Integration of Biodiversity Concerns in Climate Change Mitigation Activies

A Toolkit

Umwelt Bundes Amt

Für Mensch und Umwelt

Integration of Biodiversity Concerns in Climate Change Mitigation Activities

A Toolkit

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Acronyms and Abbreviations

AHTEG	Ad Hoc Technical Expert Group on Biodiversity and Climate Change
A&R	Afforestation and Reforestation
ATO	African Timber Organisation
BINU	Biodiversity Indicators in National Use
BP	Bank Procedure
CA	Conservation Agriculture
CAN	Climate Action Network
CBD	Convention on Biological Diversity
CCBA	Climate, Community & Biodiversity Alliance
CDM	Clean Development Mechanism
CGIAR	Consultative Group on International Agricultural Resource
CIFOR	Center for International Forestry Research
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CHM	Clearing House Mechanism
C&I	Criteria & Indicators
CM	Cropland Management
COP	Conference of the Parties
DPSIR	Driver, Pressure, State, Impact, Response
DOE	Designated Operational Entity
DNA	Designated National Authority
EBI	Energy and Biodiversity Initiative
EEA	European Environment Agency
EEC	European Economic Community
EIA	Environmental Impact Assessment
FAO	Food and Agriculture Organisation
FCS	Forest Certification Systems
FM	Forest Management
FMU	Forest Management Unit
FSC	Forest Stewardship Council
GEF	Global Environment Facility
GHG	Greenhouse Gas
GMO	Genetically Modified Organism
GS	Gold Standard
IAIA	International Association for Impact Assessment

IFOAM	International Federation of Organic Agricultural Movements
IPCC	International Panel on Climate Change
ITTO	International Tropical Timber Organisation
IUCN	International Union for Conservation of Nature and Natural Resources
JI	Joint Implementation
JLG	Joint Liaison Group
KP	Kyoto Protocol
LMO	Living Modified Organisms
LQI	Land Quality Indicator
LADA	Land Degradation Assessment in Drylands
LULUCF	Land Use, Land-Use Change, and Forestry
MA	Marrakesh Accords
NBSAP	National Biodiversity Strategy and Action Plan
NBF	National Biofuels Roundtable
NGO	Non-governmental Organisation
OECD	Organisation for Economic Cooperation and Development
OLADE	Latin American Energy Organisation
OP	Operational Programme/Policy
OTA	Office of Technology Assessment of the Congress of the United States
PDD	Project Design Document
PEFC	Programme for the Endorsement of Forest Certification Schemes, formerly Pan European Forest Certification
PPP	Policy, Plan or Programme
SBSTA	Subsidiary Body for Scientific and Technological Advice of the UNFCCC
SBSTTA	Subsidiary Body on Scientific, Technical and Technological Advice of the CBD
SEA	Strategic Environmental Assessment
SFM	Sustainable Forest Management
SLM	Sustainable Land Management
SMART	Specific, Measurable, Achievable, Relevant and Time-bound
UNCCD	United Nations Convention to Combat Desertification
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
WB	World Bank
WCD	World Commission on Dams
WWF	World Wildlife Fund

1 Introduction

The current toolkit is based on the results of the research & development project "Suitable Instruments for Integrating Biodiversity Considerations in Climate Change Mitigation Activities, Particularly in the Land Use and Energy Sector" (Choudhury et al. 2004). The following chapters define the objective and scope of the toolkit, explain the context and international political and legal framework and outline the biodiversity targets.

1.1 Objective and Scope of the Toolkit

The objective of this toolkit is to provide practical guidance on designing climate change mitigation activities in a way that also will benefit biodiversity and thus contribute to the 2010 biodiversity target[1]; and to enhance synergies between climate change mitigation and biodiversity conservation policies in carrying out the climate change mitigation activities. The toolkit addresses different categories of climate change mitigation activities: (1) activities in Non-Annex I Countries as part of the Clean Development Mechanism (CDM) under the United Nations Framework Convention on Climate Change (UNFCCC); (2) activities in Annex I Countries as part of Joint Implementation (JI) under the UNFCCC; and (3) activities as part of a funding portfolio.

The toolkit intends to provide practical information and decision support for experts who plan, implement (e.g. project developer) or evaluate (e.g. Accredited Independent Entity, Designated Operational Entities (DOE) or Designated National Authority (DNA)) climate change mitigation activities. Thereby the Marrakesh Accords (MA) created a first set of further requirements for CDM and JI projects. Before a project can be submitted for validation and registration, the project developer needs to draw up a Project Design Document (PDD). Information on PDD modalities and procedures are outlined in the Appendixes B of Decision 17/CP.7[2] (CDM) and UNFCCC/SBSTA/2003/L.27 (CDM A&R), and in Decision 16/CP.7[3] (JI).

The toolkit is built in three parts:

- The first part of the toolkit gives an overview of possible climate change mitigation activities, especially in the land use, land use change and forestry (LULUCF) sector, and their possible benefits and negative impacts on biodiversity.

[1] See Decision VI/26 CBD and follow-up: UNEP/CBD/SBSTTA/9/INF/9: 2010 – The Global Biodiversity Challenge 21-23 May 2003, London, United Kingdom. Meeting Report.

[2] Modalities and procedures for a CDM, as defined in Article 12 of the KP (UNFCCC/CP/2001/13/Add.2, Appendix B).

[3] Guidelines for the implementation of Article 6 of the KP (UNFCCC/CP/2001/13/Add.2, Annex).

- The second part introduces selected instruments that could be applied for the integration of biodiversity aspects into climate change mitigation activities. The advantages and disadvantages of these instruments for the indicated purpose are discussed and further literature for practical work with these instruments is presented.
- The third part of the toolkit will support the design of activities that are beneficial for biodiversity and contribute to the global 2010 biodiversity target. To facilitate the decision making process in the phase of the project design, the third part of the toolkit is based on decision-sheets for project types which are eligible according to the flexible mechanisms of the Kyoto Protocol (KP) which are the CDM and JI. Thereby the focus is on those sectors which possibly could have strong impacts on biodiversity: LULUCF and hydropower. The outlined activities however might also be part of national climate strategies without being convened within the scope of CDM or JI.

Furthermore the current approach will be useful for stakeholders. According to the MA stakeholders and the public have the opportunity to comment on a project proposal throughout the whole CDM project cycle, from project planning until the registration or non-registration of a project. All project proposals need to be published in the 30 day public comment period. Especially in this phase stakeholders could involve themselves intensively in the process. Furthermore they can assess, to what degree the planned project considers appropriate biodiversity aspects.

1.2 Context and International Political and Legal Framework

Against the background of two major conventions which are the result of the United Nations - Earth Summit, namely the Convention on Biological Diversity (CBD) and the UNFCCC, the integration of biodiversity concerns into climate change mitigation activities requires the achievement of synergies in the implementation of the conventions. The underlying rationale for the need to draw synergies is twofold:

- First, biodiversity management can contribute to climate change mitigation and adaptation;
- Second, both conventions contribute to sustainable development.

Both conventions include provisions which aim at achieving synergies in their implementation:

The UNFCCC calls for reducing or preventing anthropogenic emissions of greenhouse gases (GHG), including LULUCF as well as the promotion of renewable energy such as hydropower and dams (UNFCCC Art. 4.1.c).

Under the CBD, mainly decisions of CBD Conference of the Parties (COP) 5, urge Parties and governments to explore how incentive measures under UNFCCC and its KP can support CBD objectives. Furthermore the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) was requested to advise on the integration of biodiversity requirements into climate policy.

Following up these decisions an Ad Hoc Technical Expert Group (AHTEG) has been established in order to explore and discuss linkages between biodiversity and climate change, impacts of climate change on biodiversity and furthermore, how to link climate change mitigation to biodiversity. The AHTEG came to the following major conclusions (UNEP/CBD/SBSTTA 2003):

- LULUCF activities can play an important role in reducing GHG; however this depends on the local circumstances and the design of the activities.
- The impact of climate change mitigation activities on biodiversity can be positive as well as negative.
- There are opportunities to implement mutually beneficial activities, but this requires respective knowledge, political framework conditions and coordination at national and international levels.

An international workshop specifically addressed the topic of synergies and cooperation with other conventions[4], and expressed significant options to mitigate climate change and at the same time conserve biodiversity at the national level, the international community level and convention level.

First, possibilities to achieve synergies concerning the implementation of both the CBD and the UNFCCC at the national level comprises involving high-level biodiversity and climate experts, balancing bottom-up and top-down approaches, calling for synergies in national strategies, facilitating the coordination and communication between national focal points for each convention, applying the ecosystem approach at national level, and establishing and strengthening clearing house mechanisms (CHM).

Second, the international community should support:

- International funding of synergy-initiatives at the national level and support through technical advice;
- Partnerships between international organisations;

[4] This workshop was held from 2 - 4 July 2003 in Finland upon request of the COP 7 of the UNFCCC (Decision 5/CP.7) and, furthermore, of the Subsidiary Body for Scientific and Technological Advice (SBSTA), at its seventeenth session.

- The identification of best practices, the development of regional solutions and building-up local expertise.

Third, synergy activities at the convention level should enhance specific terms for the Joint Liaison Group (JLG), convene side events related to synergies at the SBSTA meetings, and draw lessons from synergies being achieved between other conventions. However, the further enhancement of synergies was not comprehensively taken up by UNFCCC COP 9 and is therefore one of the major tasks in the future.

1.3 Biodiversity Targets

The Strategic Plan for the CBD, adopted on the sixth meeting of the COP (Decision VI/26), includes the overall target to “achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to benefit of all life on Earth” (UNEP/CBD/COP/7/20/Add.3).

The World Food Summit in Johannesburg, South Africa in August/September 2002, endorsed this target and, additionally, emphasised the importance and critical role of biodiversity in sustainable development and poverty eradication.

At its seventh meeting, SBSTTA recommended to further underline the global goals with specific targets addressing, among others:

- The reduction of the loss of the components of biodiversity (biomes, habitats and ecosystems; species and populations; and genetic diversity);
- The threats to biodiversity, including those arising from invasive alien species, unsustainable use, climate change pollution and habitat change;
- Maintaining the flow of goods and services from biodiversity and ecosystems.

Table 1 provides an overview of the provisional framework of goals and sub-targets related to the global 2010 biodiversity target.

Table 1: Framework of goals and sub-targets to achieve 2010 target (UNEP/CBD/COP/7/20/Add.4).

I Protect the components of biodiversity

Goal 1. Maintain the diversity of ecosystems, habitats and biomes

Target 1.1: At least 10% of each of the world's ecological regions effectively conserved.

Target 1.2: Areas of particular importance to biodiversity protected.

Goal 2. Maintain species diversity

Target 2.1: estore, maintain, or reduce the decline of populations of species of selected taxonomic groups.

Target 2.2: Status of threatened species improved.

Goal 3. Maintain genetic diversity

Target 3.1: Genetic diversity of crops, livestock, and of commercially harvested species of trees, fish and wildlife and other major socio-economically valuable species conserved, and associated indigenous and local knowledge maintained.

II Address threats to biodiversity

Goal 4. Reduce pressures from habitat loss, land use change and unsustainable water use

Target 4.1: Rate of loss and degradation of natural habitats decreased.

Goal 5. Control threats from invasive alien species

Target 5.1: Pathways for major potential alien invasive species controlled.

Target 5.2: Management plans in place for major alien species that threaten ecosystems, habitats or species.

Goal 6. Halt unsustainable use

Target 6.1: Biodiversity-based products derived from sources that are sustainably managed.

Target 6.2: Production areas managed consistent with the conservation of biodiversity.

Target 6.3: No species of wild flora or fauna endangered by international trade.

Goal 7. Reduce pressures from climate change, pollution and soil erosion

Target 7.1: Pressures of climate change, pollution and soil erosion and their impacts on biodiversity and ecosystems reduced.

III Maintain and share benefits from biodiversity

Goal 8. Maintain capacity of ecosystems to deliver goods and services and support livelihoods

Target 8.1: Capacity of ecosystems to deliver goods and services maintained.

Target 8.2: The decline of biological resources, and associated indigenous and local knowledge, innovations and practices that support sustainable livelihoods, local food security and health care halted.

Goal 9. Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources

Target 9.1: All transfers of genetic resources in line with CBD, International Treaty on Plant Genetic Resources for Food and Agriculture and other applicable agreements.

The provisions of the CBD do not define the *loss of biodiversity*. Within the report of the London Meeting (2010 – The Global Biodiversity Challenge, 21 – 23 May 2003) defines it as a concept, which goes beyond extinction, covering the decline in extent, condition or sustainable productivity of ecosystems, the decline in abundance, distribution or sustainable use of populations and species extinction, and genetic erosion.

Additionally to the development of global biodiversity targets under the CBD, Parties of the CBD are requested to define their own country-specific biodiversity targets in the national biodiversity strategy and related action plans. Climate change mitigation projects should consider the national biodiversity strategies and action plans (NBSAP) as a fundamental source for biodiversity targets.

2 Possible Conflicts and Synergies between Climate Change Mitigation Activities and Biodiversity

Climate-related activities that might be taken under the UNFCCC and its KP may include among others, such activities as afforestation, reforestation, forest management, revegetation, cropland management, grazing land management, and cultivation of energy crops or hydropower. These activities can have positive or negative impacts on biodiversity. Whether impacts of activities are adverse or beneficial for biodiversity will 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.

The following table (Table 2) shows a spectrum of possible impacts on biodiversity for some named activities.

Table 2: Selected climate change mitigation options under CDM and JI and their possible effects on biodiversity.

Possible activities	Circumstances for potential beneficial impacts on biodiversity	Circumstances for potential adverse impacts on biodiversity
Afforestation and reforestation	• If activity improves connectivity between habitat patches or fragments • If activity takes place on degraded pasture and agricultural sites • If clearing of pre-existing vegetation and thinning is minimised • If natural regeneration and native species are used that reflect structural properties of surrounding forests • If tree density respects biodiversity needs • If mixed age classes stands are established • If areas for habitats for different species are considered • If use of chemical pesticides is excluded • If biological conservation or restoration of ecosystems is an integral part of the management scheme	• On areas where natural ecosystems are destroyed for the activities (e.g. plantations on recently cleared tropical forests) • If drainages are used • If other vegetation is completely cleared before and during the activity • If monocultures of exotic species are used on large areas • If single age-class stands are established • If chemicals are used • If no habitats are created • If short rotation periods are used • If tree density is very high
Forest management	• If natural forest regeneration occurs • If fire management respects natural	• If natural and semi-natural forests are replaced by monospecific and even-aged

Possible activities	Circumstances for potential beneficial impacts on biodiversity	Circumstances for potential adverse impacts on biodiversity
	fire regeneration cycles • If low-impact harvesting methods and extended rotation periods occur • If chemical use is excluded • If natural disturbances regimes are permitted resp. emulated (Biodiversity of young and premature stages and open areas benefit) • If used local and side adapted species for planting • If forest stands have different ages and structures • If rotation length is extended • If important microstructures such as old growth forest as well as dead and decaying wood are maintained • If important key habitats are protected • If biological conservation or restoration of ecosystems is an integral part of the management scheme	plantations • If non-site adapted species are planted, e.g. invasive alien species and genotypes or genetically modified organisms (GMOs) • If natural regeneration is suppressed • If abundant chemical use occurs • If fire management disrupts natural fire regeneration cycles • If poor logging practices (high-impact harvesting) occurs, e.g. use of damaging machinery • If large scale clear-cuttings occurs in areas without natural large scale disturbances • If important forest structures such as dead and decaying wood are removed • If drainages are used
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
Grazing land management	• Mainly positive if no natural areas are destroyed • If native 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
Revegetation	• If measure increases richness of native plant species over time • If measure prevents further degradation and protects neighbouring habitats	• If measure destroys endemic species • If exotic species for revegetation invade native habitats • Possible increase on N_2O emissions because of fertilizer use
Cultivation of energy crops:		
□ **Annual energy plants**	• Conversion of degraded cropland or non-native pastures • Use of native species (e.g. switchgrass in North America)	• Conversion of natural forests or grasslands for energy crop production • Conversion of diverse agroecosystems or set-aside lands (fallow) for energy crop production
□ **Perennial energy plants**	• Conversion of degraded cropland or non-native pastures • Use of native species	• Conversion of natural forests or grasslands for energy crop production • Conversion of diverse agroecosystems for energy crop production • Loss of breeding bird and mammal species • Fragmentation of open landscapes • Even-aged monoculture stands

Possible activities	Circumstances for potential beneficial impacts on biodiversity	Circumstances for potential adverse impacts on biodiversity
□ **Residues from forest products, crop and animal production**	• If additional nutrients from residues transformation complement natural nutrient cycle	• If natural nutrient cycle is disturbed
□ **Traditional biomass use (mainly fuelwood collection)**	• If fuelwood collection is limited to a sustainable extend	• If dead wood collection affects deadwood communities • If living branches are used and thus shelter or nesting areas for a variety of species are affected • If particular preferred fuelwood species may be targeted and these eventually disappeared • If extensive removal of branches and fallen leaves break the nutrient cycle, lower productivity and lead to soil erosion
Storage dams	Hydropower projects always lead to the loss of land coupled with irreversible loss of species populations and ecosystems. However there are options to minimise these effects, i.e. small and micro-scale schemes or run-off river projects. (Detailed criteria for environmentally friendly dam constructions are listed in Catalogue 6)	• If fish migration is prevented • If flow, flood pulse oxygen and sediment content is altered • And others (see 4.2.5)

If the implementation of activities under the KP is compatible with the objectives of the CBD depends on the following circumstances:

- if activities 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 minimised.

Furthermore for climate change mitigation measures in the further surrounding field of land-based activities the following recommendations can be given. All kinds of these activities simultaneously consider beneficial circumstances to biodiversity aspects:

- if native species are favoured over non-native species;
- if use of pesticides is minimised;
- if use of fertilizers is minimised;
- if use of genetically modified organisms (GMO) is excluded;
- if activities include restoration or conservation of native ecosystems.

3 Important Instruments for the Consideration of Biodiversity Aspects in Climate Change Mitigation Activities

There is a range of tools available to assess the state, pressures and impacts on biodiversity and to integrate biodiversity requirements into climate change mitigation activities and respective proposals. However such instruments are not always applied effectively. Therefore important instruments for biodiversity assessment such as environmental impact assessments (EIA), strategic environmental assessments (SEA), guidelines and indicators are presented in this toolkit. The following overview will support the decision making process concerning the selection of suitable instruments and give guidance on how the instruments could best be applied to ensure an appropriate consideration of biodiversity concerns.

3.1 Environmental Impact Assessment

What is EIA?

The International Association for Impact Assessment (IAIA) defines Environmental Impact Assessment (EIA) as "The process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made". Usually, EIAs are applied on a project-specific basis, such as land developments, construction or infrastructure work.

General requirements and legal basis

Many countries have developed a legal basis for EIA. This makes EIA a widespread and commonly used tool for assessing the impacts of a proposed development. Usually national legislation defines which type of activities should be subject to an EIA, categories of projects for different levels of intensity of assessment, and procedures or steps to be followed. Some funding organisations, like the World Bank (WB), have developed their own procedures and Operational Policies (OP) for the EIA process.

Advantages of EIA as an Instrument to consider biodiversity aspects

- EIA is widespread and commonly used in many countries.
- EIA often is founded on a legal basis.
- A large set of proven methods and procedures as well as best-practice from many sectors is available.

