width of the vegetation zone is defined in Annex 1 of this standard.

2.8 Farms with Agroforestry Crops located in areas where the original natural vegetative cover is forest must establish and maintain, as part of the conservation program, permanent shade distributed homogenously throughout the plantations; the shade must meet the following requirements:

a. A minimum of 70 individual trees per hectare that must include at least 12 native species per hectare.

b. A shade density of at least 40% at all times.

c. The tree crowns must comprise at least two strata or stories.

A farm without shade can be certified once it has a shade establishment or expansion plan and shade established in at least 25% of the production area. Shade must be established in the remaining 75% of the production area within five years.

Farms in areas where the original natural vegetation is not forest must dedicate at least 30% of the farm area for conservation or recovery of the area's typical ecosystems. These farms can be certified once they have a plan to establishment or recover natural vegetation within ten years. Vegetation must be re-established or recovered in an equivalent of 10% of the total farm area (one-third of the 30%) during the first three years of the plan.

3. WILDLIFE PROTECTION

The farms certified under this standard are refuges for resident and migratory wildlife, especially species that are threatened or endangered. Certified farms protect natural areas that contain food for wild animals or habitats for reproduction and raising offspring. These farms also carry out special programs and activities for regenerating and restoring ecosystems important to wildlife. At the same time, the farms, their owners and employees take measures to reduce and eventually eliminate the number of animals in captivity, despite traditional practices keeping wildlife as pets in many regions of the world.

3.1 An inventory of wildlife and wildlife habitats found on the farm must be created and maintained.

3.2 Ecosystems that provide habitats for wildlife living on the farm, or that pass through the farm during migration, must be protected and restored. The farm takes special measures to protect threatened or endangered species.

3.3 *Critical Criterion.* Hunting, capturing, extracting and trafficking wild animals must be prohibited on the farm. Cultural or ethnic groups can hunt or collect fauna in a controlled manner and in areas designated for those purposes under the following conditions:

a. The activities do not involve species in danger of or threatened with extinction.

b. There are established laws that recognize the rights of these groups to hunt or collect wildlife.

c. Hunting and collection activities do not have negative impacts on the ecological processes or functions important for agricultural and local ecosystem sustainability.

d. The long-term viability of the species' populations is not affected.

e. These activities are not for commercial purposes.

3.4 The farmer must keep an inventory of the wild animals held in captivity on the farm, and implement policies and procedures to regulate and reduce their tenancy. Endangered or threatened species must not be held in captivity.

3.5 The farm is allowed to breed wild animals in captivity when the farm has the required conditions and the permits stipulated law. These activities must be supervised by a competent professional.

3.6 Farms that reintroduce wildlife into natural habitats must have the appropriate permit from the relevant authorities and comply with the conditions established by law, or reintroduce the animals via duly authorized and established programs. A competent professional must advise the farm on release practices. Exotic wildlife must not be introduced into the farm.

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04 July 2008

Annex IV: High Conservation Value (HCV) Network

The High Conservation Value (HCV) concept was originally devised in the context of forest certification (High Conservation Value Forests or HCVF), but it is also applicable to all kinds of ecosystems and habitats. It has developed into a valuable and flexible toolkit for a variety of uses, including land-use planning, conservation advocacy, and designing responsible purchasing and investment policies.

All natural habitats possess some inherent conservation values. These could include the presence of rare or endemic species, sacred sites, or resources harvested by local residents. High Conservation Value (HCV) areas are defined as natural habitats where these values are considered to be of **outstanding significance** or **critical importance**.

The key to using the HCV approach is the identification of the six High Conservation Values (HCVs), which cover the range of conservation priorities shared by a wide range of stakeholder groups, and include social values as well as ecological values. It is these values that are important and need to be protected. A High Conservation Value area is simply the area (e.g. a forest, a grassland, a watershed, or a landscape-level ecosystem) where these values are found, or, more precisely, the area that needs to be appropriately managed in order to maintain or enhance the identified values. Identifying the areas where these values occur is therefore the essential first step in developing appropriate management for them.

