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Requirements of climate protection with regard to the quality of ecosystems: Use of synergies between the Framework Convention of Climate Change and the Convention on Biological Diversity

by

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Executive Summary

The UN Conference on Environment and Development in Rio in 1992 started a series of negotiations of conventions, protocols and other instruments in different environmental areas. The most important processes and results are currently:

- The Framework Convention on Climate Change and the Kyoto Protocol,
- The Convention on Biological Diversity and the Protocol on Biosafety,
- The Convention to Combat Desertification,
- A number of international initiatives on forest issues, which addressed the issue in the Statement of Forest Principles and Chapter 11 of Agenda 21. Many of these initiatives fed into the Commission on Sustainable Development's (CSD) review of Agenda 21's Chapter 11 in 1995, the Intergovernmental Panel on Forests (IPF) and the Intergovernmental Forum on Forests (IFF),
- The Convention on Wetlands of International Importance which already entered into force in 1971 and broadened the focus from protection of wetlands for birds to the general protection of wetland ecosystems.

The international work process under these Conventions is split into separate processes, which focus on different functions and aspects of multifunctional ecosystems and biological units. These different perspectives might lead to synergies as well as to conflicts between the Conventions. A systematic analysis of positive and negative impacts is still lacking. This report focuses on the climate system and analyses the effects of biological units on the climate system. The objectives of this study are

- a compilation of all impacts of biota on the global atmosphere and of the key functions and roles of ecosystems in the global and regional carbon cycle, for the radiation balance and the water cycle;
- the analysis of the negotiation and implementation processes under the FCCC and the CBD with the question, whether existing research of biota's influences is taken into account;
- the analysis of linkages, especially of synergies and conflicts, of different international conventions (FCCC, CBD, Ramsar Convention and Forest process);
- the analysis of the relationship between the protection of biodiversity and the resulting goods and services in relation to the FCCC,
- the elaboration of recommendations for the policymakers for the ongoing international negotiations, especially with regard to specific rules and procedures under the FCCC.

1. Interactions and influences between biological units and the climate system

The biosphere, its living organisms and organic substance play a major role for the regulation of climate processes and global warming (IPCC 2000, WBGU 2000). The main processes or key functions through which the terrestrial and marine biota influence the climate are

- carbon release and uptake,
- albedo and radiation balance,
- water cycling (especially evapotranspiration)
- emissions and uptake of other greenhouse gases such as methane and nitrous oxide.

These processes occur naturally in ecosystems, but human activities, above all land use change, have altered the process rates significantly. By changing the distribution of biological units and by changing biogeochemical cycles within these units, their ability to perform climate-stabilizing ecosystem services is significantly altered. Climate change itself feeds back on these processes, changing the role ecosystems can play in the mitigation of global warming. The main report reviews these key functions of the biosphere for the climate system and evaluates the role of human-based activities on these biological units.

Table 1 gives a summary of the functional significance of the biological units for climate-related processes. The analysis shows that all biological units have some significance for the different functions in the global climate system.

Table 1: Qualitative estimates of the functional significance of biological units for climate-relevant cycles and processes

Process	**Forest**			**Grassland**		**Desert**	**Marine Biota**
	Tropical	**Temperate**	**Boreal**	**Savanna**	**Tundra**		
Albedo	-	-	--	0	+	++	-
Water cycling	++	+	-	-	?	--	-
NPP	++	++	+	0	-	--	-
Carbon storage	++	+	+	0	+	-	++

++: very high, +: high, 0: medium, -: small, --: very small, ? uncertain.

Source: WBGU 2000

2. Relationships and impacts between biodiversity and the climate system

The consequences of declining biodiversity are yet unclear, but many studies suggest that alterations of the biodiversity of ecosystems are able to change biogeochemical cycles in a way that climatic processes and functions are modified.
At the species level, many case studies have shown that species richness, species composition and invasions by non-native species have an influence on important climate-related ecosystem

functions, especially on carbon storage. For example, many experimental studies in grasslands found a positive correlation between plant species number and productivity that affects carbon storage. Experiences with invasive species can be used to highlight the effects of single species or species composition on ecosystem functions. Research has provided evidence that invasive species can significantly alter carbon cycling and fire regimes in various regions. Influences of biodiversity on methane or nitrous oxide emissions are less well studied.
The performance of some functions for the climate system is often not directly correlated to biodiversity of species, but to structural and functional traits of biotic units. These traits have an influence on energy, carbon and water-related functions of biological units. For example, the mosses in boreal forests insulate and thus stabilize the permafrost layer in the ground. Removal of the moss layer, e.g. by increased fire frequency, can cause a destabilization of the permafrost layer with possible changes in emissions of greenhouse gases like methane or CO_2. Boreal regions are characterized by low redundancy in each functional group and by large oscillations of population dynamics by insect pest invasions and fire. In such areas, the impact of removal of one species on the performance of key functions can be high. In arid ecosystems, the elimination of a group of plants actively using soil water at a particular season or from a particular depth in the soil could lead to a decrease in productivity if that water is lost from the system. Arid lands are significant determinants of the earth's albedo. This is influenced by total plant cover, but also by the different properties of woody plants versus herbaceous plant cover.