- EIA has political backing in the international climate and biodiversity policy process.

Disadvantages of EIA as an Instrument to consider biodiversity aspects

- In many countries, the consideration of biodiversity aspects is not explicitly required in EIA legislation.
- Many climate project types would not be subject to an EIA because the agriculture and forestry sector are not included in EIA legislation in some countries.
- In practice, EIA often fails to include biodiversity aspects adequately into EIA due to lack of time, funding and expertise - especially if biodiversity is not mentioned explicitly in the terms of reference.

Recommendation

EIA is a powerful and established instrument for the assessment of project-based climate-related activities, although the integration of biodiversity aspects is not yet guaranteed in every case. However, there is good literature existing that provides practical and detailed guidance on how to integrate biodiversity aspects into EIA. To guarantee a high quality standard for climate change mitigation projects, CDM and JI projects should preferably be carried out in countries where EIA is based on national legislation, includes the agriculture and forestry sector and requires to consider biodiversity aspects in the process.

Literature

Source	Content
CBD Decision VI/7 (2002): Identification, monitoring, indicators and assessments.	Provides practical guidance on biodiversity aspects to be included into the different steps in EIA, including suggestions for screening criteria and a scoping checklist.
UNEP/CBD/SBSTTA (2003): Interlinkages between biological diversity and climate change - Advice on the integration of biodiversity considerations into the implementation of the UNFCCC and its KP.	Guidance on biodiversity aspects in mitigation and adaptation projects, including LULUCF and bioenergy projects.
The World Bank (2000): Biodiversity and Environmental Assessment Toolkit.	Contains information on methodologies, with extensive information on literature and organisations with biodiversity expertise.
The World Bank (1999) Operational Policy (OP)/Bank Procedure (BP) 4.01: Environmental Assessment.	Procedures of the WB for EIAs. EIA is mandatory for projects proposed for Bank financing.

Source	Content
Treweek, J. (2001): Integrating Biodiversity with National Environmental Assessment Processes. A review of Experiences and Methods. United Nations Environment Programme (UNEP) and United Nations Development Programme (UNDP) Biodiversity Planning Support Programme. Bristol, U.K.	Practical and extensive toolkit on biodiversity aspects in EIA, including sets of criteria and indicators (C&I) for every step in EIA.

3.2 Strategic Environmental Assessment

What is SEA?

SEA is an environmental assessment of a strategic action like a policy, plan or programme (PPP). Unlike EIA, which is restricted to site-specific project-based developments, it is focused on a broader level of activities.

General requirements and legal basis

SEA as an instrument for environmental assessment is not as well-established as project-based EIAs are. Only few countries have established a legal framework for SEA, and thus SEA techniques, methods and procedures still vary considerably. However, SEA is gaining importance as an instrument used by large funding organisations as the World Bank.

Advantages of SEA as an Instrument to consider biodiversity aspects

- SEA overcomes an important weakness of project-based EIA in that it can be used to assess a wider range of possible alternatives. Different mitigation options, e.g. including or excluding LULUCF sector activities, could be tested against each other.
- SEA can be used to assess the cumulative effects of activities.
- If SEA is carried out early, certain activities, project types or areas could be excluded from the very beginning before the planning stage.
- SEA is currently gaining importance worldwide, especially in organisations like the World Bank that are working in the field of carbon funding.
- SEA has political backing in the international climate and biodiversity policy process.

Disadvantages of SEA as an Instrument to consider biodiversity aspects

- Not many countries have established binding regulations on SEA, especially developing countries lack legislation on this instrument.
- There are no standard methods that could be applied internationally.
- The costs for a SEA are usually not borne by the project proponent, as in EIA, but by the public. This could be a disincentive for developing countries to apply the instrument, as they would have to bear the additional costs.
- The inclusion of biodiversity aspects is not well-established in SEA practice.

Recommendation

SEA is a relatively new tool that can help to establish a framework for climate policy. SEA can help to include/exclude certain types of activities, to develop standards and criteria for projects (e.g. in the CDM) that go beyond the Kyoto requirements. SEAs could be carried out on a national, regional or sectoral basis.

Literature

Source	Content
CBD Decision VI/7 (2002): Identification, monitoring, indicators and assessments.	Provides practical guidance on biodiversity aspects to be included into the different steps in EIA and SEA, including suggestions for screening criteria and a scoping checklist.
UNEP/CBD/SBSTTA (2003): Interlinkages between biological diversity and climate change - Advice on the integration of biodiversity considerations into the implementation of the UNFCCC and its KP.	Flow diagram on steps in the Kyoto project cycle, EIA and SEA.
Kjorven, O. and Lindhejm, H. (2002): Strategic Environmental Assessments in World Bank Operations: Experience to Date - Future Potential. The World Bank Group.	Information on principles of best practice, status quo of SEA at the national and international level and experience and lessons learned from SEA in World Bank activities.
Thérivel, R. and Partidário, M.R. (1996): The Practice of Strategic Environmental Assessment. Earthscan, London.	Standard literature on SEA with extensive description of steps and procedures in SEA practice and descriptions of best practice.
Treweek, J. (2001): Integrating Biodiversity with National Environmental Assessment Processes. A review of Experiences and Methods. UNEP / UNDP Biodiversity Planning Support Programme. Bristol, U.K.	Practical and extensive toolkit on biodiversity aspects in EIA and SEA (major focus on EIA), including checklists of biodiversity elements to consider in SEA and the role of SEA in mitigation.

3.3 Guidelines

What are guidelines?

In this context guidelines are rules for bearing in mind ecological consequences of management measures (e.g. ecological land use like sustainable forest or grazing land management) or other activities (e.g. energy plants such as dam construction). Guidelines are normally defined in a normative manner by an authority. They are mostly formulated in a rather general and vague manner in order to meet the assessment requirements for a wide range of different activities. Existing guidelines that could be also applied for climate change mitigation activities in the Kyoto context start with comparatively noncommittal general principles (e.g. ecosystem approach, UN Forest Declaration) and continue with more detailed and more precise guidelines like for example some sustainable forest management guidelines (see Catalogue 1), forest certification systems or voluntary standards such as the Gold Standard (GS) (WWF 2003).

General requirements

Guidelines are an internationally widespread approach. In some areas like the forestry sector they have been applied and proved to be generally effective to meet many different requirements (social, ecological or economical). Furthermore, as soon as they have been drawn up e.g. by means of a wide stakeholder consultation they can easily be applied. The various guidelines are partly founded on a legal basis, most of them however on a voluntary basis.

Advantages of guidelines as an instrument to consider biodiversity aspects

The benefit of guidelines is that they can be adjusted to many different levels and specifically developed for certain types of projects, policies, or circumstances. They can be drawn up for different levels in order to meet the respective specifications (guidelines mirror the preferences of authoring institutions, e.g. governments) and the required extent of consideration of biodiversity aspects; they can also be adjusted in detail to the respective ecosystem. Finally guidelines are applied for a long time and proven to be effective e.g. in SLM.

Disadvantages of guidelines as an instrument to consider biodiversity aspects

Worldwide many guidelines exist already for some areas of land use activities. However when applied, the extent of consideration for biodiversity differs considerably (e.g. the different forest guidelines). For some activities existing guidelines do not sufficiently consider biodiversity aspects. For others useable guidelines even do not exist at all (e.g. offshore windpower plants, carbon sequestration in marine ecosystems).

If guidelines are formulated in a very general manner, the use of such guidelines does not guarantee optimum realisation of all requirements in the context of the CBD. Such guidelines are not suitable for CDM/JI project cycle steps. For instance some host country administrations released guidelines to be able to approve CDM projects. These guidelines should intend to steer the assessment of CDM projects with regard to sustainable development including biodiversity. But if they are formulated in a general manner they provide much room for interpretation. Due to that large scope of discretion, different negotiators or different evaluators will come to different results. Therefore such guidelines could not be seen as valid evaluation approach.

Some sustainable forest management (SFM) approaches only state the requirement “biodiversity is to be considered respectively to be protected”, which is usually not specified enough to make this guideline an usable instrument for considering biodiversity aspects in the designing of forest related sink activities.

Additionally, in order to use guidelines indicators are often needed for monitoring. If these indicators are missing (see above), the adequate realisation is hard to control.

Recommendations

Guidelines differ considerably in quality and intensity as to integrating biodiversity aspects not only within the same project type (e.g. forest management) but also on the different project levels and between the different project types. International regulations such as the ecosystem approach are not sufficiently precise yet in order to make sure a specific project considers biodiversity aspects, they nevertheless form the basis for regulations to be drawn up later e.g. on a national level.

In the forestry sector many different regional guidelines already today form a good basis - which can of course be optimised as to considering biodiversity aspects (see Table 2). In other projects suitable project guidelines still need to be evaluated (e.g. hydropower, cultivation of energy crops).

3.4 Indicators

What are indicators?

Indicators are instruments to describe the state or condition of something valued, as well as its change of quality or value (Dumanski & Pieri 1997). Thus indicators provide information on certain phenomena, monitor changes and allow comparing trends over a certain period of time (SHYAMSUNDAR 2002). Several attempts have been made in the meantime to combine a number of indicators and aggregate them to indices.

The importance of indicators relevant to biodiversity and its monitoring and reporting has increasingly been stressed at different political levels. Different scales and levels of reflection have different implications on how biodiversity will be assessed and on how biodiversity requirements will best be integrated into other policies at global, European and national levels.

Furthermore biodiversity indicators have been developed for different thematic areas, i.e. agri-environmental biodiversity or forest biodiversity.

General requirements

Both indicator and indices development face the challenge of "adequate" selection in order to meet the issue of political concern and to be sufficiently substantive and at the same time easy to understand. Furthermore the success of indicators depends on their applicability. Therefore many scientists stress repeatedly that indicators generally should be **s**pecific, **m**easurable, **a**chievable, **r**elevant and **t**ime-bound (SMART) philosophy.

The application of the driver/pressure/state/impact/response (DPSIR) framework takes different aspects of biodiversity into account. It describes the links between the pressures on land and biodiversity induced by human activities in this case carbon mitigation activities, the change in the quality of biodiversity and the response to these changes in order to halt or reverse trends.

Advantages of indicators as an instrument to consider biodiversity aspects

There are numerous specific local, national, and regional policies as well as local and site-specific conditions which require a profound assessment of biodiversity. Indicators are thus a suitable and necessary tool for assessing, monitoring and reporting on the state, impact, pressures and responses as well as cause-effect relationship related to biodiversity at global, regional and national levels. In relation to projects and activities indicators are a suitable means for site-selection.

This can be reflected by the application or specific case-by-case selection and generation of indicators for the integration of biodiversity concerns.

Indicators might directly flow into political decision making processes. They support reliable statements for projects involving land uses which do not require EIA or SEA.

Disadvantages of indicators as an instrument to consider biodiversity aspects

Generally the use and development of indicators face the following constraints:

- Indicator development and research relies upon adequate political and scientific framework.
- Data collection might be difficult due to external factors (i.e. climate variability).
- Scientific uncertainty and poor understanding of ecosystem processes.

Despite the intensive work of many organisations and initiatives on the development of biodiversity indicators there is a big discrepancy between scientific indicator development and policy requirements.

Furthermore there is an incompatibility concerning the technical requirements of indicator sets and data availability. In order to develop suitable state indicators an appropriate database has to be provided. Some regions lack the political or scientific framework for additional research. In other regions, i.e. drylands, comprehensive data collection is difficult to achieve due to variable climate and diversity of responses to rainfall (BUNNING 2003).

In all specific indicator sets are required for a variety of project types, ecosystems and land management. In cases where adequate indicators are not available, indicators have to be generated. This is a time-consuming and costly process.

Recommendations

Many biodiversity indicator sets are limited to state indicators. Impact and cause-effect biodiversity indicators should complement these sets in the future. The level of indicator applicability should be clearly indicated.

Harmonisation and coordination of ongoing indicator developments or existing indicator sets have already started in some areas, i.e. agro-biodiversity indicators, and should become one of the premises in indicator development.

Literature

Source	Content
UNEP/CBD/COP 2003: Implementation of the Strategic Plan: Evaluation of Progress Towards the 2010 Biodiversity Target: Development of Specific Targets, Indicators and a Reporting Framework. UNEP/CBD/COP/7/20/Add.3.4. December 2003.	Compilation of provisional global indicators for assessing progress towards the 2010 biodiversity target; Compilation of a provisional list of goals and targets with underlying technical rationales.
UNEP/CBD/SBSTTA (2003): Report of the expert meeting on indicators of biological diversity including indicators for rapid assessment of inland water ecosystems.	Indicator generation and development.

Source	Content
UNEP/CBD/SBSTTA/9/INF/7; 14 October 2003. Report to the Ninth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice. Montreal, 10-14 November 2003.	
Millennium Ecosystem Assessment (2003): Ecosystems and Human Well-Being. Millennium Ecosystem Assessment. Island Press.	Ecosystem Assessment at global level, indicator development.
Organisation for Economic Cooperation and Development (OECD) (2001): Environmental Indicators for Agriculture, Methods and Results, Volume 3. Paris, France.	Coordination of development of agri-environmental indicators; Source of information on the status and trends in the environment due to agricultural impact.
European Environment Agency (EEA) (2003): EEA core set of indicators. Revised version April 2003. Compiled by: Peter Kristensen. Copenhagen: EEA.	State and trends in Europe's biodiversity; Integration of biodiversity into other sectors; Indicator development and Europe-wide coordination.
European Commission (2000): Indicators for the Integration of Environmental Concerns into the Common Agricultural Policy. COM (2000) 20 final. Brussels.	Proposals for the integration of biodiversity concerns into the agricultural policy.
Biodiversity Indicators in National Use (BINU) http://www.ulrmc.org.ua/services/binu/keyquest_prop.html	The project BINU contributes to the development of operational national level biodiversity indicators to support planning and decision-making. Therefore several indicator frameworks are being tested for a focal ecosystem in four participating countries.
Land Quality Indicator (LQI) program http://www-esd.worldbank.org/html/lqi/intro.htm Dumanski, J. (1997): Criteria and Indicators for Land Quality and Sustainable Land Management. ITC Journal 1997 – 3/4.	International initiative to monitor changes having an impact on the sustainability of land resources in managed ecosystems.
Lane & Bunning (2003): Stocktaking of Dryland Biodiversity Issues in the Context of the Land Degradation Assessment of Drylands (LADA): Selection and Use of Indicators and Methods for Assessing Biodiversity and Land Condition. Draft 28 July 2003. Rome: Food and Agriculture Organisation (FAO).	Survey resulting in a compilation of dryland biodiversity issues in the context of the Land degradation Assessment of Drylands and an overview on potential indicators and methods for assessing biodiversity and land condition.
Energy and Biodiversity Initiative (EBI) (2003): Energy and Biodiversity: Integrating Biodiversity Conservation into Oil and Gas Development.	Development of a guide on the generation of biodiversity indicators within the oil and gas sector. The results comprise a methodology for indicator generation as well as a catalogue of indicators, outlining the application level and the strengths and weaknesses of each indicator.

4 Practical Guidance

The following chapter on practical guidance concerning the integration of biodiversity requirements into climate change mitigation activities consists of two parts: (1) one general part with an introductory decision sheet and related lists for minimum criteria and standards, (2) project-specific decision sheets (see 4.2).

4.1 Introductory Decision Support

The introductory decision sheet is independent from the project type and stresses general requirements to be considered for any kind of activity. Furthermore the introductory decision sheet provides guidance to the question whether an activity results in significant environmental impacts and an EIA has to be carried out[5], and how biodiversity requirements could be included in the planning phase of an activity. For additional support the introductory decision sheet refers to several check lists with minimum criteria and requirements.

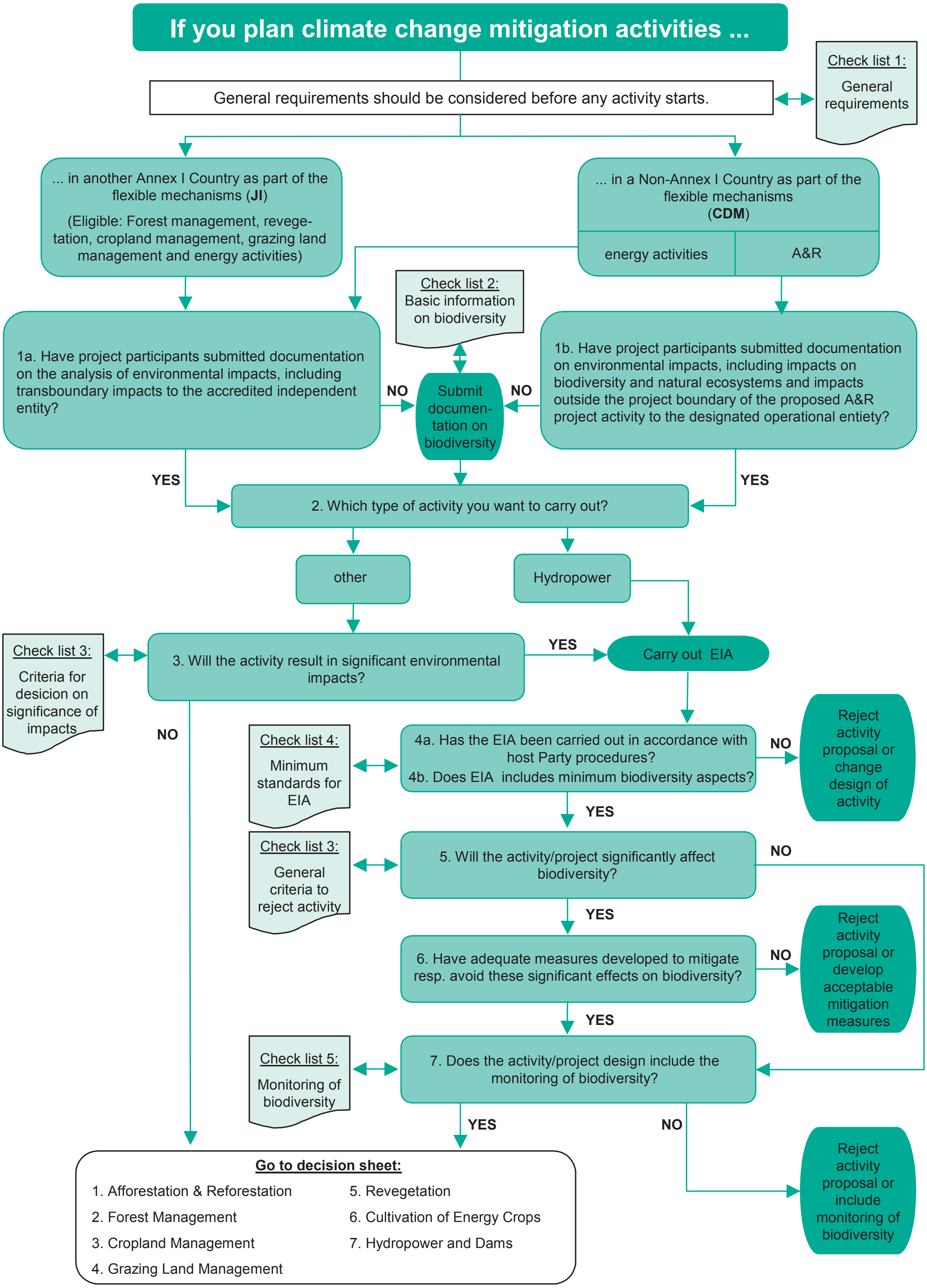
List 1: General requirements

To ensure that climate change mitigation activities also contribute to the conservation and sustainable use of biodiversity it is a pre-condition for proper project planning that a thorough review of existing information sources, programmes and plans take place. This section gives you basic information on sources which most should be considered, to guarantee high standard also for biodiversity concerns:

- Is the (host) country Party to the UNFCCC?
- Has it ratified the KP?
- Is the (host) country Party to the CBD?
- Has it developed a NBSAP?
- Does the (host) country have a stated national climate policy/strategy?
- Does this climate policy/strategy include provisions to guarantee that projects will contribute to the conservation and sustainable use of biodiversity?
- Does the planned activity (proposal) enhance biodiversity according to the 2010 biodiversity target[6]?