- Identify which High Conservation Values are present: the presence or absence of each HCV is determined, by using existing data and collecting additional information as necessary.
- Identify the HCV area and how it must be managed: the HCV area is the area of habitat which must be appropriately managed in order to maintain or enhance the identified HCVs.
- Establish an appropriate monitoring regime: to ensure that the management practices are effective in their aim of maintaining or enhancing the HCVs.

The six types of High Conservation Value areas

High Conservation Value areas are critical areas in a landscape which need to be appropriately managed in order to maintain or enhance High Conservation Values. There are six main types of HCV areas, based on the definition originally developed by the Forest Stewardship Council for certification of forest ecosystems, but now increasingly expanded to apply to assessments of other ecosystems (HCV-network, 2008). The six types of HCV areas are listed below[3].

[3] http://hcvnetwork.org

3.1 HCV1. Globally, regionally or nationally significant concentrations of biodiversity values.

This HCV contains the following four elements:

HCV1.1 Protected areas

Protected areas perform many functions, including conserving biodiversity. Protected area networks are a cornerstone of the biodiversity conservation policies of most governments and many NGOs and the importance of them is recognised in the Convention on Biological Diversity (CBD). Although the processes of selecting areas for protection have varied greatly in different countries and at different times, many are nonetheless vital for conserving regional and global biodiversity values.

HCV1.2 Threatened and endangered species

One of the most important aspects of biodiversity value is the presence of threatened or endangered species. Forests that contain populations of threatened or endangered species are clearly more important for maintaining biodiversity values than those than do not, simply because these species are more vulnerable to continued habitat loss, hunting, disease etc.

HCV1.3 Concentrations of endemic species

Endemic species are ones that are confined to a particular geographic area. When this area is restricted, then a species has particular importance for conservation. This is because restricted range increases the vulnerability of species to further loss of habitat etc, and at the same time the presence of concentrations of endemic species is evidence of extraordinary evolutionary processes.

HCV1.4 Critical temporal use

Many species use a variety of habitats at different times or at different stages in their life-history. These may be geographically distinct or may be different ecosystems or habitats within the same region. The use may be seasonal or the habitat may be used only in extreme years, when, nevertheless, it is critical to the survival of the population. This component includes critical breeding sites, migration sites, migration routes or corridors (latitudinal as well as altitudinal) or forests that contain globally important seasonal concentrations of species. This element is included to ensure the maintenance of important concentrations of species that use the forest only occasionally.

3.1.1 Tools for landscape analysis of HCV1

HCV1.1 Protected Areas	
Tasks	Protected areas will usually be HCVF. These should be defined in HCVF maps. Forests necessary to maintain the values within protected areas can also be HCVF (e.g. adjacent forests used by endangered species within the protected areas, forests that protect the hydrology of the protected areas, forests that act as migration corridors between protected areas). This will be particularly important when protected areas are severely threatened. Determine whether the protected area network adequately represents forest ecosystems at an appropriate scale (ecoregion, island, national). This will inform decisions about HCV1.2-4 and HCV3.
Data sources	Maps of existing and proposed protected areas, provincial spatial plans, land designation etc. Satellite imagery, recent forest cover and vegetation maps.
Tools and Approaches	WWF gap analysis[9] Threat analysis[10]

Note: Numbers refer to the lists of further information on tools and approaches in Appendix 2.

HCV1.2 Threatened and Endangered species	
Tasks	Determine forest areas that support any Critically endangered species or significant concentration of other threatened species. In large, information poor landscapes it may be impossible to define areas where such species occur. In this case, the onus should be placed on all land managers to determine that an area does not contain either critically endangered species or concentrations of threatened or endangered species. The landscape analysis can guide forest managers towards which species are likely to be present and which forest types are most likely to contain them.
Data sources	Relevant legislation, CITES[6], IUCN red data lists[7], Red Data books, conservation priority setting initiatives, habitat maps, endangered species networks, scientific and conservation literature and organisations etc.
Tools and Approaches	Systematic conservation planning[11] WWF Ecoregional vision workshop[12] Landscape species indicators[13] Five-S Framework[14] Functional landscapes[15] Rapid ecological assessment[16] Population Viability analysis[17] Bio-Rap Assessment[18] Forest Quality Assessment[19] Landscape Approach[20]

Note: Numbers refer to the lists of further information on tools and approaches in Appendix 2.