3. Functional synergies and conflicts between the CBD and the FCCC

Mitigation activities that are discussed under the Kyoto Protocol, e.g. sequestration activities under Articles 3.3 (afforestation, reforestation, deforestation) and 3.4 (additional activities) or adaptation measures can have positive or negative impacts on biodiversity conservation. Table 2 summarizes the possible synergies and conflicts between climate change mitigation and biodiversity conservation. Only few activities discussed under the FCCC are clearly positive or negative for biodiversity, with the exception of the conservation of natural ecosystems.
Whether impacts of activities are positive or negative for biodiversity mainly depend on

- the selection of practices within the activity,
- the management options related to the activity,
- biological and physical conditions of the area where the activity takes place,
- socio-economic conditions of the region where the activity takes place.

Table 2 Summary of possible impacts on biodiversity of land use activities considered under the Kyoto Protocol

Possible land use activities	**Circumstances for positive impacts on biodiversity**	**Circumstances for negative impacts on biodiversity**
Conservation of natural forests	General positive	Priority areas for conservation could be different
Conservation and restoration of wetlands	Conservation general positive, further research needs	Restoration positive for biodiversity, but could result in increase in CH_4 and N_2O emissions
Afforestation and reforestation	• On degraded pasture and agricultural sites • If natural regeneration and native species are used that reflect structural properties of surrounding forests • If mixed age classes stands are established • If clearing of pre-existing vegetation and thinning is minimized • If chemical use is minimized • If areas for habitats for different species are considered • If rotation length is extended • If tree density respects biodiversity needs • If low impact harvesting methods are used	• On areas where natural ecosystems are destroyed for the activities • If monocultures of exotic species are used on large areas • If single age-class stands are established • If other vegetation is completely cleared before and during the activity • If chemicals are used abundantly • If no habitats are created • If short rotation periods are used • If tree density is very high • If harvesting operations clear complete vegetation • If sites with special significance for the in-situ conservation for agrobio-diversity are afforested
Restoration of degraded lands/ ecosystems	• Often positive because restoration increases species richness • Positive effect will depend on the definition of "degraded"	• Habitats of species that are adapted to extreme conditions could be destroyed • Possible increase on N_2O emissions because of fertilizer use

Possible land use activities	Circumstances for positive impacts on biodiversity	Circumstances for negative impacts on biodiversity
Forest management	• If natural forest regeneration occurs	• If monocultures of exotic species are planted and natural regeneration suppressed
Agroforestry	Mainly positive if not established on areas of natural ecosystems	Negative if natural forests or other natural ecosystems are replaced
Cropland management	• If reduced tillage is used without increased application of herbicides	• If reduced tillage is used with increased application of herbicides and pesticides • Increase in cropping intensity has mainly negative impacts • If established on areas of natural ecosystems
Grassland and pasture management	• Mainly positive if no natural areas are destroyed • If no exotic species are used • If fire management respects natural fire regeneration cycles	• If established on areas that previously contained natural ecosystems • If non-native species are introduced
Introduction of species	If species are known as non-invasive in the affected ecosystem, restore natural ecosystems and provide habitat for other native species	Mainly negative
Storage dams	-	Large storage dams are mainly negative
Adaptation activities	Adaptation activities that conserve or restore natural ecosystems are generally positive	Adaptation activities that use hard technologies and that strongly change natural ecosystems are generally negative

Source: Öko-Institut

Because of this situation, few unambiguous generalizations can be drawn with regard to recommendations for the eligibility of activities under the FCCC. If the implementation of

activities under the FCCC is compatible with the objectives of the CBD depends on the following circumstances:

- if activities eligible for accounting could be defined in such a way that practices and related management options with negative impacts on biodiversity can be excluded,
- if adequate rules and criteria are developed for the implementation of eligible activities that ensure that adverse impacts on biodiversity are avoided,
- if functioning tools and instruments are developed at the global and the national level that ensure the consideration of adverse impacts on biodiversity with the implementation of activities,
- if appropriate monitoring and controls are established that ensure with and after the implementation that negative impacts are avoided and minimized.

4. Regions with special significance for biodiversity

The identification of priority areas under the CBD could be used either to promote cooperative activities between FCCC and CBD in specific areas or to separate certain areas where mitigation or adaptation activities should either be avoided or should only be implemented under stringent conditions in order to avoid damage to biodiversity.

The selection of priority regions for biodiversity conservation depends largely on the examined aspect of biodiversity (ecosystem, species and genetic diversity). A comparison of the regions with high significance for biodiversity and regions with high significance for the climate system (WBGU 2000) shows some overlaps as well as differences between the regions. Of the 25 biodiversity hotspots, 13 are also important for the climate, three hotspots fall partly into climatically important areas and nine lie in regions that probably have only a low importance for the climate system. These numbers are only preliminary results that are derived from a simple comparison of two maps without exact regional definition. However, they show that protection of biologically rich regions will not automatically lead to optimum climate protection and vice versa. Regions like Central Chile or the Cape Floristic Province that show a minor importance for the global climate system may be overlooked if climate stabilization is chosen as a major criterion for conservation priorities. On the other hand, the overlapping areas indicate regions where measures to mitigate climate change through land-use-related activities should be selected very carefully.