[5] Whereas no environmental assessment is required for domestic measures (as provided for under §3.3 and 3.4 of the KP), there are cases with a clear call for EIA for projects within the framework of JI (Decision 16/CP.7 §33(d)) and CDM (UNFCCC/SBSTA/2003/L.27 §12(c)).

[6] “To achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on earth.” (Decision VI/26 CBD).


If you plan climate change mitigation activities ...
General requirements should be considered before any activity starts.
Check list 1:
General requirements
... in another Annex I Country as part of the flexible mechanisms (JI)
(Eligible: Forest management, revegetation, cropland management, grazing land management and energy activities)
... in a Non-Annex I Country as part of the flexible mechanisms (CDM)
energy activities
A&R
Check list 2:
Basic information on biodiversity
1a. Have project participants submitted documentation on the analysis of environmental impacts, including transboundary impacts to the accredited independent entity?
NO
Submit documentation on biodiversity
NO
1b. Have project participants submitted documentation on environmental impacts, including impacts on biodiversity and natural ecosystems and impacts outside the project boundary of the proposed A&R project activity to the designated operational entiety?
YES
YES
2. Which type of activity you want to carry out?
other
Hydropower
Check list 3:
Criteria for desicion on significance of impacts
3. Will the activity result in significant environmental impacts?
YES
Carry out EIA
NO
Check list 4:
Minimum standards for EIA
4a. Has the EIA been carried out in accordance with host Party procedures?
4b. Does EIA includes minimum biodiversity aspects?
NO
Reject activity proposal or change design of activity
YES
Check list 3:
General criteria to reject activity
5. Will the activity/project significantly affect biodiversity?
NO
YES
6. Have adequate measures developed to mitigate resp. avoid these significant effects on biodiversity?
NO
Reject activity proposal or develop acceptable mitigation measures
YES
Check list 5:
Monitoring of biodiversity
7. Does the activity/project design include the monitoring of biodiversity?
YES
NO
Reject activity proposal or include monitoring of biodiversity
Go to decision sheet:
1. Afforestation & Reforestation
2. Forest Management
3. Cropland Management
4. Grazing Land Management
5. Revegetation
6. Cultivation of Energy Crops
7. Hydropower and Dams

continuing List 1: General requirements

- Does the planned activity contribute to the conservation and sustainable use of biodiversity[7]?
- Does the proposal include basic information on biodiversity?
- Does the proposal consider procedural guidelines, e.g.
    - minimum standards for stakeholder consultation, e.g. local communities, environmental non-governmental organisations (NGOs), NGOs of indigenous communities;
    - minimum standards for EIA (definition of activities for which EIA is mandatory, recommended or not necessary)?
- Do you have regulations for monitoring biodiversity in projects?

Furthermore the political framework related to nature conservation has to be taken into account. The following list (Table 3) provides an overview on information sources including species based approaches as well as ecosystem-based approaches.

Table 3: Species and Ecosystems Assessment and Information Obtained by Various Organisations.

Approach / Indicator	Responsible Institution	Description
Endemic Bird Areas	BirdLife International http://www.birdlife.net	Analysis of all the world's bird species with a breeding range of 50,000 km² or less, identification and mapping of all areas with two or more such species
Important Bird Areas	BirdLife International http://www.birdlife.net	
Centres of Plant Diversity	International Union for Conservation of Nature and Natural Resources (IUCN), World Wildlife Fund (WWF) http://www.iucn.org/themes/ssc/plants/plantshome.html	Identification of globally important areas for the conservation of plant diversity
Global Red List	IUCN http://www.redlist.org	Species at risk of extinction

[7] A good way to achieve correspondence between climate change mitigation measures and biodiversity aims would be to carry out a SEA.

Approach / Indicator	Responsible Institution	Description
Global River Basin Analysis/ Fish Family Diversity	UNEP-WCMC http://www.wcmc.org.uk	Biodiversity richness in 157 major river basis worldwide; combination with river basin vulnerability
Hotspots	Conservation International http://www.biodiversityhotspots.org/xp/Hotspots	25 regions that are rich in endemic species and threatened by habitat loss
Vavilov Centres	http://www.icarda.cgiar.org/Location.htm	Areas of genetic diversity of wild relatives of domestic crop plants; particularly important in relation to agricultural biodiversity, 25 areas identified
Ecofloristic Zone Analysis	Among others FAO, WCMC http://www.unep-wcmc.org/forest/data/cdrom2/zones.htm http://www.fao.org/wairdocs/x5309e/x5309e02.htm	Analysis of protected area coverage in the tropics, digitised by FAO as part of FAO Forest Resources Assessment
WWF-US Global 200 Ecoregions	WWF-US http://www.panda.org	Global priority ecoregions identified
Large Marine Ecosystems	http://www.unep.org/DEWA/water/MarineAssessment/reports/germany_report/LME-GIWA.doc	50 units have been mapped and identified, defined as ocean space encompassing near-coastal areas from river basins and estuaries

Furthermore a preliminary process has to assess whether the area of activity covers a designated protected area or a site with legally protected species. The following list provides an indicative overview on the legal framework at global and national levels:

Global level

- World Heritage Site (Convention for the Protection of the World Cultural and Natural Heritage).
- Site under the Ramsar Convention (Convention on Wetlands of International Importance Especially as Waterfowl Habitat).
- Sites hosting species listed under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals).

- Sites hosting species listed under CITES (Convention on International Trade in Endangered Species of Wild Flora and Fauna).
- Site hosting species under the Bern Convention (Convention on the Conservation of European Wildlife and Natural Habitats).

National/regional level

- Areas or species protected by national or regional legislation.
- Other non-legally binding site of conservation.
- Biosphere Reserve (United Nations Educational, Scientific, and Cultural Organisation (UNESCO) Man & Biosphere Programme).

Political Framework

From the political point of view the preparatory period of a climate change mitigation measure should answer the following questions:

- Who are the relevant stakeholders taking care of biodiversity protection in the envisaged project area?
- Did the country of action already complete a NBSAP[8]? How might the project link up to the broader objectives of the strategy?
- Did the region of action already establish any plans, programmes or policies related to sustainable land use or resource management? How might the project link up to these initiatives?

List 2: Basic Information on Biodiversity in Project Proposals

This list includes basic information to be included either into the PDD as required by the CDM or JI procedures[9] or into any general description of any climate change mitigation activity proposal.

[8] A list of completed NBSAPs is available at http://www.undp.org/bpsp/nbsap_links/nbsap_links.htm.

[9] Information is compulsory for JI projects according to Decision 16 §33(d) and App. B and for CDM A&R projects according to UNFCCC/SBSTA/2003/L.27 §12(c) and App. B. (CDM) on modalities and guidelines for A&R projects under the CDM.

site-specific

- environmental conditions of the area, including a description of soils, climate, hydrology, ecosystems, and the possible presence of rare and endangered species and their habitats;
- endemic species;
- special ecosystem types (wetlands, waterways, natural grasslands);
- possible presence of agro ecologically important crop varieties and/or their wild relatives;
- legal status of the area;
- protected areas or areas with importance for biodiversity outside the project boundary but possibly influenced by the project;
- resting zones or other areas important for migratory species.

activity-specific

- see decision sheets 1 to 7

List 3: Criteria for Decision on Significance of Impacts

This list includes criteria that can be used to determine the significance of impacts on biodiversity, either as a screening step to decide on the type and extent of EIA to be carried out or to reject proposals. The criteria have developed by CBD COP (UNEP/CBD/COP/6/20, Decision VI/7, Appendix 2):

Category A: EIA mandatory

Only in the case criteria can be based on formal legal backing, such as:

- National legislation, for example in case of impact on protected species and protected areas;
- International conventions such as CITES, the CBD, the Ramsar Convention on Wetlands, etc.;
- Directives from supranational bodies, such as the European Union Directive 92/43/EEC of 21 May 1992 on Conservation of Natural Habitats and of Wild Fauna and Flora and Directive 79/409/EEC on the Conservation of Wild Birds.

Indicative list of activities for which an EIA could be mandatory:

(a) At the genetic level:

- Directly or indirectly cause a local loss of legally protected varieties/cultivars/breeds of cultivated plants and/or domesticated animals and their relatives, genes or genomes of social, scientific and economic importance e.g. by introducing living modified organisms that can transfer transgenes to legally protected varieties/cultivars/breeds of cultivated plants and/or domesticated animals and their relatives.

(b) At species level:

- Directly affect legally protected species, for example by extractive, polluting or other disturbing activities;
- Indirectly affect legally protected species, for example by reducing its habitat, altering its habitat in such a manner that its survival is threatened, introducing predators, competitors or parasites of protected species, alien species or GMOs;
- Directly or indirectly affect all of the above for cases which are important in respect of e.g. stop-over areas for migratory birds, breeding grounds of migratory fish, commercial trade in species protected by CITES;
- Directly or indirectly affect non-legally protected, threatened species.

(c) At ecosystem level:

- Are located in legally protected areas;
- Are located in the vicinity of legally protected areas;
- Have direct influence on legally protected areas, for example by emissions into the area, diversion of surface water that flows through the area, extraction of groundwater in a shared aquifer, disturbance by noise or lights, pollution through air.

Category B: The need for or the level of EIA is to be determined.

In cases where there is no legal basis to require an EIA, but one can suspect that the proposed activity may have a significant impact on biological diversity, or that a limited study is needed to solve uncertainties or design limited mitigation measures. This category covers the frequently referred to but difficult to use concept of “sensitive areas”. As long as so-called sensitive areas do not have any legal protected status it is difficult to use the concept in practice, so a more practical alternative is provided.

The following categories of criteria point towards possible impacts on biological diversity, and further attention is thus required:

(a) Activities in, or in the vicinity of, or with influence on areas with legal status having a probable link to biological diversity but not legally protecting biological diversity. For example: a Ramsar site has the official recognition of having internationally important wetland values, but this recognition does not automatically imply legal protection of biological diversity in these wetlands). Other examples include areas allocated to indigenous and local communities, extractive reserves, landscape preservation areas, sites covered by international treaties or conventions for preservation of natural and/or cultural heritage such as the UNESCO biosphere reserves and World Heritage Sites;

(b) Impacts on biological diversity possible or likely, but the EIA is not necessarily triggered by law:

(i) At the genetic level:

- Replacing agricultural, forestry or fishery varieties or breeds by new varieties, including the introduction of living modified organisms (LMOs).

(ii) At the species level:

- All introductions of non-indigenous species;
- All activities which directly or indirectly affect sensitive or threatened species if or in case these species are not yet protected (good reference for threatened species is provided by the IUCN Red Lists); sensitive species may be endemic, umbrella species, species at the edge of their range, or with restricted distributions, rapidly declining species. Particular attention should be given to species which are important in local livelihoods and cultures;
- All extractive activities related to the direct exploitation of species (fisheries, forestry, hunting, collecting of plants (including living botanical and zoological resources), etc.);
- All activities leading to reproductive isolation of populations of species (such as line infrastructure).

(iii) At the ecosystem level:

- All extractive activities related to the use of resources on which biological diversity depends (exploitation of surface and groundwater, open pit mining of soil components such as clay, sand, gravel, etc.);
- All activities involving the clearing or flooding of land;
- All activities leading to pollution of the environment;
- Activities leading to the displacement of people;
- All activities leading to reproductive isolation of ecosystems;

- All activities that significantly affect ecosystem functions that represent values for society. Some of these functions depend on relatively neglected taxa;
- All activities in areas of known importance for biological diversity, such as areas containing high diversity (hot spots), large numbers of endemic or threatened species, or wilderness; required by migratory species; of social, economic, cultural or scientific importance; or which are representative, unique (e.g. where rare or sensitive species occur) or associated with key evolutionary or other biological processes.

Category C: No EIA required

- Activities which are not covered by one of the categories A or B, or are designated as category C after initial environmental examination.

The generic nature of these guidelines does not allow for the positive identification of types of activities or areas where EIA from a biodiversity perspective is not needed. At country level, however, it will be possible to indicate geographical areas where biological diversity considerations do not play a role of importance and, conversely, areas where they do play an important role (biodiversity-sensitive areas).

List 4: Minimum Standards for EIA

EIAs can be a powerful tool to ensure a high environmental standard in climate change mitigation activities. However, to make sure that biodiversity aspects are fully considered, EIA procedures should meet the criteria indicated below:

- EIAs should include the minimum steps as recommended by the IAIA or in CBD Decision VI/7.
- Examination of alternatives should be given importance.
- Mitigation measures should be laid down in an implementation plan and be monitored.
- EIA should provide for sufficient stakeholder consultation in the process.
- All relevant components of biodiversity should be included into the impact assessment study, e.g. bioregion, landscape, ecosystem, habitat, community, species, population, individual and genes.
- A clear list of criteria should help to determine whether an EIA is mandatory, recommended or not necessary (see CBD Decision VI/7).
- Requirements for monitoring (procedures to be followed).

- Regulations for action if monitoring reveals that contrary to initial expectations biodiversity is being affected.

Further information can be obtained from CBD Decision VI/7 or from TREWEEK (2001).

List 5: Monitoring of Biodiversity

Proponents of a defined climate change mitigation activity should provide a clear framework for monitoring and follow-up of relevant biodiversity aspects or information to be included into the proposal and in subsequent reports on activity progress:

activity proposal

- should determine which aspects are relevant and apt for monitoring (e.g. propose appropriate indicators for monitoring, including time frame, season and frequency needed for monitoring);
- should indicate a baseline or status-quo-analysis of these indicators[10];
- should indicate a budget for monitoring.

monitoring procedures

- should include on-site visits by biodiversity experts;
- should be undertaken regularly;
- should check whether initial mitigation measures have been carried out.

activity progress reports

- should include the results of monitoring;
- should include declarations of action taken to mitigate possible negative effects as revealed by monitoring.

[10] Examples for indicators are:
- population size of rare/endangered/endemic species in project area
- total area of special habitats (e.g. wetlands)
- erosion rate of catchments
- distribution and status of non-native species
- water quality of downstream river
- air quality

4.2 Activity-specific Decision Support

In line with the scope of the toolkit the specific decision sheets focus on selected activities and project types of the energy and LULUCF sector (see Table 4).

Table 4: Overview of selected activities and project types and their eligibility under the Kyoto mechanisms JI and CDM

Type of activity	JI	CDM
1. Afforestation & Reforestation (A&R) (see 4.2.1)	X	X
2. Forest Management (see 4.2.2)	X	
3. Cropland Management (see 4.2.3.1)	X	
4. Grazing Land Management (see 4.2.3.2)	X	
5. Revegetation (see 4.2.3.3)	X	
6. Cultivation of Energy Crops (see 4.2.4)	X	
7. Hydropower and Dams (see 4.2.5)	X	X

One major issue which determines the impact of an activity on biodiversity is the form of pre-cultivation. The conversion of ecosystems of high natural value results in both loss of organic carbon and of biodiversity and should thus be rejected. Adequate options for the conversion of land will be highlighted for every project type.

Furthermore the projects-specific decision sheets will step-by-step support the design of a biodiversity-friendly activity for climate change mitigation.

4.2.1 Afforestation & Reforestation

A&R activities can have positive, neutral or negative impacts on biodiversity. The impact depends strongly on the level and nature of biodiversity of the ecosystem being replaced (UNEP/CBD/SBSTTA 2003), or restored or conserved, whether the project explicitly is designed to benefit biodiversity (e.g., by building corridors, maintaining natural ecosystem landscapes), the specific species and projects activities, the appropriate or inappropriate integration of project activities into the landscape matrix and the spatial scale being considered.

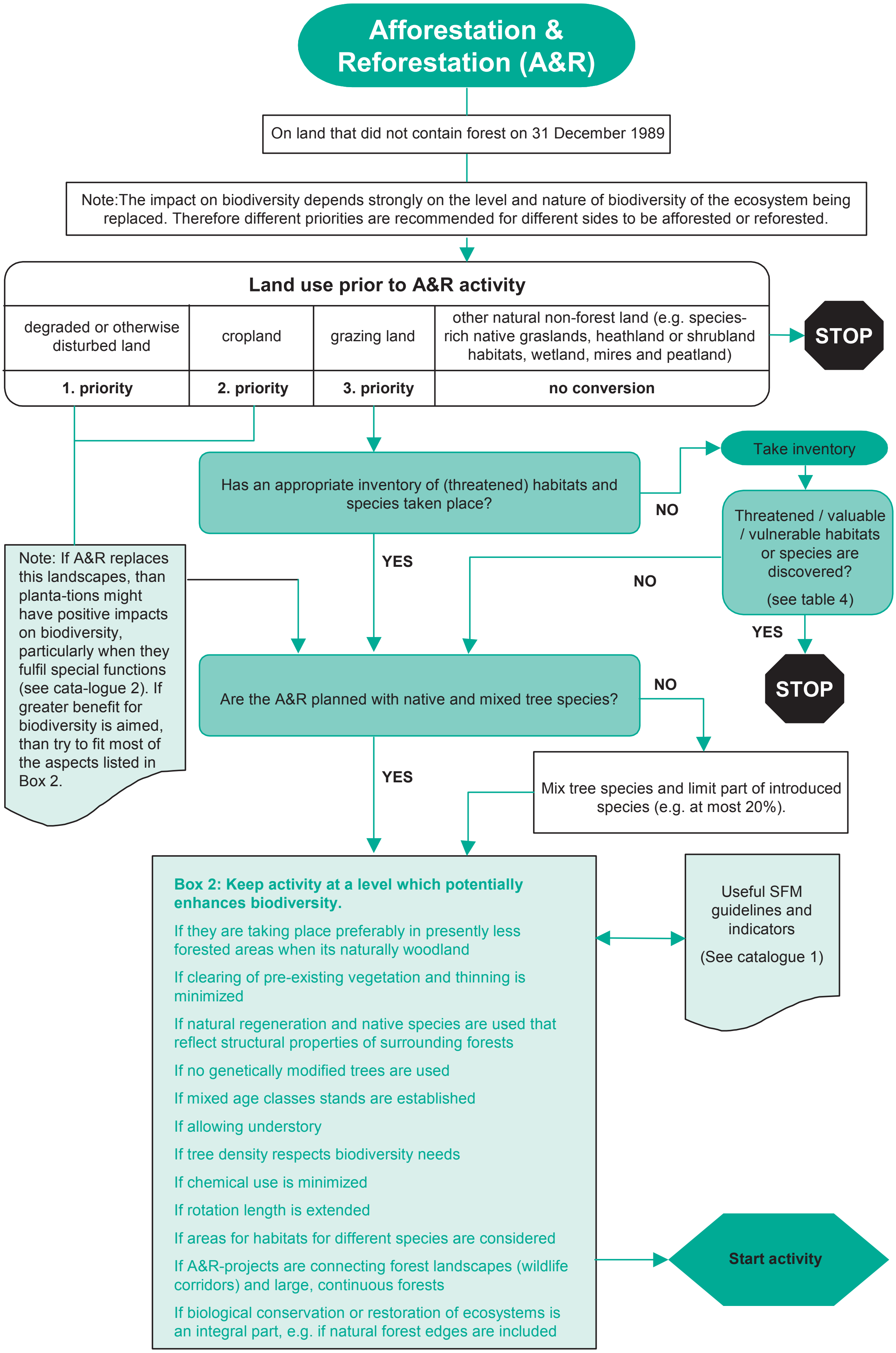
Specific sites may be better candidates for implementing such activities than others, based on past and present uses, the local or regional importance of their associated biological diversity and proximity to nearby, natural forests. For instance degraded lands may offer the best opportunities for such activities to enhance biodiversity, as these lands have already lost much of their original biodiversity whereas A&R activities that replace native non-forest ecosystems (e.g. species-rich native grasslands, wetland, heathland or shrubland habitats) by non-native species, or by a single or few species of any origin, can negatively affect biodiversity (UNEP/CBD/SBSTTA 2003). Since wetlands are a very species-rich ecosystem, which is endangered world-wide and there are sufficient alternative A&R surfaces, we recommend cardinally not converting wetlands by A&R activities.