HCV1.3 Concentrations of endemic species	
Tasks	Determine forest areas where concentrations of endemic species are known to occur. In large, information poor landscapes it may be impossible to define areas where such species occur. In this case, the onus should be placed on all land managers to determine that an area does not contain concentrations of endemic species.
Data sources	Scientific and conservation literature and organisations, Endemic Bird Areas[4], Important Bird Areas[5], endangered species networks, habitat maps etc.
Tools and Approaches	Systematic conservation planning[11] WWF Ecoregional vision workshop[12] Landscape species indicators[13] Five-S Framework[14] Functional landscapes[15] Rapid ecological assessment[16] Population Viability analysis[17] Bio-Rap Assessment[18] Forest Quality Assessment[19] Landscape Approach[20]

Note: Numbers refer to the lists of further information on tools and approaches in Appendix 2.

HCV1.4 Critical temporal concentrations	
Tasks	Define forest areas where critical temporal concentrations of species are known to occur. These include migration corridors, migration sites, and other areas that are critical to many species. In large, information poor landscapes it may be impossible to define areas where such species occur. In this case, the onus should be placed on all land managers to determine that an area does not contain critical temporal concentrations species.
Data sources	Important Bird Areas[5] If the landscape is small, then local scientists, conservation organisations, land managers and local people are likely to be aware of any extraordinary or critical temporal concentrations of species. In large landscapes, many critical temporal forest resources will be too small to analyse and map (e.g. salt licks, some migration corridors).
Tools and Approaches	Systematic conservation planning[11] WWF Ecoregional vision workshop[12] Five-S Framework[14] Functional landscapes[15] Rapid ecological assessment[16] Bio-Rap Assessment[18] Forest Quality Assessment[19] Landscape Approach[20]

Note: Numbers refer to the lists of further information on tools and approaches in Appendix 2.

3.2 HCV2. Globally, regionally or nationally significant large landscape level forests.

This part of the HCVF definition aims to identify those forests that contain viable populations of most if not all naturally occurring species. It also includes forests that contain important sub-populations of very wide-ranging species (e.g. wolverine, tiger, elephant) even though the sub-populations may not in themselves be viable in the long term. It includes forests where ecological processes and ecosystem functioning (e.g. natural disturbance regimes, forest succession, species distributions and abundance) are wholly or relatively unaffected by recent human activities. Such forests are necessarily large (tens of thousands of hectares) and will be less affected by recent human activities than other forests within the region. Such forests are increasingly rare and continue to be threatened throughout the world, through processes such as deforestation, forest fragmentation and degradation.

Nevertheless, the occurrence of large, natural forests differs greatly from country to country. In countries where there has been extensive forest conversion, there may be no forests that would be considered under this HCV. Alternatively, forests that are capable of maintaining most or all species may be so few that they are already well known and the working group has only to list or produce a map of them. However, some countries retain a relatively large proportion of forest cover and in such cases the working group will have to decide the extent to which patterns of historical and current use as well as current threats have reduced the ability of forests to support the natural array of species.

It is also worth emphasising that the forest considered under HCV2 is not necessarily confined to a particular administrative unit (e.g. forest management unit). This is because several contiguous administrative units of forest land may together form a significant large landscape level forest. An individual administrative unit can be a HCVF under HCV2 if it is whole or part of a significant large, landscape level forest.

3.2.1 Tools for landscape analysis of HCV2

HCV2 Significant large, landscape level forests	
Tasks	Decide whether there are any forest areas of sufficient size and quality (e.g. fragmentation, degradation) that could potentially contain viable populations of most if not all naturally occurring species. Whether they are globally, regionally or nationally significant will depend on how rare or threatened such large areas of forest are. Define the boundaries of these significant large, landscape-level forests on maps where possible.
Data sources	Satellite imagery, Global Forest Watch intact natural forest maps[8], land designation maps, forest cover and vegetation maps.
Tools and Approaches	Systematic conservation planning[11] WWF Ecoregional vision workshop[12] Landscape species indicators[13] Five-S Framework[14] Functional landscapes[15] Population Viability analysis[17] Forest Quality Assessment[19]

Note: Numbers refer to the lists of further information on tools and approaches in Appendix 2.