5. Improvement of linkages between the FCCC and the CBD

Potential collaborative activities between FCCC and CBD fall into two main groups:

1. analysis of the impacts of climate change on biological diversity, and
2. the integration of biodiversity considerations in the implementation of the FCCC and the Kyoto Protocol, such as in the implementation of land-use change and forestry activities or adaptation measures.

This report only analyses the second category of cooperation activities and excludes the area of climate change impacts on biodiversity. The main focus of the analysis was a closer consideration of the contributions of the work under the CBD to resolve the conflicts with biodiversity issues encountered with the implementation of the KP.
Recent decisions under both conventions have established new institutional structures aiming at closer cooperation. Work in some important areas was already started. These approaches are first steps to use synergies and should continue.

5.1 Key thematic areas under the CBD with relevance for the FCCC

Table 3 provides an overview of the key thematic areas where both conventions are linked including the relevant articles.

Table 3 Overview on interfaces between the FCCC, the KP and the CBD

Topic	Framework Convention on Climate Change / Kyoto-Protocol	Convention on Biological Diversity
Sustainable forestry	FCCC Art. 4.1.d KP Art. 3.3, 3.4, 3.7	CBD Art. 10
Adaptation measures	FCCC Art. 4.1.b, 4.4 KP Art. 12.8	-
Plans, programmes, policies and measures	FCCC Art 4.1.b, Art. 4.2.a KP Art. 2	CBD Art 6, 11
Monitoring	FCCC Art. 4.1.a, KP Art. 5, 7 and provisions under Art. 6, 12	CBD Art. 7
Environmental impact assessment	FCCC Art. 4.1.f,	CBD Art. 14
Financial mechanism	FCCC Art. 11, 4.3, KP Art. 11	CBD Art. 20, 21
Technology transfer	FCCC Art. 4.1.c, 4.5, 4.8, 4.9 KP Art. 10.c	CBD Art. 16
Research and training	FCCC Art. 4.1.g, 5, 6 KP Art. 10.d	CBD Art. 12
Education and public awareness	FCCC Art. 4.1.i, 6 KP Art. 10.e	CBD Art. 13
Forestry and agriculture	Projects in the area of land-use change and forestry FCCC Art. 4.1.d, KP Art. 3.3, 3.4, 6,. 12	Thematic programmes (forest and agriculture biodiversity)

Source: Öko-Institut

The detailed analysis concentrates

- on the ecosystem approach as one of the key frameworks developed under the CBD, which is promoted as the framework to be used by other conventions,
- on in-situ conservation and the potential relevance of areas of special relevance to the CBD and their possible use for the purposes of the FCCC,

- on monitoring and reporting as appropriate data and information is the fundamental prerequisite for a successful cooperation,
- on instruments such as environmental impact assessment (EIA) as the application of established instruments across conventions could provide an integrated approach for conflict resolution,
- on the financial mechanism as the FCCC and CBD are linked through the use of the Global Environment Facility (GEF) so that GEF provides for experiences in integrating aspects of both conventions.

Ecosystem approach

Conservation organizations promote to adopt and to integrate the ecosystem approach as developed under the CBD in the context of the FCCC and the KP. The ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. A more detailed look at the principles and the operational guidance for the ecosystem approach developed under the CBD leaves some doubts whether the approach is really able to contribute significantly to resolve the problems under the KP. At least some of the operational principles could be read in a way that no further action under the KP is needed and that stakeholders at the national or regional level should deal with potential conflicts and adverse impacts. However, the ecosystem approach could provide useful guidance in other areas than those described above, but it clearly does not yet provide the adequate means to balance climate change, biodiversity and social objectives at the implementation level for project activities or concrete adaptation measures.

Sustainable use

The services of the biosphere as discussed under the CBD related to climate protection should be extended to other services than carbon storages and include services with regard to water cycle, energy budget and albedo. Recommendations with regard to sustainable use of forests and grasslands should be developed under the CBD.

Conservation and protected areas

It would be helpful to have a clear list from the CBD that identifies sites of high interest for biodiversity. For such sites, coordinated and mutually supportive approaches could be developed between activities under both Conventions and LULUCF activities. Project developers at the regional level could more easily be aware of sites where thorough considerations of biological diversity are needed. Articles 8.c, 8.d, 8.k and 8.l. of the CBD are key Articles for the linkages between the two conventions because they present the basis for an effective legal framework for biodiversity protection of all areas within a Party's jurisdiction at the national level. If such legal frameworks exist, they will provide adequate guidance at the national level to minimize or eliminate potential negative impacts of activities under the FCCC and the KP. Therefore implementation of these provisions should be promoted and objective assessments of the actual implementation progress by Parties are needed. The results of such assessments can determine the need for further actions at the global level either under the FCCC or the CBD.