For the mentioned above reasons the different existing forest management guidelines respectively forest processes with their respective C&I are not sufficient for A&R activities. For sink activities in the framework of forest management the different approaches (see Catalogue 1) more or less take into account biological diversity. However, for A&R activities the question of prior land use is of basic importance and influences the decisions. An EIA (see 3.1) can be of help in some cases and should always be considered for larger afforestation. In other cases EIA is even compulsory for CDM A&R projects according to UNFCCC/SBSTA/2003/L.27 on “Modalities and procedures for afforestation and reforestation project activities under the clean development mechanism in the first commitment period of the KP” (see Box 1).

Box 1: Modalities and procedures for A&R project activities under the CDM in the first commitment period of the KP.

“Project participants have submitted to the designated operational entity documentation on the analysis of the socio-economic and environmental impacts, including impacts on biodiversity and natural ecosystems, and impacts outside the project boundary of the proposed afforestation or reforestation project activity under the CDM. If any negative impact is considered significant by the project participants or the host Party, project participants have undertaken a socio-economic impact assessment and/or an **environmental impact assessment** in accordance with the procedures required by the host Party. Project participants shall submit a statement that confirms that they have undertaken such an assessment in accordance with the procedures required by the host Party and include a description of the planned monitoring and remedial measures to address them”.

Source: UNFCCC/SBSTA/2003/L.27, §12(c).


Afforestation & Reforestation (A&R)
On land that did not contain forest on 31 December 1989
Note:The impact on biodiversity depends strongly on the level and nature of biodiversity of the ecosystem being replaced. Therefore different priorities are recommended for different sides to be afforested or reforested.
Land use prior to A&R activity
degraded or otherwise disturbed land
cropland
grazing land
other natural non-forest land (e.g. species-rich native graslands, heathland or shrubland habitats, wetland, mires and peatland)
1. priority
2. priority
3. priority
no conversion
STOP
Take inventory
Has an appropriate inventory of (threatened) habitats and species taken place?
NO
Threatened / valuable / vulnerable habitats or species are discovered?
(see table 4)
NO
YES
YES
STOP
Note: If A&R replaces this landscapes, than planta-tions might have positive impacts on biodiversity, particularly when they fulfil special functions (see cata-logue 2). If greater benefit for biodiversity is aimed, than try to fit most of the aspects listed in Box 2.
Are the A&R planned with native and mixed tree species?
NO
YES
Mix tree species and limit part of introduced species (e.g. at most 20%).
Box 2: Keep activity at a level which potentially enhances biodiversity.
If they are taking place preferably in presently less forested areas when its naturally woodland
If clearing of pre-existing vegetation and thinning is minimized
If natural regeneration and native species are used that reflect structural properties of surrounding forests
If no genetically modified trees are used
If mixed age classes stands are established
If allowing understory
If tree density respects biodiversity needs
If chemical use is minimized
If rotation length is extended
If areas for habitats for different species are considered
If A&R-projects are connecting forest landscapes (wildlife corridors) and large, continuous forests
If biological conservation or restoration of ecosystems is an integral part, e.g. if natural forest edges are included
Useful SFM guidelines and indicators
(See catalogue 1)
Start activity

As part of A&R also **agroforestry** activities can be eligible under the CDM, if they do not fulfil the definition of forest[11] prior to, but after the project it will be fulfilled. Agroforestry has a great potential of delivering environmental benefits (biodiversity and others) as well as socio-economic benefits[12].

Catalogue 1: Useful Guidelines and Indicators for A&R and FM

Forest processes

(For an overview see also http://www.fao.org/forestry/index.jsp; resp. http://www.fao.org/DOCREP/004/AC135E/ac135e00.htm#Contents)

Region/Forest Types	Process and Year Initiated	Internet Further Information
Humid tropical forests; especially in Africa	International Tropical Timber Organisation (ITTO) in collaboration with African Timber Organisation (ATO), 2003 ITTO Criteria and Indicators for Sustainable Management of Natural Tropical Forests	http://www.itto.or.jp/inside/indicators .html See REPORTING QUESTIONNAI-RE FOR INDICATORS AT THE FOEST MANAGEMENT UNIT (FMU) LEVEL and there Criterion 5: Biological Diversity. Or see ITTO Guidelines on the Conservation of Biological Diversity in Tropical Production Forests (ITTO Policy Development Series No.5 - http://www.itto.or.jp/policy/pds5).
European forests	Pan-European Forest Process, 1993 Helsinki Criteria	http://www.minconf-forests.net
North, East and Southern Africa	Dry Zone Africa, 1995	http://www.fao.org/montes/foda/wforcong/PUBLI/PDF/V6E_T374.PDF
Temperate and boreal forests	Montreal Process, 1995	http://www.mpci.org http://www.mpci.org/criteria_e.html
Amazon forest	Tarapoto Proposal, 1995	http://www.rinya.maff.go.jp/mar/Mr.%20Sanchez%20Paper.pdf
Near East	Near East Process, 1996	http://www.fao.org/world/Regional/RNE/MoreLinks/Forest/indicators.pdf
Central America	Central America Process or Lepaterique Process, 1997	http://www.fao.org/DOCREP/004/AC135E/ac135e07.htm
South and Central Asia	Dry Forest Asia, 1999	http://www.fao.org/DOCREP/003/X6895E/x6895e04.htm

[11] "Forest is a minimum area of land of 0.05-1.0 hectares with tree crown cover (or equivalent stocking level) of more than 10-30 per cent with trees with the potential to reach a minimum height of 2-5 metres at maturity in situ. A forest may consist either of closed forest formations where trees of various storeys and undergrowth cover a high proportion of the ground or open forest. Young natural stands and all plantations which have yet to reach a crown density of 10-30 per cent or tree height of 2-5 metres are included under forest, as are areas normally forming part of the forest area which are temporarily unstocked as a result of human intervention such as harvesting or natural causes but which are expected to revert to forest" (11/CP.7; Annex A).

[12] Whether agroforestry activities have adverse or beneficial effects on biodiversity is similarly to A&R activities, wherefore this toolkit does not have a separately decision tree for agroforestry activities.

Voluntary Guidelines/Certification Systems		
Worldwide all kind of forests	Forest Stewardship Council (FSC), 1993	http://www.fscoax.org
Europe	Programme for the Endorsement of Forest Certification Schemes (PEFC), 1999	http://www.pefc.org
All land based climate mitigation worldwide, all project activities	Climate, Community & Biodiversity Alliance (CCBA) Triple Benefit Standards (CCBA land use certification), 2004	http://www.climate-standards.org

Catalogue 2: Plantations

Plantations typically have lower biodiversity than natural forests. Particularly large-scale industrial plantations of exotic species may only be capable of supporting low levels of local biodiversity at the stand level (HEALEY & GARA 2002).

Nevertheless on degraded lands or cropland even monoculture plantations of exotic species may contribute to biodiversity, for instance if they:

- allow the colonization and establishment of diverse understory communities by providing shade and ameliorating harsh microclimates,
- are appropriately situated within the broader landscape context; e.g. connecting areas of natural forest enabling for species migration and gene exchange (CIFOR 2003),
- can reduce pressures on natural forests by serving as sources of forest products, thereby leaving greater areas of natural forests for biodiversity conservation and provision of environmental services.

However, afforestation and reforestation plantations can easily have even more beneficial environmental impacts, especially if modifications are incorporated. Even modest changes in project design have the potential to significantly benefit biodiversity in plantation forests. For example:

- mixing different species along the stand edge,
- creating small clearings within the stand,
- creating small water catchments in or near the stand,
- and allowing under-story growth may greatly improve habitat for some animals and create favourable microsite conditions for some plants.

Significant biodiversity benefits can be achieved:

- by allowing a portion of the stand on a landscape to age past maturity,
- by reducing chemical and insect control,
- and avoiding localities where rare or vulnerable ecosystems and species are present at the time of site selection (HUNTER 1999, THOMPSON et al. 2003).

"Finally, mixed-species plantations have more overall ecosystem-service value and therefore are more likely to be retained by local communities for a longer time than single-species plantations (DAILY 1997, PRANCE 2002)" (UNEP/CBD/SBSTTA 2003). Nevertheless plantations inherently pose great risks to biodiversity and local livelihoods (among others UNEP/CBD/SBSTTA 2003). Therefore also numerous NGOs even strongly request that the environmental and social assessment process must effectively screen out large commercial plantations (CAN 2003).

4.2.2 Forest Management

Because forests are enormous repositories of terrestrial biodiversity at all levels of organisation (genetic, species, population, and ecosystem), improved management activities, that can enhance carbon uptake or minimise carbon losses may have positive or negative effects on biodiversity (see UNEP/CBD/SBSTTA 2003). Forest ecosystems are extremely varied and therefore positive or negative impact of any FM operation will differ according to soil, climate, and site history, including disturbance regimes (such as fire). Possible FM activities that are likely to alter carbon stocks comprise the following examples[13]:

- Forest regeneration
- Forest fertilisation
- Pest management
- Forest fire management
- Low-impact harvesting and harvest quantity and timing
- Other improved SFM measures, e.g.:
    - Conversion of coniferous forests to broadleaved forests
    - Enhancing deadwood
- Reducing forest degradation

[13] Brief descriptions of FM activities can be found in Chapter 4 of the IPCC Special Report on LULUCF (IPCC 2000).

During FM activities like fertilisation, pest management with using pesticides or fire management[14] might have an adverse impact on biodiversity, the most of the other FM-activities are extraordinary suitable to combine carbon sequestration with beneficial effects on biodiversity. Good examples are the improved SFM-guidelines, i.e. extending the rotation period or enhancing deadwood. That is all measures that simultaneously enhance carbon stocks and forest typically biodiversity.

However, from the view of biodiversity, reducing forest degradation respectively forest protection[15] would be definitely one of the best options to combine the integration of biodiversity concerns into sink activities as required by the conventions (see 1.1).

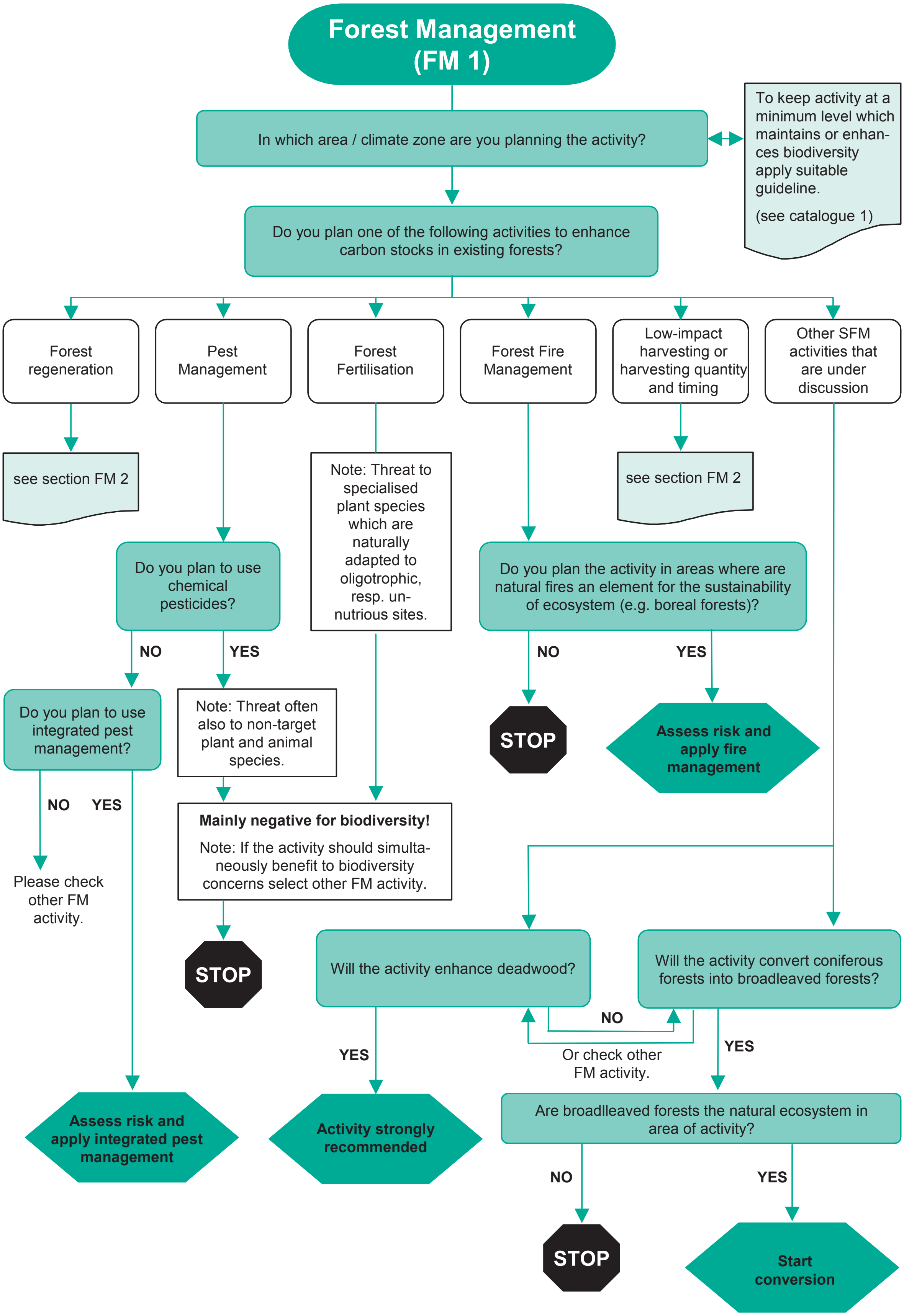
The following decision sheet considers these arguments in the way that activities which are mainly negative for biodiversity will be not recommended due to there are sufficient biodiversity friendly forest management activities to enhance probably carbon stocks. Furthermore for some activities it is still difficult to measure scientifically whether and in which quantity they really lead to long time carbon sequestration (IPCC 2001, HEROLD et al, 2001, WBGU 2003). If this handicap is clarified, in future it should be also an important aspect how much carbon can be stored by activity in relation to benefit or adverse impacts for biodiversity.

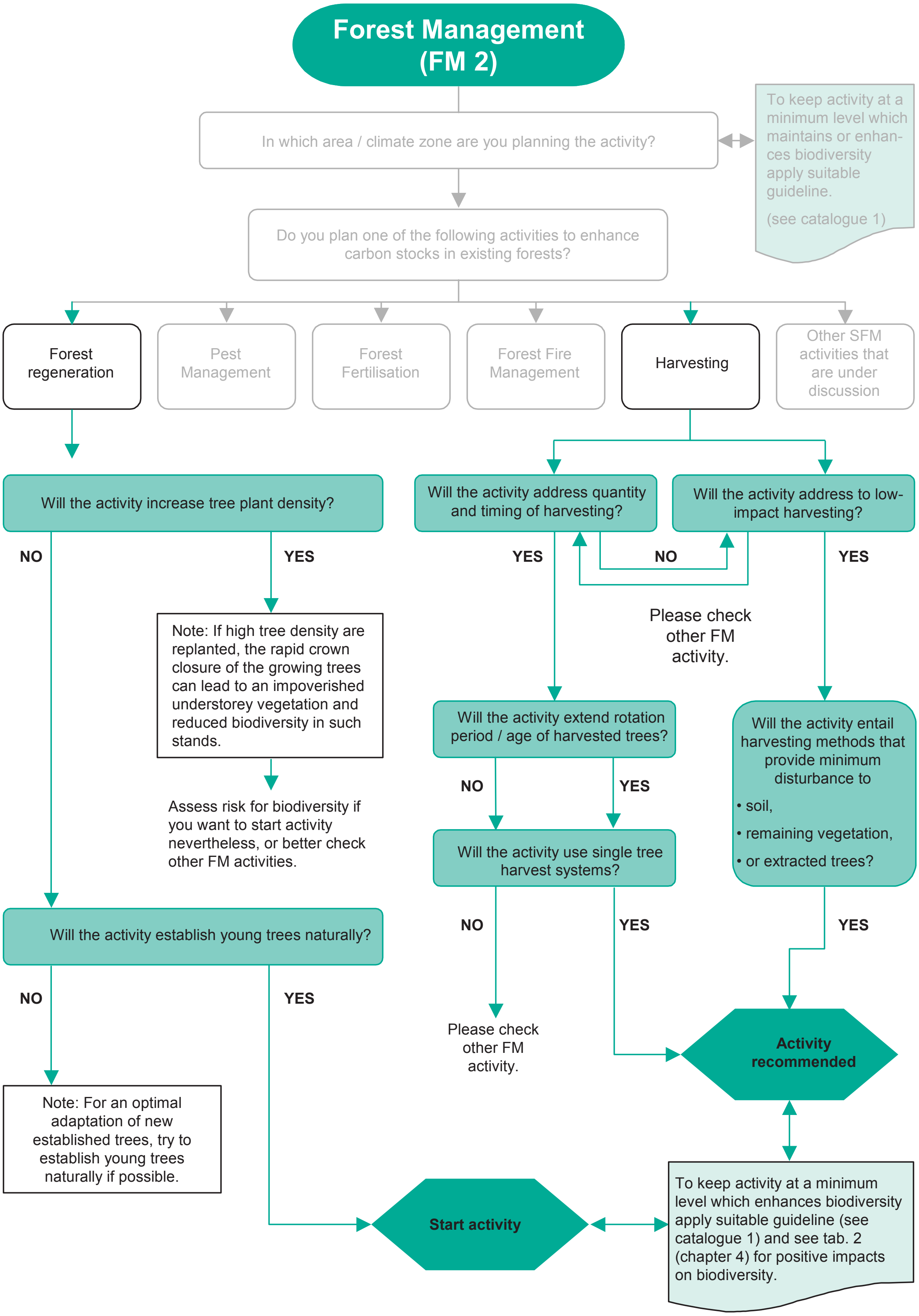
Particularly in the forestry sector, international guidelines like ATO/ITTO, Asia Dry Forest, or Montreal Process are very well developed. The topic of biological diversity is an aspect in all guidelines for sustainable forest management, but differs somewhat in content and structure. Still the SFM guidelines with their indicator sets (see Catalogue 1) are a useful instrument by the accomplishment of climate change mitigation activities already today. Furthermore we recommend using regional guidelines if they exist, because they even can go more into detail than international guidelines. The advantage of this is that the requirements are adapted to different climates and types of landscape.