3.3 HCV3. Rare, threatened or endangered ecosystems

Some ecosystems are naturally rare, where the climatic or edaphic conditions necessary for their development are limited in extent. Recent processes, such as land conversion may have decreased their extent even further. Examples include montane forests in eastern Africa, cloud forests in Central America or riverine forests in semi-arid regions of Africa.

Other ecosystems have become rare through recent human activity such as conversion of natural ecosystems into agricultural or other land use. It is often these ecosystems that are the most threatened by continued anthropogenic actions.

This value is designed to ensure that threatened or endangered forest ecosystems, communities or types are maintained. These include forest types which were previously widespread or typical of large regions. They also include rare associations of species, even when the constituent species may be widespread and secure. These include:

- Associations (intact or not) that have always been rare (e.g. limestone forests in Indonesia; cloud forests of Central America; riverine forests in semi-arid regions of Africa).
- Intact ecosystems that are now rare or greatly reduced, even if previously widespread or typical of the region (e.g. lowland dipterocarp forest in Indonesia).
- Forests ecosystems, even if heavily disturbed or degraded, which are now rare or greatly reduced, and where intact examples are very rare (e.g. mangrove forest in parts of in Indonesia)

In these cases, the HCV is the rare ecosystem itself, which may be all or part of the any particular forest. Native forest ecosystems or species assemblages that are characteristic of a region but are not rare or endangered should not be considered HCVFs under this part of the definition.

3.3.1 Tools for landscape analysis of HCV3

HCV3 Rare, threatened or endangered ecosystems	
Tasks	Define which ecosystems or forest types are threatened or endangered. Where possible, define these on maps. The effective protection given to forest types through the national or regional protected area network, as well as the threats to these forest types, should all be taken into account.
Data sources	Satellite imagery, land designation maps, forest cover and vegetation maps.
Tools and Approaches	WWF Gap assessment[9] Threat analysis[10] Systematic conservation planning[11] WWF Ecoregional vision workshop[12] Landscape species indicators[13] Five-S Framework[14] Functional landscapes[15] Rapid ecological assessment[16] Population Viability analysis[17] Bio-Rap Assessment[18] Forest Quality Assessment[19] Landscape Approach[20] Representing ecological communities in ecoregion conservation plans[21]

Note: Numbers refer to the lists of further information on tools and approaches in Appendix 2.

3.4 HCV4. Forest areas that provide basic services of nature in critical situations.

All forests provide some services of nature, such as watershed protection, stream flow regulation or erosion control and these services should always be maintained under good management. In most forests the consequence of a breakdown in these services is relatively minor. In some cases, however, their failure would have a serious catastrophic or cumulative impact. For example, a forest that forms a large proportion of the catchment area of a river that has a high risk of damaging and destructive flooding downstream may be critical in preventing flooding and would be considered a HCV. It is this type of situation that HCV4 attempts to identify.

Since there is a range of separate ecosystem services, this value has been sub-divided into five elements:

HCV4.1 Unique sources of drinking water

One of the basic services of nature that forests can provide is drinking water supplies to communities or other settlements. Where the forest protects and maintains water supplies for people or communities who have no alternative sources of drinking water, then this will always be critical. This element could alternatively be considered under HCV5.

HCV4.2 Forests critical to water catchments

Forests play an important role in preventing flooding, controlling stream flow and regulating water quality. Where a forest area constitutes a large proportion of a water catchment, it is able to play a critical role in maintaining these water quantity and quality. The greater the importance of the water catchment, in terms of flooding or drought risk or water usage, the more likely it is that the services provided by the forest are critical and that the forest is a HCVF.

HCV4.3 Forests critical to erosion control

A third basic service of nature that forests provide is terrain stability, including control of erosion, landslides, avalanches and downstream sedimentation. All areas suffer some degree of erosion and many are also prone to a degree of terrain instability, but often the extent or risk of these is very low or the consequences minor. In some cases, though, forests protect against erosion, landslides and avalanches in areas where the consequences, in terms of loss of productive land, damage to ecosystems, property or loss of human life, are severe. In these cases, the ecosystem service provided by the forest is critical, and it is these that should be designated HCVFs.