5.2 Monitoring, reporting and information exchange

Identification and Monitoring

Article 7 CBD on identification and monitoring is a key article for the integration of both conventions as only the information and data on important components of biodiversity identification allows adequate measures for conservation when mitigation or adaptation activities are implemented. Further work on identification and monitoring is needed under the CBD, such as a programme to further study the direct links between the pressures on and the

state of biological diversity. At the implementation level, which is important for activities under the FCCC and the KP, there is still a lack of standardized monitoring programmes for biodiversity issues. This fact complicates considerably the integration of biodiversity issues in the implementation of activities or projects. The work under the CBD on monitoring issues should be strengthened and promoted to establish an adequate knowledge base for cross-conventional problems. Easily accessible biodiversity data would also be an important pre-requisite for an adequate integration of biodiversity aspects with mitigation or adaptation activities under the FCCC and the KP. The global accessibility of monitoring data is also an area where further progress is needed.

The information from Parties presented in their second national CBD reports is very valuable to assess whether and to which degree present monitoring activities in different countries match with the need to monitor adverse impacts of forest related mitigation measures and projects. If information from second national reports shows that biodiversity monitoring is very limited or inexistent in a country, a more careful approach with regard to project validation and monitoring could be required under the FCCC. An assessment of the existing progress on monitoring of biodiversity could also provide useful information for the scientific discussions on monitoring, accounting and eligibility under the FCCC. Currently only few second national reports are available. Therefore a more complete assessment of second national reports should be conducted at a later stage.

The CBD is providing work on biodiversity indicators at the global level, which has to be rather general, abstract and aggregated to be globally applicable. For the resolution of conflicts between mitigation or adaptation activities under the FCCC and biological diversity in many cases concrete, specific, regional or site-specific biodiversity indicators would be most useful and would guarantee to be appropriate and applicable to the specific problems. This means that there is a clear gap between the progress that can be achieved under the CBD on biodiversity indicators and the factual need under the FCCC and the KP. The secretariat under the CBD is currently assessing experiences gained in the implementation of national and regional processes with indicators for forest biodiversity. This issue will be substantially reviewed at the seventh meeting of the subsidiary body (SBSTTA) of the CBD. Any future initiatives should be further analysed with regard to possible contributions to the FCCC and the KP. Nevertheless, the gap between the needs at project and at global level will remain.

Reporting under the FCCC

Useful information on biodiversity issues is already provided in national communications of Parties under the FCCC without any formal requirements in the respective guidelines. The reporting on biodiversity issues in national communication to the FCCC is somewhat arbitrary and incidental, incomplete, very different in scope, extension and degree of detail because of the lack of guidance. This does not allow a systematic use of the reported information under the CBD, even if individual contributions are very valuable and informative. In two areas it seems especially relevant to improve the reporting guidelines under the FCCC to encourage reporting on linkages between climate change and biodiversity. The first area is the reporting on mitigation policies and measures in the forest and agricultural sectors, the second area is the impacts of climate change on ecosystems and biodiversity, related research activities as well as the consideration of biodiversity aspects with the planning and implementation of adaptation measures. Country-specific experiences on these issues could enhance global understanding and formulation of adequate international policies. These requirements should not be mandatory but encourage Parties to report in order to improve understanding and exchange of information. It should also be considered how this information could and should be made available for the CBD process. More specific proposals are included in the respective section of the report.

The Consultative Group of Experts (CGE) on Non-Annex I national communications under the FCCC is currently developing proposals to improve guidelines for Non-Annex I national communications. It is likely that the section on vulnerability assessment, climate change impacts and adaptation in reporting guidelines for Non-Annex I national communication will be revised in order to provide more specific and structured guidance to Parties how to report on these issues and which elements to include. Any revision should address the linkages between adaptation activities and biodiversity as well as climate change impacts on biodiversity. Parties addressed these issues without any formal requirements in their national communications in the past, but there seems to be a lack of awareness that this information could be provided in a more systematic way and should be exchanged with the CBD. In this regard it is recommended to develop specific proposals how biodiversity issues could be integrated in the reporting guidelines for national communications under the FCCC.

Reporting under the CBD

Many proposals under the FCCC that addressed possible ways to consider adverse effects of climate change related measures and projects on biodiversity, have been limited to very general recommendations and in most cases they have not been based on the analysis of country-specific information in relation to the tools or solutions that countries have in place to address such conflicts (e.g. criteria and indicators, EIA, SIA, management rules and guidelines etc.). The information already provided under the CBD in national reports and thematic reports should be assessed in a more comprehensive analysis as it could contribute significantly to fill this gap. Such an analysis could be one important step in the direction of a discussion on recommendations that base on country experiences and established activities. Reporting guidelines and formats under the CBD could be improved to enhance the mutual usefulness of the reported information. Cross-linkages are often not considered in the elaboration and revision of reporting guidelines and formats. Under the CBD it should be considered how Parties could be encouraged to provide more specific and detailed information if so available. If Parties only fill in the multiple choice formats without providing additional information in the respective boxes, the answers are not very helpful for any further analysis and assessment, as the most relevant information usually is contained in the comment boxes. In the revision of guidelines and formats it should also be considered whether and how an improved mutual cooperation between the conventions could streamline reporting obligations and reduce reporting burdens of Parties. Recommendations should not only increase reporting requirements but also use existing linkages to avoid repeated reporting of similar issues in different reports.