A more detailed instrument is the various certification systems in the forest sector. The degree of their specification makes certification systems an instrument that can take into consideration biodiversity aspects in the utilisation of forests. Therefore we recommend to introduce internationally accepted forest certification systems (FCS) (e.g. FCS or recognised systems under the PEFC process as a prerequisite for FM), as well as for A&R activities (see 4.2.1), to ensure that the project activity will take into consideration biodiversity aspects very well. Thus it means for example that in both systems the use of GMOs is not allowed and the use of pesticides and fertilizers is limited to extraordinary circumstances.

[14] Natural fires are a crucial element for the succession of many forests, especially in boreal areas. However, natural and human-caused fires can have also deleterious impacts on biodiversity if they devastate large forest areas that normally do not get burnt (e.g. tropical forests).

[15] Note: This is not an eligible activity under the KP in the first commitment period.


Forest Management (FM 1)
In which area / climate zone are you planning the activity?
To keep activity at a minimum level which maintains or enhances biodiversity apply suitable guideline.
(see catalogue 1)
Do you plan one of the following activities to enhance carbon stocks in existing forests?
Forest regeneration
Pest Management
Forest Fertilisation
Forest Fire Management
Low-impact harvesting or harvesting quantity and timing
Other SFM activities that are under discussion
see section FM 2
Note: Threat to specialised plant species which are naturally adapted to oligotrophic, resp. un-nutrious sites.
see section FM 2
Do you plan to use chemical pesticides?
NO
YES
Do you plan the activity in areas where are natural fires an element for the sustainability of ecosystem (e.g. boreal forests)?
NO
YES
Do you plan to use integrated pest management?
Note: Threat often also to non-target plant and animal species.
STOP
Assess risk and apply fire management
NO
YES
Mainly negative for biodiversity!
Note: If the activity should simultaneously benefit to biodiversity concerns select other FM activity.
Please check other FM activity.
STOP
Will the activity enhance deadwood?
Will the activity convert coniferous forests into broadleaved forests?
NO
Or check other FM activity.
YES
YES
Assess risk and apply integrated pest management
Activity strongly recommended
Are broadlleaved forests the natural ecosystem in area of activity?
NO
YES
STOP
Start conversion



Forest Management (FM 2)
In which area / climate zone are you planning the activity?
To keep activity at a minimum level which maintains or enhances biodiversity apply suitable guideline.
(see catalogue 1)
Do you plan one of the following activities to enhance carbon stocks in existing forests?
Forest regeneration
Pest Management
Forest Fertilisation
Forest Fire Management
Harvesting
Other SFM activities that are under discussion
Will the activity increase tree plant density?
NO
YES
Note: If high tree density are replanted, the rapid crown closure of the growing trees can lead to an impoverished understorey vegetation and reduced biodiversity in such stands.
Assess risk for biodiversity if you want to start activity nevertheless, or better check other FM activities.
Will the activity establish young trees naturally?
NO
YES
Note: For an optimal adaptation of new established trees, try to establish young trees naturally if possible.
Start activity
Will the activity address quantity and timing of harvesting?
Will the activity address to low-impact harvesting?
YES
NO
YES
Please check other FM activity.
Will the activity extend rotation period / age of harvested trees?
NO
YES
Will the activity use single tree harvest systems?
NO
YES
Please check other FM activity.
Will the activity entail harvesting methods that provide minimum disturbance to
• soil,
• remaining vegetation,
• or extracted trees?
YES
Activity recommended
To keep activity at a minimum level which enhances biodiversity apply suitable guideline (see catalogue 1) and see tab. 2 (chapter 4) for positive impacts on biodiversity.

A good example for the precondition to use forest certification systems is the Operational Policy 4.36 (Forests) of the WB that states “to be eligible for Bank financing, commercial harvesting operations must also be certified under an independent forest certification system”.

4.2.3 Agricultural Land Management and Revegetation

Any kind of agricultural land management as well as revegetation of degraded lands has to be set in the broader context of land management. SLM delivers a suitable tool in the context of climate change mitigation projects because land provides an environment for different uses, in many countries particularly for agriculture, and at the same time land is the target for improved environmental management, such as source/sink function for greenhouse gases, ameliorating and filtering of pollutants which in turn can have an important impact on biodiversity (DUMANSKI 1997).

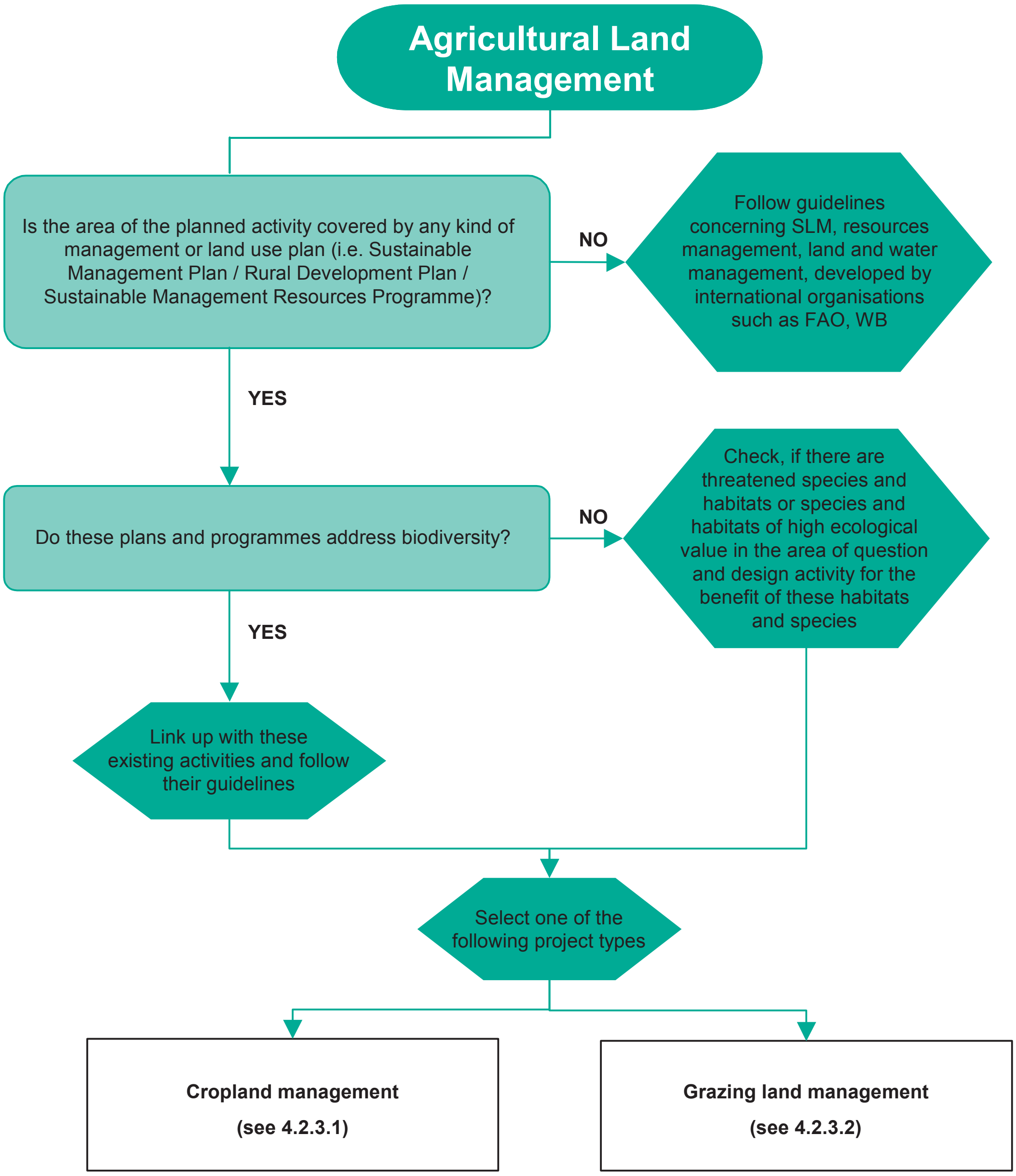
Table 5: Priorities for Agricultural Land Management set out by the European Community Biodiversity Action Plan for Agriculture.

Priorities for agricultural land management
• Keeping intensive farming at a level which is not harmful to biodiversity. This can be achieved by the application of good agricultural practice, and establishing sustainable resource management;
• Ensuring that farming activities are economically viable, socially acceptable and safeguard biodiversity;
• Implementing agri-environmental measures for the sustainable use of biodiversity;
• Ensuring that the necessary ecological infrastructure exists;
• Supporting measures related to maintaining local breeds and varieties and the diversity of varieties used in agriculture;
• Preventing the spreading of non-native species.

Furthermore the proper design and use of sustainable land management approaches will help make agriculture part of a solution which benefits the environment rather than a process which often harms the environment. SLM definitely goes beyond agriculture and includes other aspects such as wildlife, waterfowl and biodiversity management.

The choice and design of specific agricultural land management practices determine both the effect on climate change mitigation and on biodiversity.

The European Community Biodiversity Action Plan for Agriculture (EUROPEAN COMMISSION 2000) stresses the relationship between agriculture and biodiversity and points out both the mutual benefits but also the pressure on biodiversity from farming. This analysis resulted in the following priorities for the action plan (Table 5), the adoption of which is highly recommended for activities world-wide.



4.2.3.1 Cropland Management

Depending on the design of the measures cropland management can have both positive and negative effects. These effects can directly address biodiversity and ecosystems or the resources on which they depend, such as soil and water.

The major activities of cropland management which can be used to sequester carbon comprise intensification, erosion control, conservation tillage and irrigation. These activities may enhance as well as harm biodiversity and the ecosystems. Intensification practices such as fertiliser use and chemical weed and pest control may affect biodiversity and soil and water quality. In order to avoid these effects any practice for intensification should follow site-specific sustainable agricultural guidelines.

Similarly irrigation can pose certain risks to biodiversity and soil and water resources. This includes both on-site impacts, such as groundwater pollution and salinisation as well as off-site effects, such as pollution and eutrophication of freshwater ecosystems.

Conservation tillage results in most cases in an improvement of conditions on which biodiversity depend. This includes i.e. the improvement of soil quality and an increased water retention capacity, the reduction of wind and water erosion, soil removal and the siltation of waterways. In particular cases the increase of the water retention might cause additional leaching coupled with salinisation.

Similar effects as mentioned under conservation tillage are induced by erosion control measures, i.e. by shelterbelts or vegetation strips. The benefits include the reduced siltation and pollution of waterways resulting in better soil and water quality, reduced fertiliser use, leaking and salinisation resulting in the enhancement of both on-site and off-site biodiversity.

In general the value of biodiversity in crop-based agro-ecosystems depends on the following main characteristics:

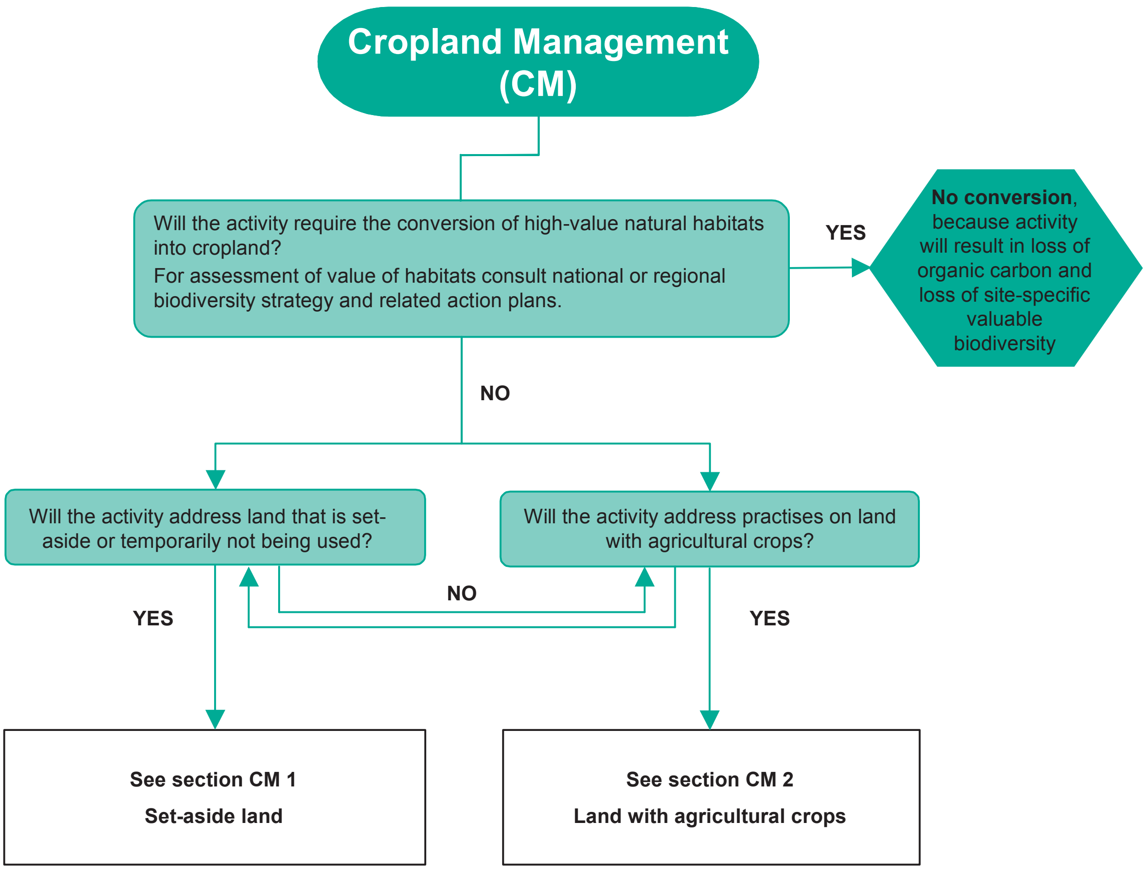
- The diversity of crop species;
- The genetic diversity of crops;
- The use of locally adapted crops;
- The diversity of flora and fauna within and around the ecosystems;
- The permanence of the various crops;
- The intensity and type of management;
- The extent of isolation from natural vegetation;
- The maintenance of linear structures and biotopes within agricultural land.

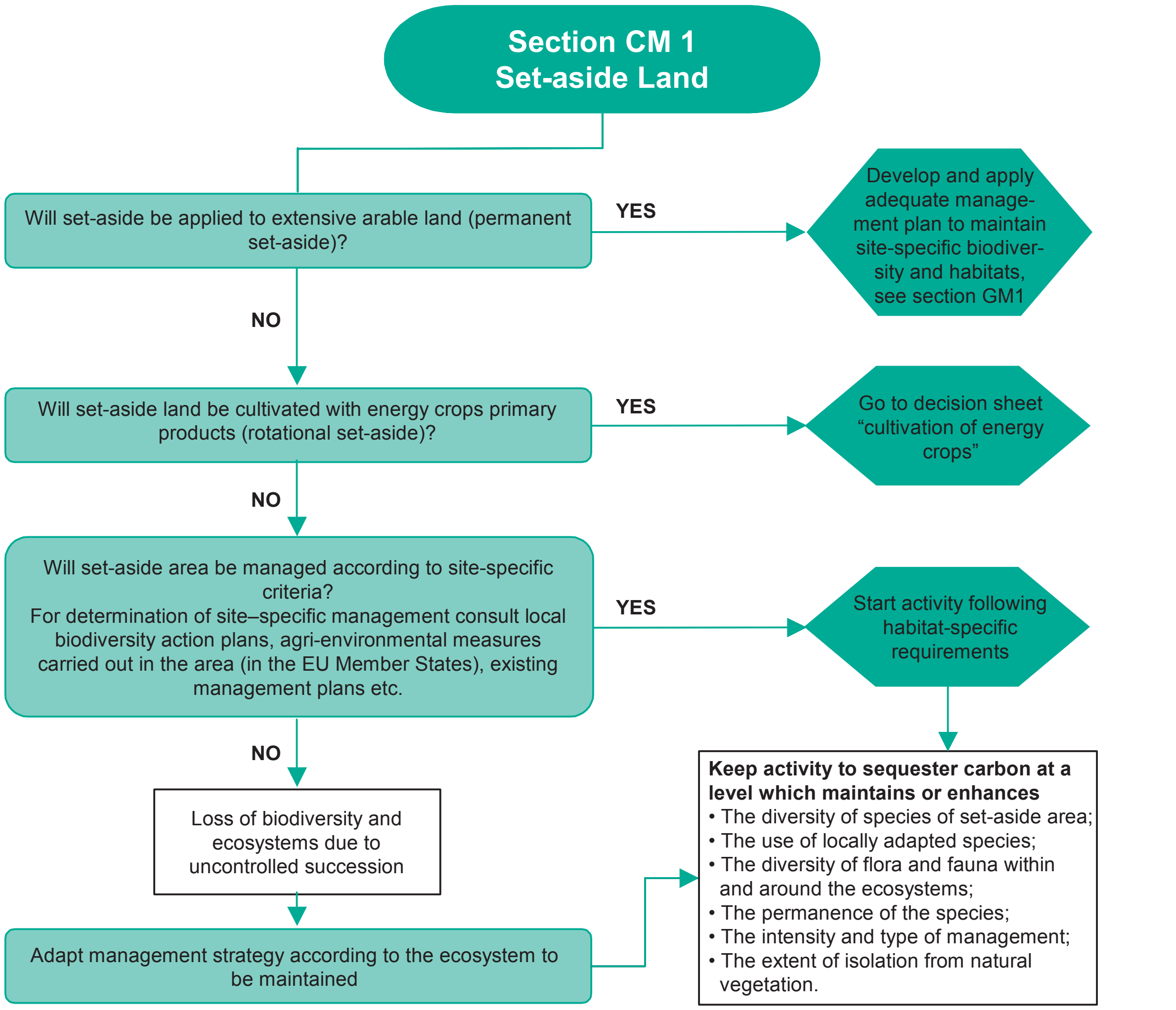
Agricultural systems and their management might influence biodiversity, mainly due to the following pressures:

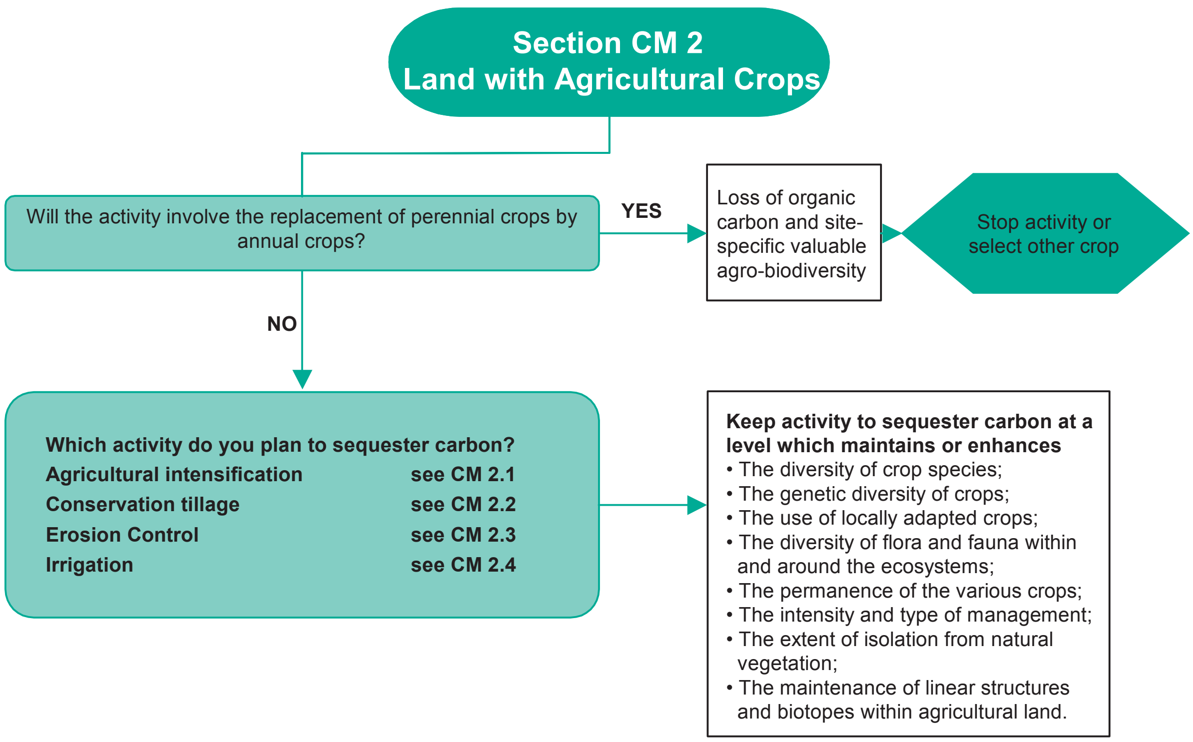
- Clearing, fragmentation and habitat conversion;
- Intensification and inappropriate land use;
- Introduction of alien invasive species;
- Use of GMOs;
- Over-exploitation and unsustainable harvesting of natural resources.