HCV4.4 Forests providing barriers to destructive fire

Fire is a part of the natural dynamics of many forest ecosystems, such as boreal forests in Canada or eucalypt forests in Australia. Mostly these fires are small and pose no great threat or risk. However, forest fires, whether started by natural causes or by humans, can sometimes develop into destructive, uncontrolled fire that can be

a serious risk to human life and property, economic activity, or to threatened ecosystems or species. A HCV under this element includes forest that naturally acts as a barrier to fire in areas that are prone to fire where the consequences are potentially severe.

HCV4.5 Forests with critical impact on agriculture or fisheries

All forests affect local microclimate and wind. Where forest areas are close to agricultural land, these effects can sometimes be critical to maintaining agricultural production. The effect of forest on maintaining agricultural production will vary according to climate and topography, spatial configuration of agricultural land and forest as well as crop types. Similarly, some forest areas are critical to maintaining fisheries (e.g. many mangrove forests and riparian forests). The consequences of loss of agricultural or fisheries production will also depend on the social and economic circumstances, with, for example, subsistence agriculturalists being particularly vulnerable to any loss of production. This element of HCV4 aims to identify forests that are critical to maintaining agricultural and fisheries production.

3.4.1 Tools for landscape analysis of HCV4

HCV4.1 Unique sources of drinking water	
Tasks	Define and where possible map unique sources of drinking water. This will usually not be possible in a very large landscape.
Data sources	Legislation, official designations (e.g. community watersheds), vegetation maps, satellite imagery, topographic maps, environmental protection experts.
Tools and Approaches	Forest Quality Assessment[19]

Note: Numbers refer to the lists of further information on tools and approaches in Appendix 2.

HCV4.2 Forests critical to water catchments	
Tasks	Define and where possible map forests critical to water catchments.
Data sources	Legislation, official designations (e.g. protection forests), vegetation maps, satellite imagery, topographic maps, environmental protection experts.
Tools and Approaches	Forest Quality Assessment[19]

Note: Numbers refer to the lists of further information on tools and approaches in Appendix 2.

HCV4.3 Forests critical to erosion control	
Tasks	Define and where possible map forests critical to erosion control.
Data sources	Legislation, official designations (e.g. protection forests), vegetation maps, satellite imagery, topographic maps, environmental protection experts.
Tools and Approaches	Forest Quality Assessment[19]

Note: Numbers refer to the lists of further information on tools and approaches in Appendix 2.

HCV4.4 Forests providing barriers to destructive fire	
Tasks	Define and where possible map forests providing barriers to destructive fire. This element is confined to a small number of environments worldwide and so will be absent from many landscapes.
Data sources	Local wildfire specialists.
Tools and Approaches	Forest Quality Assessment[19]

Note: Numbers refer to the lists of further information on tools and approaches in Appendix 2.

HCV4.5 Forests with critical impact on agriculture or fisheries	
Tasks	Define and where possible map forests providing critical protection to agriculture and fisheries. Forests with critical impact on agriculture will often be too small to map in large landscapes. Mangrove and riparian forests are the ones most likely to be critical to fisheries.
Data sources	Legislation, official designations (e.g. protection forests), vegetation maps, satellite imagery, topographic maps, social and agricultural production experts.
Tools and Approaches	Forest Quality Assessment[19]

Note: Numbers refer to the lists of further information on tools and approaches in Appendix 2.

3.5 HCV5. Forest areas fundamental to meeting basic needs of local communities.

The definition of HCVFs recognises that some forests are essential to human well-being. This value is designed to protect the basic subsistence and security of local communities that are derived from forests - not only for "forest-dwelling communities", but also for any communities that get substantial and irreplaceable amounts of income, food or other benefits from the forest.

Employment, income and products are values that should be conserved if possible, without prejudice to the other values and benefits present within the forest. However, HCVs do not include excessive extraction, even when communities are currently economically dependent on it. Nor do they include the excessive application of traditional practices, when these are degrading or destroying the forests and the other values present in the forest.