Information exchange and monitoring

Under both Conventions, ways to enhance the mutual information exchange should be explored. One option would be to produce specific compilation and synthesis reports or technical papers that summarize the reported information relevant under the other convention. Other ways and means for such information exchange exist, such as the development of a meta-database covering both conventions, the development of an inter-convention web site and search engine, the development of a lessons-learned network or joint working groups under both conventions. These possibilities should be further explored and promoted.

5.3 Instruments and tools to address and resolve conflicts under both conventions

The analysis in the report shows that potential conflicts between the CBD and the implementation of the KP mainly arise at the implementation level of specific activities and projects. Whether an activity is a benefit or threat for biodiversity also often depends on the management option chosen. Therefore it is difficult to agree to common global criteria, indicators and standards as such an agreement would be needed at a very detailed level. In

such a situation, it seems important that frameworks for common instruments and tools are agreed on the international level that provide guidance for potential conflicts at the national level. Different instruments are developed under different conventions, e.g. CBD focuses on environmental impact assessment (EIA) and strategic impact assessment (SEA), the Aarhus Convention on participation of stakeholders, the forest process on management rules and principles. All elements could contribute to an appropriate implementation of articles related to forestry and agriculture under the KP. However, the success of such an approach will depend on the implementation and appropriate application across all Parties involved in those conventions. Improved exchange and discussion of actual progress of implementation and application of such instruments across conventions is recommended. Further research based on actual progress of implementation of these instruments is necessary to evaluate the usefulness and the possibilities of application of these instruments under the FCCC.

Impact assessments

As EIAs require national legislation, the specific implementation of the general rules provided in Art. 14 CBD can vary significantly. This may substantially reduce the value of the instrument if no comparable implementation can be achieved across Parties. A closer analysis of EIA legislation and procedures in different countries is needed in order to provide a clearer view on the usefulness and the problems of the practical implementation of EIAs as a general tool to harmonize objectives of CBD with objectives of FCCC in relation to LULUCF activities.

The considerable discretion left to Parties in relation to “appropriate” procedures and arrangements under Art. 14 CBD should be reduced. This lack of preciseness considerably weakens the comparable implementation of the Article. In this regard the development of guidelines on the incorporation of biodiversity-related issues into legislation and/or processes on environmental impact assessment should be supported and it should be ensured that the development process considers the use of these guidelines for projects in forestry and agriculture. The guidelines should elaborate some minimal standards for implementation of procedures and arrangements to ensure some basic standards across Parties.

With regard to Articles 3.3 (accounting of afforestation, reforestation and deforestation) and 3.4 (accounting of additional LULUCF activities) it should be evaluated if EIAs and SEAs are the most appropriate instruments to integrate biodiversity aspects into forest policies. In general SEAs and EIAs are less focused on forestry activities as many countries have chosen a different approach that establishes binding principles and criteria for forest management in the framework of the national forest policy. Further analysis on the mutual usefulness, or contradiction between EIAs/SEAs and criteria and principles for sustainable forest management should be conducted.

In developing countries adequate planning processes are often lacking as well as capacities for ecological assessments. Financial and human resources and political support are also limited. Even if the concrete implementation of EIA under the CBD varies considerably between countries, it can strengthen the importance of adequate planning processes considering ecological impacts. In this regard Article 14 CBD has a strong potential to promote effective planning systems and an enhanced importance for strategic planning in developing countries. This process will also be useful in the case of any project activities under the CDM in developing countries. It is important that the appropriate application of instruments and tools such as EIA are promoted by the financial mechanisms and capacity building activities under the conventions as the capacities to apply such tools ensure the implementation of the objectives under both conventions.

Participation

With Articles 8 and 14 the CBD acknowledge the key role of public participation for the implementation of the Convention. In addition, CBD also recognizes the important role of

local participation and participation of indigenous and local communities to the conservation and sustainable use of biological diversity.
The key role of participation of stakeholders is not taken into account in the discussions and documents on forest activities under the FCCC and the KP. Rules under the Kyoto Protocol for the Clean Development Mechanism (CDM) and Joint Implementation (JI) should incorporate the principles of public participation as already implemented under the CBD or as affirmed in recent international environmental agreements, including the Rio Declaration and the UNECE Convention on Access to Information, Public Participation in Decision-Making, and Access to Justice in Environmental Matters, known as the Aarhus Convention. Involvement of civil society can ensure that the CDM and JI contribute to the overall objective of sustainable development and assist in verifying that standards and criteria for projects at the national or international level are met. In this regard involvement of indigenous and local communities is a general requirement that CDM and/or JI projects should fulfil and should include biodiversity issues but should not be limited to such aspects.
National legal frameworks and necessary administrative measures to respect, preserve, maintain the knowledge, innovations and practices of indigenous and local communities relevant to the conservation and sustainable use of biological diversity should be further supported under the CBD. Such a legal status would facilitate the consideration of these issues in the project validation phase under the KP.