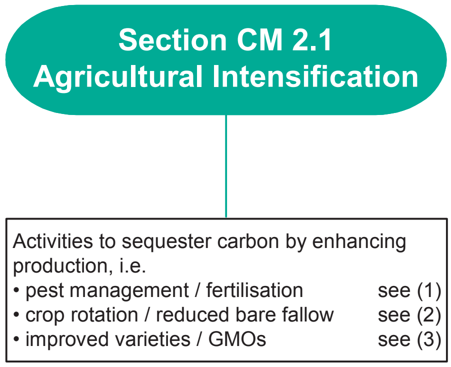
The activity should be designed in a way that the characteristics which determine the value of biodiversity will be maintained and that loss or deterioration of these characteristics will be avoided.

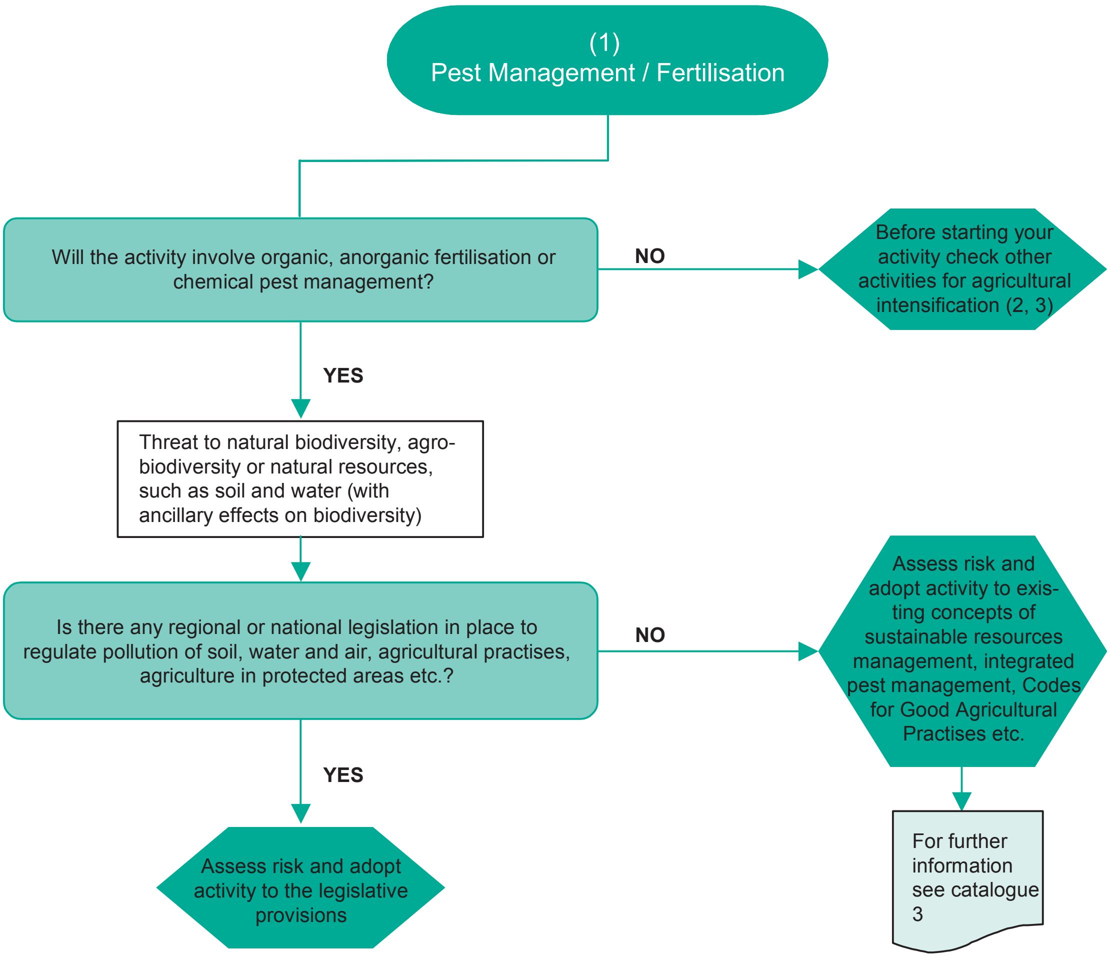
The following decision sheet delivers guidance on the type of land use prior to the climate project and the potential and reasonable changes. Thus, natural habitats should be maintained and not be converted into any other land use. If abandoned land is converted into annual or permanent crops or into set-aside, the decision sheet indicates how to keep the respective climate change mitigation activity at a level which is not harmful to biodiversity.

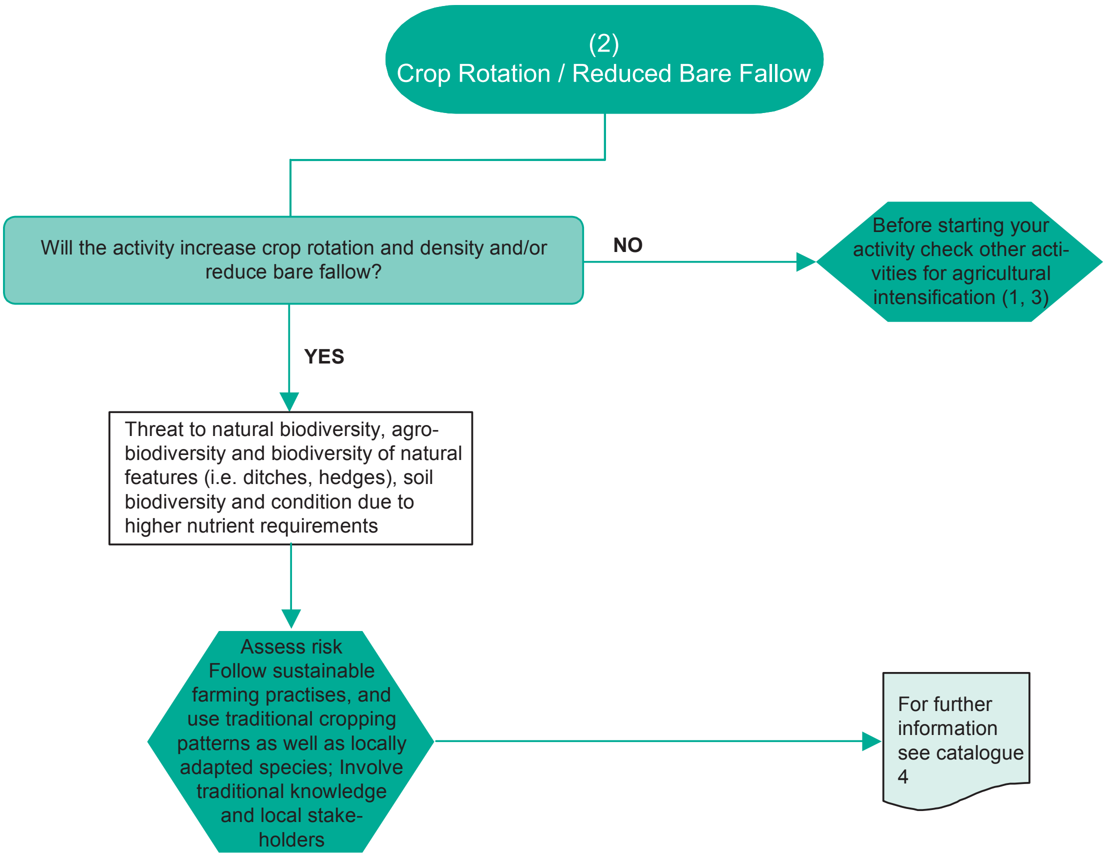


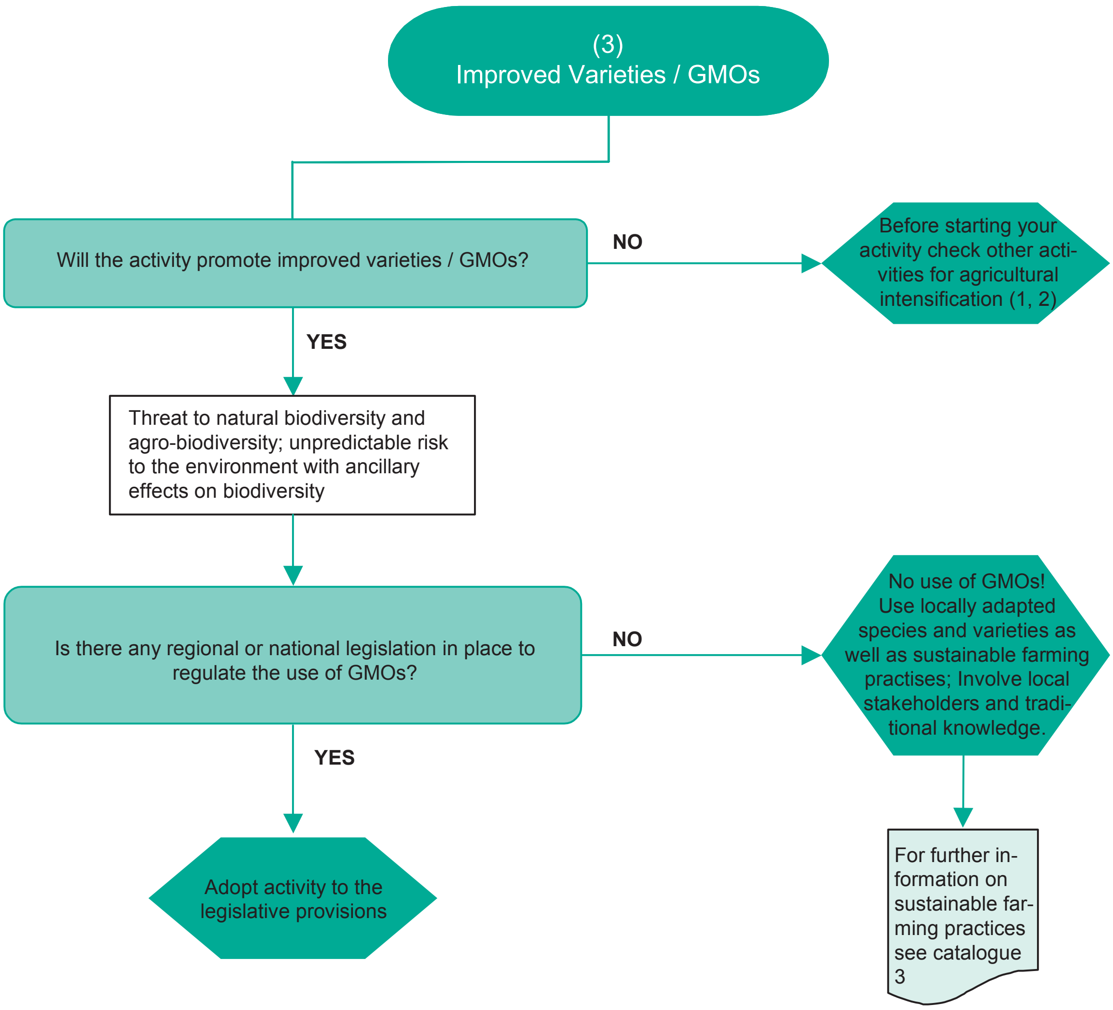

Section CM 1
Set-aside Land
Will set-aside be applied to extensive arable land (permanent set-aside)?
YES
Develop and apply adequate management plan to maintain site-specific biodiversity and habitats, see section GM1
NO
Will set-aside land be cultivated with energy crops primary products (rotational set-aside)?
YES
Go to decision sheet “cultivation of energy crops”
NO
Will set-aside area be managed according to site-specific criteria?
For determination of site–specific management consult local biodiversity action plans, agri-environmental measures carried out in the area (in the EU Member States), existing management plans etc.
YES
Start activity following habitat-specific requirements
NO
Loss of biodiversity and ecosystems due to uncontrolled succession
Adapt management strategy according to the ecosystem to be maintained
Keep activity to sequester carbon at a level which maintains or enhances
• The diversity of species of set-aside area;
• The use of locally adapted species;
• The diversity of flora and fauna within and around the ecosystems;
• The permanence of the species;
• The intensity and type of management;
• The extent of isolation from natural vegetation.

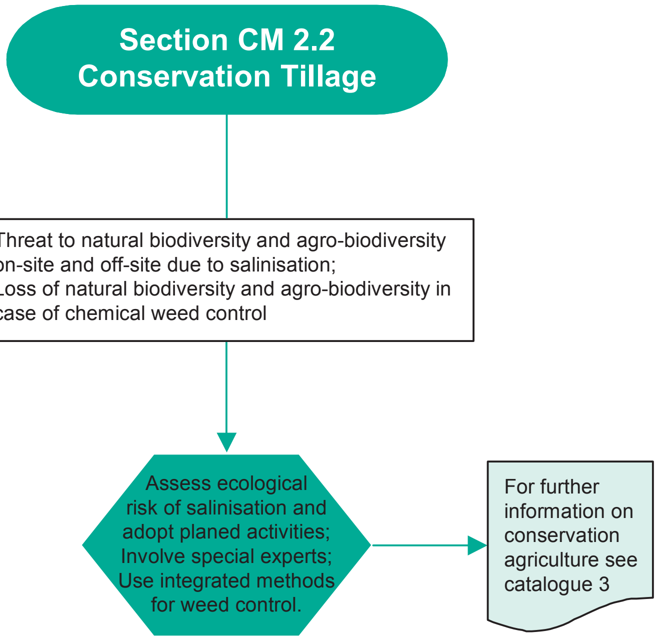

Section CM 2
Land with Agricultural Crops
Will the activity involve the replacement of perennial crops by annual crops?
YES
Loss of organic carbon and site-specific valuable agro-biodiversity
Stop activity or select other crop
NO
Which activity do you plan to sequester carbon?
Agricultural intensification see CM 2.1
Conservation tillage see CM 2.2
Erosion Control see CM 2.3
Irrigation see CM 2.4
Keep activity to sequester carbon at a level which maintains or enhances
• The diversity of crop species;
• The genetic diversity of crops;
• The use of locally adapted crops;
• The diversity of flora and fauna within and around the ecosystems;
• The permanence of the various crops;
• The intensity and type of management;
• The extent of isolation from natural vegetation;
• The maintenance of linear structures and biotopes within agricultural land.

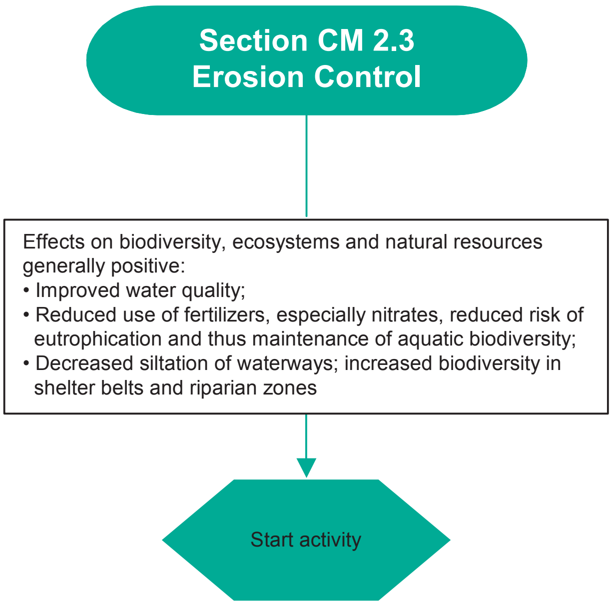

Section CM 2.1
Agricultural Intensification
Activities to sequester carbon by enhancing production, i.e.
• pest management / fertilisation see (1)
• crop rotation / reduced bare fallow see (2)
• improved varieties / GMOs see (3)

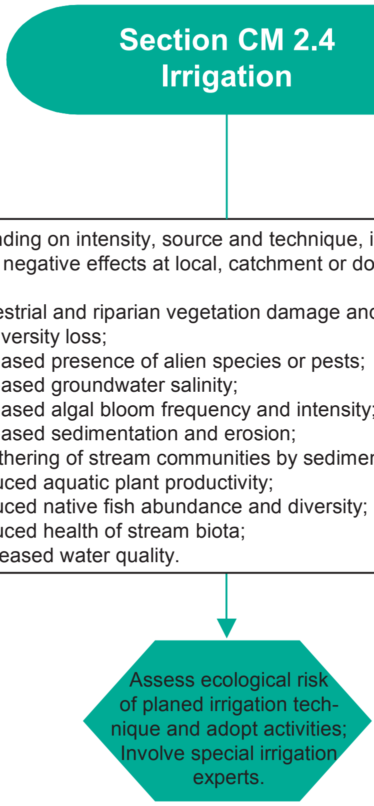

(1)
Pest Management / Fertilisation
Will the activity involve organic, anorganic fertilisation or chemical pest management?
NO
Before starting your activity check other activities for agricultural intensification (2, 3)
YES
Threat to natural biodiversity, agro-biodiversity or natural resources, such as soil and water (with ancillary effects on biodiversity)
Is there any regional or national legislation in place to regulate pollution of soil, water and air, agricultural practises, agriculture in protected areas etc.?
NO
Assess risk and adopt activity to existing concepts of sustainable resources management, integrated pest management, Codes for Good Agricultural Practises etc.
For further information see catalogue 3
YES
Assess risk and adopt activity to the legislative provisions