A forest may have HCV status if local communities obtain essential fuel, food, fodder, medicines, or building materials from the forest, without readily available alternatives. In such cases, the High Conservation Value is specifically identified as one or more of these basic needs.

The following would not be considered HCVs:

- Forests providing resources that are useful but not fundamental to local communities.
- Forests that provide resources that could readily be obtained elsewhere or that could be replaced by substitutes.

HCV5 applies only to basic needs. For example, for a community that derives a large part its protein from hunting and fishing in forests where there is no alternative source of meat or fish, the forests would constitute a HCVF. Another forest, where people hunted largely for recreational purposes (even if they did eat their catch) and where they were not dependent upon hunting, would not constitute a HCVF.

Over time, a value may grow or decline, with changing community needs and changes in land use. A forest, which was previously only one of many sources of supply, may become the only, or basic fundamental source of fuel wood or other needs. Conversely, needs may decline and disappear with time.

3.5.1 Tools for landscape analysis of HCV5

HCV5 Forest areas fundamental to meeting basic needs of local communities	
Tasks	Define forest areas fundamental to meeting the basic needs of local communities. Consider communities that live outside the boundaries of the landscape but that use forests within. Mapping HCV5 may be difficult without a full consultation process due to conflicting rights and tenures. In the absence of comprehensive data, potential HCV5 forests may be approximated by buffering around villages and points of access if local resource use patterns are known (e.g. some communities may be known to rely on forests within a 5 km radius of the villages or within 10 km of rivers). In large landscapes, this may be difficult to map. Mapping of settlement locations may provide a useful guide to areas where HCV6 is more likely to occur.
Data sources	Land use and tenure maps, local social scientists and anthropologists, indigenous peoples'organisations, past and present development aid projects.
Tools and Approaches	Rapid Rural Appraisal[22] ODA Participatory Forest Assessment[23] The Landscape Approach[19] Forest Quality Assessment[20] Resource Assessment of non-wood forest products[24] Integrating Nutritional Concerns into Forestry Projects[25]

Note: Numbers refer to the lists of further information on tools and approaches in Appendix 2.

3.6 HCV6. Forest areas critical to local communities' traditional cultural identity.

As well as being essential for subsistence and survival, forests can be critical to societies and communities for their cultural identity. This value is designed to protect the traditional culture of local communities where the forest is critical to their identity, thereby helping to maintain the cultural integrity of the community.

A forest may be designated a HCVF if it contains or provides values without which a local community would suffer a drastic cultural change and for which the community has no alternative. Examples of HCVF under this part of the definition would include:

- Sacred groves in India, Borneo and Ghana
- Forests used to procure feathers of the Argus Pheasant used by Dayak communities in Borneo in headdresses for important ceremonies.
- Forests in the Brazilian Amazon that are used by extractivist communities (such as rubber tappers) as the sole or main source of economic activity.

3.6.1 Tools for landscape analysis of HCV6

HCV5 Forest areas critical to local communities' cultural identity	
Tasks	Define forest areas critical to local communities' cultural traditional identity. Consider communities that live outside the boundaries of the landscape but that use forests within. Mapping HCV5 may be difficult without a full consultation process due to conflicting rights and tenures and where communities are unwilling to communicate their cultural heritage. In the absence of comprehensive data, potential HCV5 forests may be approximated by buffering around villages and points of access if local resource use patterns are known (e.g. some communities may be known to rely on forests within a 5 km radius of the villages or within 10 km of rivers). Buffer around villages and up rivers In large landscapes, this may be difficult to map. Mapping of settlement locations may provide a useful guide to areas where HCV6 is more likely to occur.
Data sources	Land use and tenure maps, lists of sacred groves or sacred burial sites etc., local social scientists and anthropologists, indigenous peoples organisations etc., past and present development aid projects.
Tools and Approaches	Rapid Rural Appraisal[22] Participatory Forest Assessment[23] Forest quality assessment[19] The Landscape approach[20]

Note: Numbers refer to the lists of further information on tools and approaches in Appendix 2.