Negative and positive lists

It would be useful for the discussions under the FCCC, if the CBD would help to identify elements for negative or positive lists in relation to adverse impacts on biodiversity. For the identification of such lists, expertise under the FCCC does not seem to be appropriate. Any such tool can only be implemented for forest or land-use related activities under the FCCC if more scientific guidance is provided.

5.4 Financial resources and financial mechanism

GEF brings a number of advantages to the challenge of linking FCCC and CBD. As perhaps the largest provider of assistance for biodiversity and climate projects, GEF has considerable influence. There are several factors that provide GEF with opportunities to link thematic areas, governments, international organizations, and NGOs and with a facility to serve as a catalyst for increased coordination between biodiversity conservation and climate change:

- its relationship with both conventions
- its reliance on implementing agencies that are major development organizations with extensive relationships in recipient countries,
- its network of national focal points,
- and its governance structure.

GEF's operational programs stress the importance of taking a holistic approach and to integrate objectives of both conventions. These are all strengths that GEF should continue to promote and exploit strategically.
Besides these well-articulated strategies and programs, the actual project portfolio contains only very few projects that explicitly address the contributions and benefits of projects to both conventions. Therefore, at the implementation level, there is a need to further promote an integrated approach and to communicate the results to both conventions. The holistic approach is mainly addressed through one operational program out of twelve and it is essential that not only specific programs on cross-conventional issues are developed, but also that the possible synergies and conflicts are better integrated under each GEF operational program where such effects occur.

The operational program on forest ecosystems (operational program number 3 under the biodiversity focal area) should address inter-linkages in addition to the current focus on biodiversity issues. Key indicators developed under the program should consider carbon sequestration effects and integrated approaches should be clearly encouraged.
In the climate change focal area clearer linkages to biodiversity aspects should be included in the elaboration of adaptation strategies and programs. The approach for global projects under the climate change focal area that address key underlying roots for forest degradation should continue as this seems to be more cost-efficient than many small individual projects.
GEF should continue to strongly support participation of affected stakeholders, including indigenous peoples, under for the biodiversity-related operational programs. The experiences gathered in GEF projects should be collected, summarized and made available for further guidance on land-use change and forestry projects under the KP.
Monitoring, the systematic collection of information of impacts on biodiversity and the establishment of baselines before the start of projects should be strengthened under the biodiversity focal area, as the current lack of impact assessment of biodiversity projects is also a considerable barrier for consideration of biodiversity issues under the FCCC.
At present GEF's monitoring and evaluation of project activities focus also on biodiversity and climate change as separate areas and neither consider the linkages, nor elaborate recommendations with regard to a better integration of both issues into GEF projects.

5.5 General recommendations

Clearer guidance on priorities under the CBD to other processes

For experts from areas other than biodiversity, it is difficult to clearly understand what type of biodiversity the CBD tries to conserve as the term "biodiversity" typically refers to ecosystem, species, or genetic diversity. Maintaining desired diversity at one level will have very different requirements than conserving it at another. This situation complicates the integration of biodiversity goals in the work under other conventions such as the FCCC. Clearer guidance on the priorities under the CBD for crosscutting themes would help other conventions.

Improved cooperation on impacts of adaptation measures

For forest activities, potential negative impacts on biodiversity are intensively discussed. For adaptation measures potential negative impacts on biodiversity are rarely highlighted. The examples for possible adaptation activities given in the report show that a close cooperation between both conventions should also be established with the further development of adaptation strategies, frameworks and measures under the FCCC and the KP. In the past, few concrete activities have taken place, but this will change considerably with the implementation of the KP, as additional funds for adaptation projects are provided. Since activities under the KP are yet at a planning stage, the implementation of adaptation activities could be used as a new approach for cooperation between the two conventions to start early communication and integrated work.

Leadership of Parties needed

At the international level leadership from Parties to improve the linkages and cooperation between the two conventions is lacking. Activities are mainly pushed by some NGOs and conservation organizations, international organisations and by the Convention secretariats. Few cooperative or informing activities at the national level seem to be reflected by few activities pushing for improved cooperation at the international level. Leadership from Parties is strongly needed to improve the cooperation and to achieve an integrated approach.

6. Contribution from work on criteria and indicators in the multilateral forest processes to the FCCC

Considerable work on criteria and indicators for sustainable forest management has been developed in a series of multilateral forest processes, including the UN forest process, ITTO, the Helsinki and Montreal process and others. The analysis in the report evaluates whether and how this work could provide inputs to the FCCC and the KP in order to enhance synergies and to avoid adverse impacts with regard to sustainable forest management.