(2)
Crop Rotation / Reduced Bare Fallow
Will the activity increase crop rotation and density and/or reduce bare fallow?
NO
Before starting your activity check other activities for agricultural intensification (1, 3)
YES
Threat to natural biodiversity, agro-biodiversity and biodiversity of natural features (i.e. ditches, hedges), soil biodiversity and condition due to higher nutrient requirements
Assess risk Follow sustainable farming practises, and use traditional cropping patterns as well as locally adapted species; Involve traditional knowledge and local stakeholders
For further information see catalogue 4


(3)
Improved Varieties / GMOs
Will the activity promote improved varieties / GMOs?
NO
Before starting your activity check other activities for agricultural intensification (1, 2)
YES
Threat to natural biodiversity and agro-biodiversity; unpredictable risk to the environment with ancillary effects on biodiversity
Is there any regional or national legislation in place to regulate the use of GMOs?
NO
No use of GMOs! Use locally adapted species and varieties as well as sustainable farming practises; Involve local stakeholders and traditional knowledge.
YES
Adopt activity to the legislative provisions
For further information on sustainable farming practices see catalogue 3


Section CM 2.2
Conservation Tillage
Threat to natural biodiversity and agro-biodiversity on-site and off-site due to salinisation;
Loss of natural biodiversity and agro-biodiversity in case of chemical weed control
Assess ecological risk of salinisation and adopt planed activities; Involve special experts; Use integrated methods for weed control.
For further information on conservation agriculture see catalogue 3


Section CM 2.3
Erosion Control
Effects on biodiversity, ecosystems and natural resources generally positive:
• Improved water quality;
• Reduced use of fertilizers, especially nitrates, reduced risk of eutrophication and thus maintenance of aquatic biodiversity;
• Decreased siltation of waterways; increased biodiversity in shelter belts and riparian zones
Start activity



Catalogue 3: Cropland management

Sustainable Land and Resources Management

Consultative Group on International Agricultural Resource (CGIAR)
http://www.cgiar.org

Sustainable management and use of natural resources – UNEP Programme
http://www.unep.org/unep/sub1.htm

Carbon from Communities Project
The Carbon from Communities project presents a unique opportunity to simultaneously address agricultural productivity, natural resource conservation and carbon sequestration in Mali.
http://www.sanrem.uga.edu/carbon/carbon.cfm

Regional Scientific Workshop on Land Management for Carbon Sequestration, 26-27 February 2004, Mali.
http://www.icrisat.org

Land Quality Indicator (LQI) program
http://www-esd.worldbank.org/html/lqi/intro.htm

Dumanski, J. (1997): Criteria and Indicators for Land Quality and Sustainable Land Management. ITC Journal 1997 – 3/4
http://wbln0018.worldbank.org/essd/susint.nsf/Image+Catalog/slm.pdf/$File/slm.pdf

Sustainable Farming

International Federation of Organic Agricultural Movements (IFOAM): IFOAM Organic Guarantee System
including i.e. the IFOAM Basic Standards for Organic Production and Processing and the principles of organic agriculture.
http://www.ifoam.org

Environmental Indicators for Agriculture: Methods and Results Volume 3. OECD.
http://www1.oecd.org/publications/e-book/5101011E.PDF

Agriculture and Biodiversity: Developing Indicators for Policy Analysis
Proceedings from an OECD Expert Meeting, Zurich, Switzerland, November 2001.
http://www.oecd.org/document/57/0,2340,en_2649_33791_17134009_1_1_1_1,00.html

Good Agricultural Practices

Development of a Framework of Good Agricultural Practices. Committee on Agriculture, 17th session, Rome 31 March to 4 April 2003, FAO.
http://www.fao.org/DOCREP/MEETING/006/Y8704e.htm

Good Agricultural Practices Website
http://www.fao.org/prods/GAP/gapindex_en.htm

The Codes of Good Agricultural Practice for the Protection of Water, Air and Soil, United Kingdom.
Designed to provide practical guidance for farmers to avoid water pollution and to protect soil as their most valuable resource.
http://www.defra.gov.uk/environ/cogap/cogap.htm

Code of Good Agricultural Practice or Latvia (1999)
http://baap.lt/codes_gap/latvia/ccod_eng/lvcgapluk.pdf

Conservation Agriculture

Intensifying crop production with conservation agriculture (CA)
Concepts, experiences and general links:
http://www.fao.org/ag/AGP/AGPC/doc/themes/5e.html

Frontiers in Conservation Tillage and Advances in Conservation Practice
http://www.fao.org/ag/AGS/AGSE/agse_e/2do/cons1b.htm

Integration of Biodiversity

Biodiversity and the Ecosystem Approach in Agriculture, Forestry and Fisheries. Satellite event on the occasion of the ninth session of the Commission on Genetic Resources for Food and Agriculture. Proceedings. Rome 12-13 October 2002, FAO.
http://www.fao.org/DOCREP/005/Y4586E/Y4586E00.htm

National Biodiversity Strategy and Action Plans
http://www.biodiv.org (http://www.undp.org/bpsp)

Indicators for the Integration of Environmental Concerns into the Common Agricultural Policy. COM (2000) 20 final. Brussels.
http://europa.eu.int/comm/agriculture/envir/index_en.htm

EEA Environmental Indicators
http://themes.eea.eu.int/

4.2.3.2 Grazing Land Management

Grazing land comprises grassland, pastures, rangeland, shrubland, savannah and arid grassland (UNEP/CBD/SBSTTA 2003). The MA define grazing land management as the "system of practices on land used for livestock production aimed at manipulating the amount and type of vegetation and livestock produced" (UNFCCC/CP/2001/13/Add.1).

The major activities of grazing land management which can be used to sequester carbon comprise:

- Grazing management;
- Protected area and set-aside;
- Grassland productivity improvements.

Depending on the design of the measures grazing land management can have both positive and negative effects. These effects can directly address biodiversity and ecosystems or the resources on which they depend, such as soil and water.

The value of biodiversity of grazing land depends on the following main characteristics:

- The diversity of species and varieties of grazing land and livestock;
- The use of locally adapted grassland and livestock species and varieties;
- The vegetation composition of pasture related habitats;
- The diversity of flora and fauna within and around the ecosystems;
- The permanence of the species;
- The intensity and type of management;
- The extent of isolation from natural vegetation.

Grazing land systems and their management might influence biodiversity, mainly due to the following pressures:

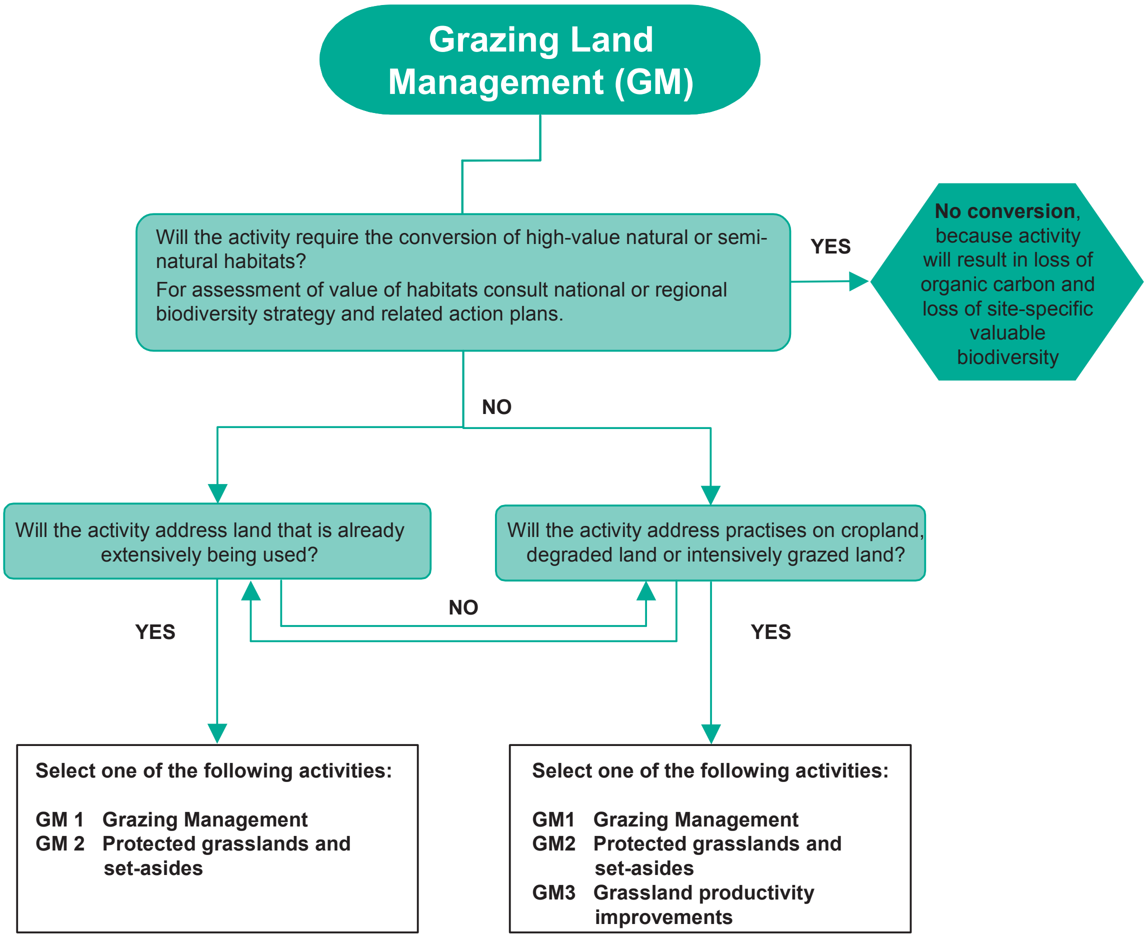
- Clearing, fragmentation and habitat conversion;
- Productivity enhancing management;
- Introduction of alien invasive species;
- Over-grazing and unsustainable use of grassland.

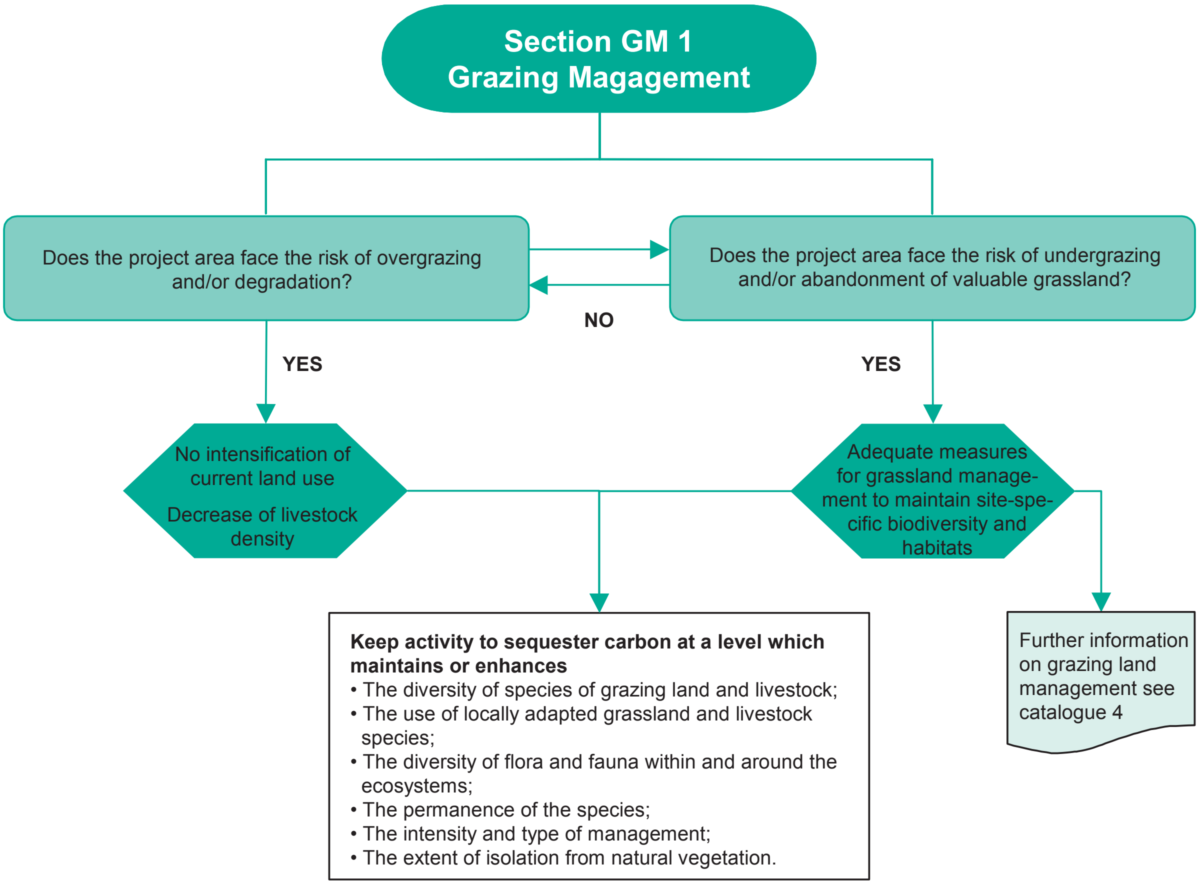
The activity should be designed in a way that the characteristics which determine the value of biodiversity will be maintained and that loss or deterioration of these characteristics will be avoided.

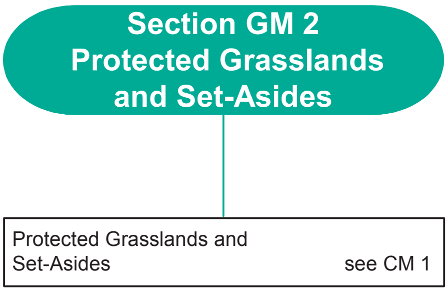
In Europe, i.e., semi-natural grasslands are most valuable habitats and the richest habitat in terms of biodiversity on European farmland. Regarding the threats and decline of semi-natural grasslands, monitoring of their status and trends is required.

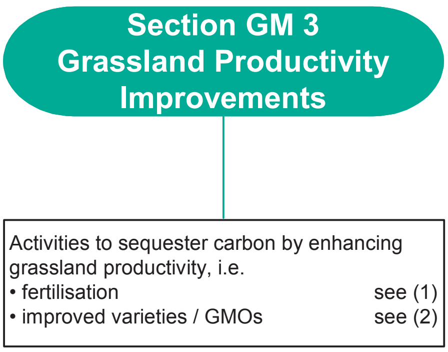
Additionally semi-natural grassland might serve as an indicator by itself, regarding the fact that semi-natural grassland is destroyed by the intensification of agriculture and land abandonment and this loss is often irreversible. These types of grassland vary significantly from grasslands in other climate regions.

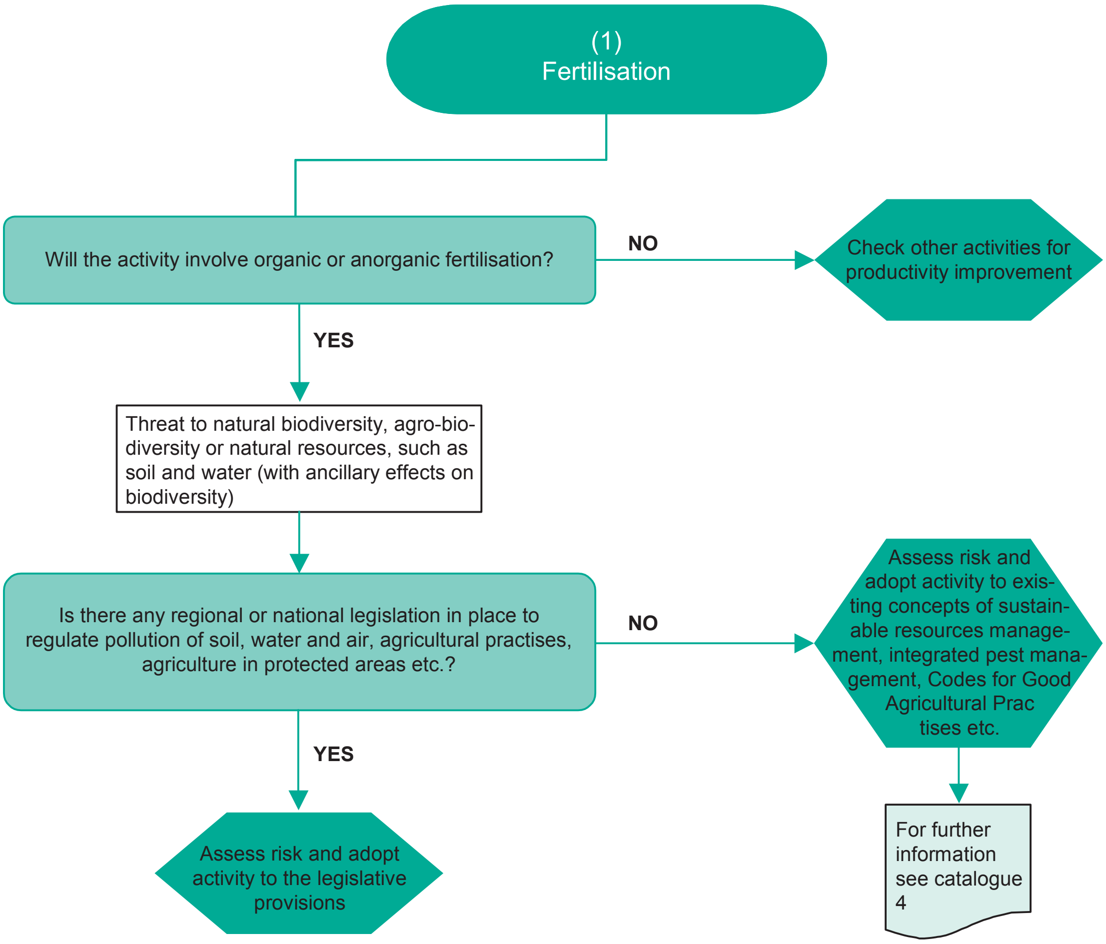
The following decision sheet delivers guidance on the type of land use prior to the climate project and the potential and reasonable changes.