The crucial aspect concerning the use of criteria and indicators developed in multilateral forest processes for purposes under the FCCC is the geographical scope (global, regional, national) and the implementation level (from generic principles to individual level of a forest management unit) they address. Conflicts between biodiversity and activities under the FCCC and the KP mainly arise at the implementation level with regard to the specific area and specific management options. Thus, the main challenge is to bring down the internationally developed and agreed criteria and indicators to a level on which implementation becomes feasible. Unfortunately many processes do not address the level of forest management, but remain at a rather general level and only few processes have already developed criteria and indicators or guidelines at the level of forest management (see Table 4). Examples are the Pan-European Operational Level Guidelines for Sustainable Forest Management or the criteria and indicators of the Tarapoto Proposal.

Table 4 Ongoing international processes on criteria and indicators for sustainable forest management and the respective implementation level

Process	Number of Criteria	Number of Indicators	Level of Implementation	Forest Type
Helsinki	6	27	Regional and National Level Operational Guidelines on Forest management unit	Boreal and Temperate
Montreal	7	67	National Level	Boreal and Temperate
Tarapoto	1 7 4	7 47 22	Global Level National Level Forest management unit Level	Amazon Forests
Dry-Zone Africa	7	47	National Level	Sub-Sahara Forests and Highland Forests
Near-East	7	65	National Level	Dry-Forests
Central America	4 8	40 42	Regional Level National Level	All Types of Forests
ATO	26	60	Regional /National Level	Congo Basin Forests

Source: FAO / UNEP 1999

A fundamental problem with the use of indicators from multilateral forest processes to resolve problems or conflicts under the KP is the different focus of the criteria and indicators catalogues. The essential idea of the development of criteria and indicators catalogues was not the aim to provide tools for a problem resolution in a special case and under specific circumstances of the KP. Therefore it is not a surprising fact that often criteria and indicators catalogues do not address the detailed implementation level at which conflicts occur and which would be necessary to resolve the discussed problems.
Another problem is the fact that the development of criteria and indicators needs to be accompanied by certain standards, quantitative limits or thresholds that provide guidance for decision-makers. Only the existence of such standards allows identifying whether a certain trend, monitored by the periodical assessment of certain indicators under a criterion, should be categorized as a positive or negative fact. Standards must be regionally adapted because of different characteristics of ecosystems. Such standards do not exist for the different multilateral processes. Therefore it remains doubtful how the guidance and trends that are measured with the indicators developed could already be used for decision-making at the present stage of development.
The comparison in the report shows that the Montreal indicators are much closer to full carbon accounting approaches as discussed under the KP, which means a more complete accounting of all ecosystem compartments. Positive is also the description of the carbon pools that should be assessed. However, the Montreal Process Working Group itself defines the relevant indicators as in the category of indicators that may require the gathering of new or additional data and / or a program of systematic sampling or basic research. This highlights another important deficiency of indicator approaches which is the lack of monitoring data. Even for less ambitious indicator approaches than the Montreal indicators participating countries reported considerable problems to measure the proposed indicators. This means that there are technical challenges with regard to the practical implementation of criteria and indicators to assess the sustainability of certain management methods or forest-related projects on the scale of the forest management unit.
Despite the considerable work that was already performed in relation to sustainable forest management in these processes, the major problem for the use of this work under the FCCC is the lack of international agreement on a specific set of rules, criteria and indicators for sustainable forest management that is shown by the multitude of forest-related processes. Thus, a global agreement on criteria and indicators that encompasses the regional approaches seems to be the most important need in order to integrate the work under the forest processes in provisions and activities under the FCCC and the KP.

7. Improvement of linkages between the FCCC and the Ramsar Convention on wetlands

The initial process of closer co-operation between the two conventions should be intensified, because well co-ordinated provisions under both conventions can have a positive impact on both conventions' objectives.
The Ramsar Convention Process should integrate the objective of carbon storage in the objectives for protection and wise use of natural wetlands because of the immense capacity of carbon storage in wetlands soils and biomass of wetlands. Existing attempts for closer cooperation with FCCC should continue and should be strengthened especially with regard to the following areas:

- the predicting and monitoring of the impacts of climate change on wetland areas;
- the role of wetlands in adapting to, and mitigating the impacts of climate change and;

- the role of wetlands, notably peatlands and forested wetlands, in reducing greenhouse gas emissions.

Under the FCCC it is recommended to integrate the following issues in the FCCC process:

- The Ramsar principle of protection and wise use of natural wetlands should be acknowledged under FCCC process for any mitigation or adaptation activities;
- The process under the FCCC should seek to integrate the Ramsar's list of wetlands with global importance in the recommendations relating to mitigation and adaptation activities. The list could for example be used in the certification process of CDM activities to avoid that land project activities take place in protected areas under the RC.
- Despite their large potentials, mitigation activities related to wetlands such as wetland restoration or prevention of peatland fires should receive more attention in the work on the implementation of mitigation activities under the FCCC.
- The FCCC should closely cooperate with the RC in the future development of work on adaptation strategies and activities.
- Funding institutions responsible for the future adaptation fund under the KP should closely cooperate with institutions of the RC in the design of adaptation frameworks and activities.
- Future research and assessment activities should continue to provide information on climate change impacts on wetlands.

In relation to both conventions,

- the linkages between the conventions should be further analysed and documented at different levels (e.g. global and national) including the assessment of any perverse incentives and conflicts created under the provisions of the FCCC which may lead to further degradation and losses of wetlands.
- the dialogue between the respective convention secretariats should be enhanced to identify and implement mechanisms for enhanced cooperation and information exchange.

8. Future research needs

Climate related functions of the biosphere

The role of the biosphere for the carbon cycle has been the subject of many studies and research projects in the past. Biological units are also involved in the processes of generation, storage, transport, and release of biogenic methane. Less research activities are dedicated to these processes and scientists have only recently begun to understand the mechanisms and the potential for a natural methane feedback to climate change. Significant uncertainty surrounds many of the results. Thus, additional research in the field of natural methane emissions is needed to reduce this uncertainty, especially with regard to wetlands. This research should focus on systems not previously measured, in addition to developing better information on areas of different ecosystem types. Great uncertainty exists in the future wetland emission scenarios.

Similar large uncertainties as for CH_4 emissions occur for the correct estimation of global emissions of N_2O from different natural sources. A better understanding at the process level and better availability of global data for different sources is needed to arrive at a more accurate estimate and better assessments of future climate effects.

However, even building on a much larger amount of research activities, there are still gaps in the knowledge related to carbon storage in ecosystems. Especially for certain forest types, forest management options, grasslands and estimates of the soil carbon pools are lacking.

There are also methodological problems associated with the estimation of carbon processes in ecosystems.
This report highlights that the biosphere performs other important functions in the climate system beside carbon storage, e.g. in water cycling processes or for the energy balance of the land surface
The roles of the biosphere in water cycling processes that influence the climate system are not well understood. Research over long timescales is lacking. Often assumed perturbations of ecosystems used in model scenarios to determine the influence of vegetation are too large-scale to be realistic (e.g. deforestation of the whole Amazon forests as a modelling scenario). There is also a need to integrate the findings of experimental and modelling studies at different levels. Long-term measurements over large spatial scales are needed. Another important aspect for future research is that the role of biological units and geographical regions for the water cycling processes has not been studied in a detailed and systematic way. The question how local and regional effects add up to global effects is still unanswered. With respect to management options, the evaporative characteristics of different tree species are still unclear, and consequently information on the influence of large-scale reforestation / afforestation on the water cycle are missing.
Research gaps also exist for the influence of the biosphere on the albedo and energy balance of the land surface. Experimental and modelling studies have concentrated on either a global evaluation or an evaluation of processes in some key regions (Sahel, boreal forests). Most modelling studies on change of land-use operate with very drastic effects (replacement of the whole Amazonian forest by grassland), so that the effect of smaller-scale changes is not yet quantified. Many studies in desert and savannah ecosystems are often performed under the aspect of desertification, so that they lack conclusions with regard to links with global climate change. It is thus recommended to extend studies on albedo, surface effects and radiation budgets to other regions and to include the aspect of global climate effects in desertification studies.

Influence of biodiversity on the climate system

Correlations with biodiversity have been found for some of the functions of the biosphere within the climate system (carbon cycle, water cycle and energy balance), but more research is needed on general influences and quantification of effects. Some functions are not directly correlated to biodiversity of species, but to structural and functional traits of biotic units. This means that the replacement of single species or whole vegetation types can lead to significant changes in climate-relevant processes. However, most studies are either case studies that examine a single species or a single process and it is difficult to derive general conclusions for whole ecosystem types. Quantification of the contribution of single processes (e.g., species invasions) on climate-relevant cycles is also not yet possible. The report shows that interesting findings on the role of individual species for climate related functions can be derived from the research on invasive species. A systematic review of the effects of species invasions on climate-relevant processes is outstanding and would be helpful.

Need for more integrated research activities

In the past, research has mainly concentrated on either biodiversity or climate change. Thus the number of studies that reveal information about the linkages and interactions remain very limited. There are still large knowledge gaps around the questions:

- Which ecosystems are important for both climate processes and biodiversity conservation?
- Which management / mitigation options favour both climate protection and biodiversity conservation in different ecosystem types?

Many studies are now undertaken that examine the carbon sequestration potential of different ecosystem types or management options with respect to the Kyoto Protocol. Such studies should generally look at the role of biodiversity within these systems, and analyse how different management options affects biodiversity on and off site.

Useful approaches have started to identify regions with significance for both biodiversity and the climate system and to create maps for both thematic areas and combine these maps in a second step. Further research in this area is needed to arrive at a valuation of the different functions of the biosphere, biodiversity and its components.