Section GM 1
Grazing Magagement
Does the project area face the risk of overgrazing and/or degradation?
Does the project area face the risk of undergrazing and/or abandonment of valuable grassland?
NO
YES
YES
No intensification of current land use
Decrease of livestock density
Adequate measures for grassland manage-ment to maintain site-spe-cific biodiversity and habitats
Keep activity to sequester carbon at a level which maintains or enhances
• The diversity of species of grazing land and livestock;
• The use of locally adapted grassland and livestock species;
• The diversity of flora and fauna within and around the ecosystems;
• The permanence of the species;
• The intensity and type of management;
• The extent of isolation from natural vegetation.
Further information on grazing land management see catalogue 4


Section GM 2
Protected Grasslands and Set-Asides
Protected Grasslands and Set-Asides
see CM 1

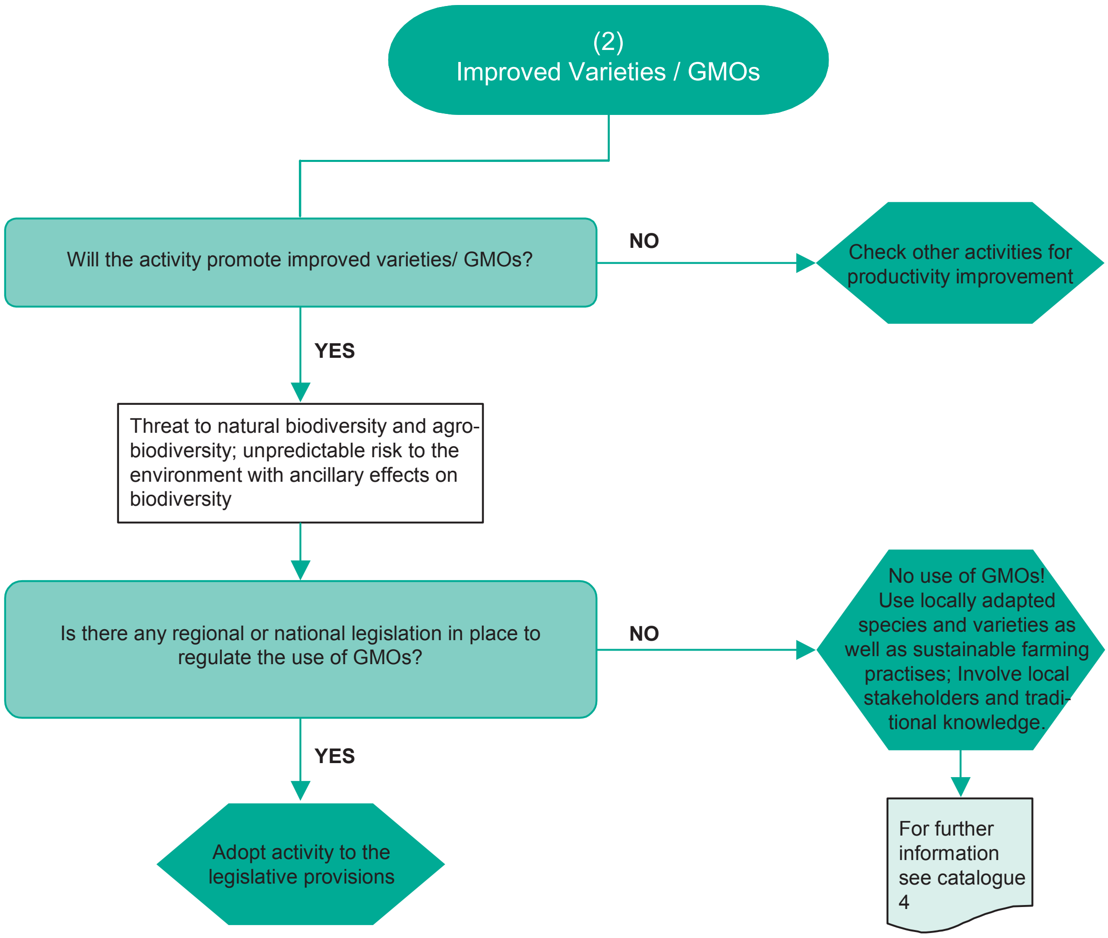

Section GM 3
Grassland Productivity Improvements
Activities to sequester carbon by enhancing grassland productivity, i.e.
• fertilisation
see (1)
• improved varieties / GMOs
see (2)



The conversion of extensive pastures and natural grasslands results in significant biodiversity loss and should therefore be avoided. If cropland or degraded land is converted into perennial grassland, grazing land or set-aside, guidelines for grazing management, sustainable grassland productivity improvements and fire management should be considered.

Numerous approaches for grazing land management already exist at regional and local levels worldwide. In many countries guidelines are developed for specific habitats and do not deliver general conclusions for application at other sites. Therefore the most appropriate guidelines for the maintenance of the vegetation composition of the pasture related habitats have to be selected and consulted case by case.

The proper assessment of grassland often faces the lack of appropriate indicators and data; therefore they are often tackled within the area of wild species.



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http://www.fs.fed.us/mntp/plan

EEA Environmental Indicators
http://themes.eea.eu.int/

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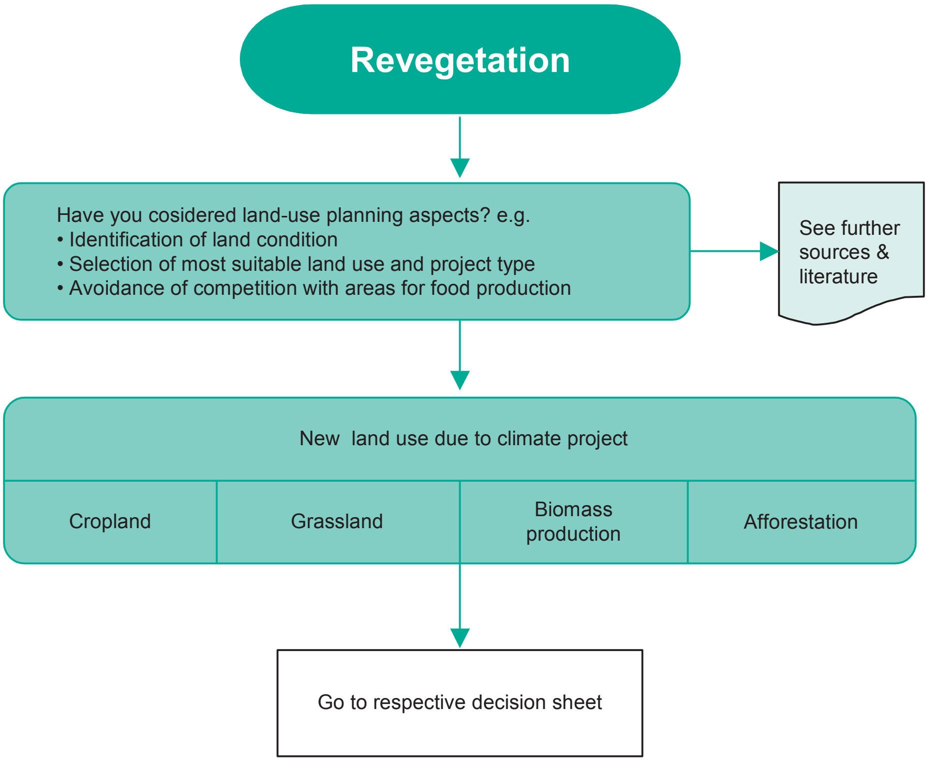
http://www.oecd.org/document/57/0,2340,en_2649_33791_17134009_1_1_1_1,00.html

4.2.3.3 Revegetation

According to the MA "revegetation" is a direct human-induced activity to increase carbon stocks on sites through the establishment of vegetation that covers a minimum area of 0.05 hectares and does not meet the definitions of afforestation and reforestation" (UNFCCC/CP/2001/13/Add.1, p.58). Revegetation activities aim at increasing plant cover on severely degraded, eroded or otherwise disturbed land. Therefore the toolkit reflects the close link between revegetation and degraded land and takes existing approaches for degraded land into account.

According to the United Nations Convention to Combat Desertification (UNCCD) definition land degradation describes a natural process or a human activity that results in a loss of sustainability and economic functions. Land degradation describes a severe problem of global dimension which is particularly associated with desertification in arid, semi-arid and sub-humid zones, commonly subsumed under the term "drylands".

KARTHA & LARSON (2000) stress that the restoration of degraded land has a high potential to benefit the environment. At the same time this requires optimal site-specific strategies and depends on a large number of aspects. Therefore general recommendations are difficult to make. In developing a new strategy it is fundamental to take the pre-use into account and offer appropriate alternatives to the local communities. To get an adequate guidance for revegetation activities, a project designer can fall back on fitting land use activities (see respective decision trees).



4.2.4 Cultivation of Energy Crops

Bioenergy systems have a wide range of potential positive or negative environmental impacts. Depending on the design of the activity, the cultivation of energy crops might affect soil quality and fertility, hydrology and biodiversity. Therefore biomass has to be produced in a manner that is sensitive to the local ecological conditions (KARTHA & LARSON 2000).

The activity should take note of the following characteristics of an area:

- Soil biodiversity,
- Biodiversity of crops and guest species,
- Biodiversity of contiguous natural habitats.

Generally activities related to the cultivation of energy crops should apply the following priorities:

For the cultivation of energy plants, perennial crops should be preferred over annual crops because they generally require less soil cultivation, less use of fertilizer and pesticides and provide better shelter for wildlife.

Multi-species stands should be preferred over monoculture stands, because they reduce the risk of diseases and provide more food and shelter for wildlife. Biodiversity enhancing measures should accompany monoculture stands, if these cannot be avoided.

Native species should be preferred over exotic or invasive species. Plant species with invasive potential should be excluded from cultivation. Plants for which the invasive potential is unknown in the considered region should not be introduced without prior research/risk assessment of their invasive potential.

The impact of the production of bioenergy crops also depends on the likely alternative of the land-use activity. Special attention should also be given to the crop or land use type that is replaced by crops for bioenergy use: the replacement of intensively cultivated fields or degraded sites should be preferred over the replacement of natural forests or grasslands.

Crop types should match native ecosystem types, for example trees in woodland regions, perennial grass species in savannah regions. Crops should meet the conditions of the broad ecological region, but also the ecological characteristics of the specific cropping site.

Catalogue 5: Production of energy crops

Kartha, S. & Larson, E.D. (2000): Bioenergy Primer. Modernised Bioenergy for Sustainable Development. New York: UNDP.
http://www.undp.org/seed/eap/html/publications/2000/2000b.htm

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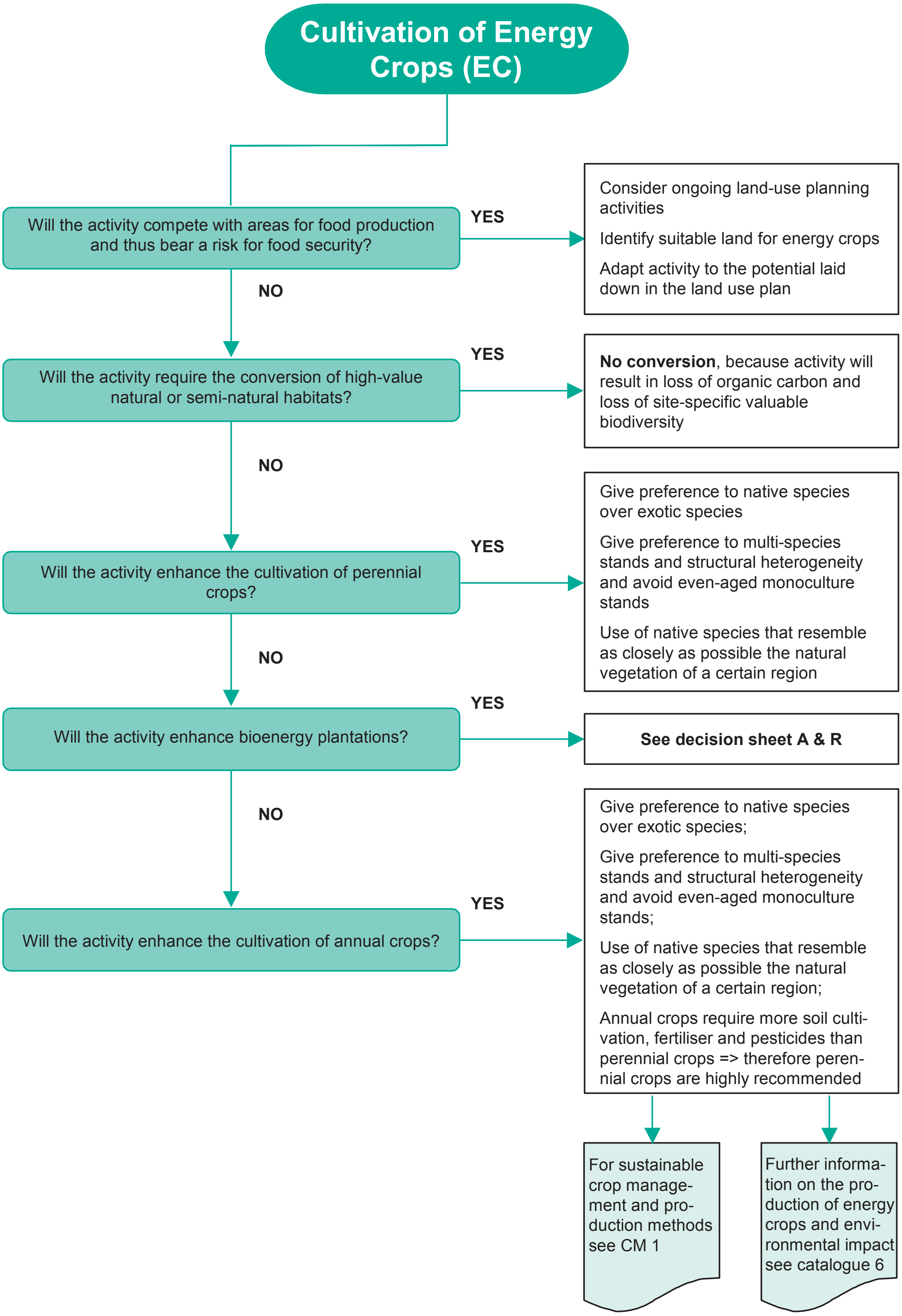
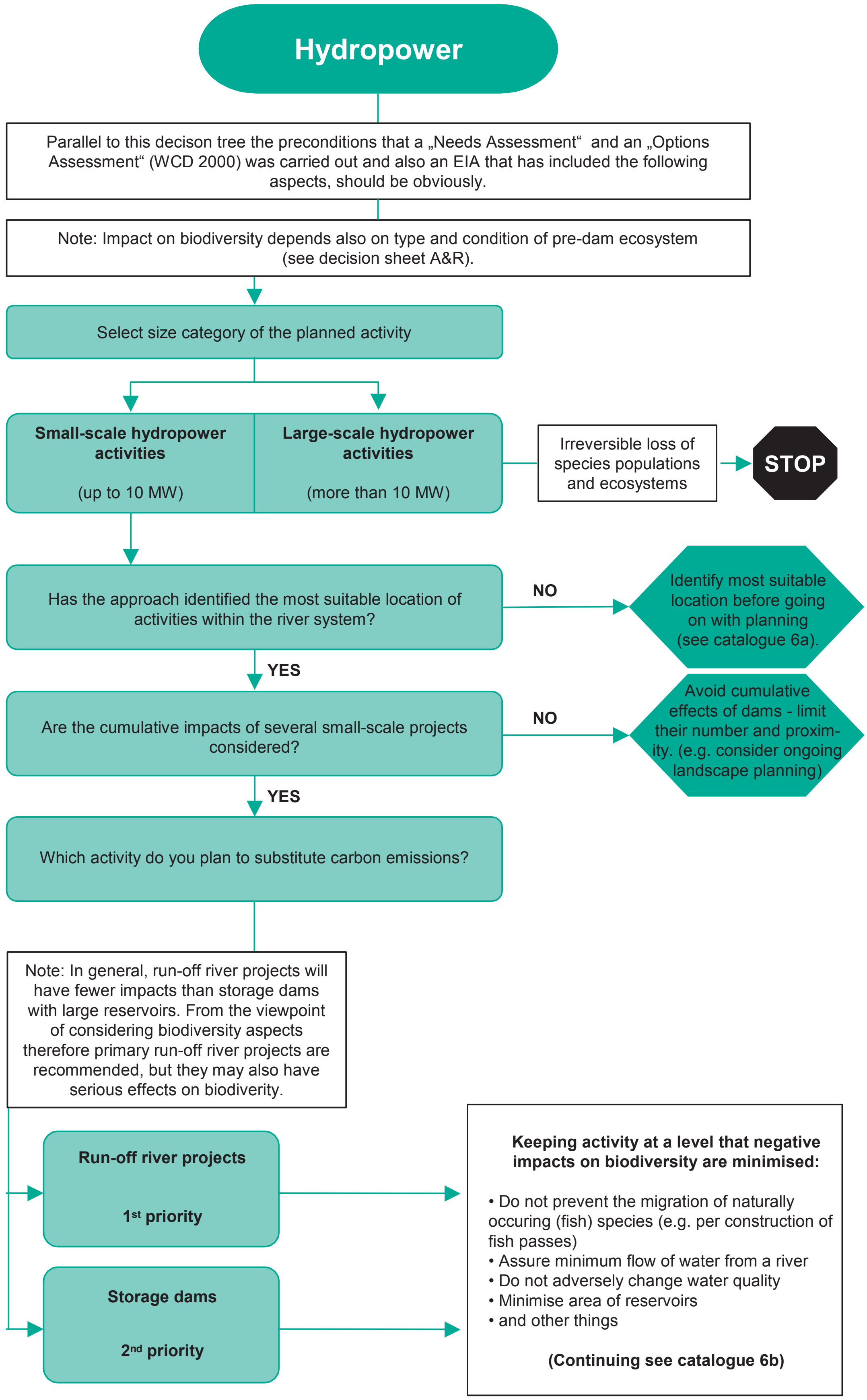
OTA – Office of Technology Assessment of the Congress of the United States (1993): Potential Environmental Impacts of Bioenergy Crop Production – Background Paper. OTA-BP-E-118. Washington D.C. Government Printing Office.
http://www.wws.princeton.edu/cgi-bin/byteserv.prl/~ota/disk1/1993/9337/933705.PDF

The Bioenergy Primer i.e. lists detailed indicators for monitoring environmental impacts related to the measurement of soil quality but just generally refers to biodiversity under alternate and prior land uses. However for the assessment of biodiversity the indicators for cropland management can be applied.




Hydropower
Parallel to this decison tree the preconditions that a „Needs Assessment“ and an „Options Assessment“ (WCD 2000) was carried out and also an EIA that has included the following aspects, should be obviously.
Note: Impact on biodiversity depends also on type and condition of pre-dam ecosystem (see decision sheet A&R).
Select size category of the planned activity
Small-scale hydropower activities (up to 10 MW)
Large-scale hydropower activities (more than 10 MW)
Irreversible loss of species populations and ecosystems
STOP
Has the approach identified the most suitable location of activities within the river system?
NO
Identify most suitable location before going on with planning (see catalogue 6a).
YES
Are the cumulative impacts of several small-scale projects considered?
NO
Avoid cumulative effects of dams - limit their number and proxim-ity. (e.g. consider ongoing landscape planning)
YES
Which activity do you plan to substitute carbon emissions?
Note: In general, run-off river projects will have fewer impacts than storage dams with large reservoirs. From the viewpoint of considering biodiversity aspects therefore primary run-off river projects are recommended, but they may also have serious effects on biodiverity.
Run-off river projects
1st priority
Storage dams
2nd priority
Keeping activity at a level that negative impacts on biodiversity are minimised:
• Do not prevent the migration of naturally occuring (fish) species (e.g. per construction of fish passes)
• Assure minimum flow of water from a river
• Do not adversely change water quality
• Minimise area of reservoirs
• and other things
(Continuing see catalogue 6b)

4.2.5 Hydropower and Dams

Although hydropower activities make available desired additional resources (water for nourishing security, renewable energy) or protect existing resources (flood protection), it also unfavourable affects the environment and society. Hydropower activities always lead to the loss of land coupled with irreversible loss of species populations and ecosystems (MCALLISTER 1997, WCD 2000). There are several impacts on ecosystem from hydropower plants and therewith on biodiversity that can not be excluded:

- Reservoirs lead to loss of terrestrial ecosystems.
- Hydropower plants, especially dams hold back sediments, especially the heavy gravel and cobbles. The river, deprived of its sediment load, seeks to recapture it by eroding the downstream riverbed. Riverbed deepening will lower the groundwater table along a river, threatening vegetation and reduces habitat for many fish that spawn in the river bottom, and for invertebrates such as insects, molluscs and crustaceans.
- Dams also change the pattern of the flow of a river, both reducing its overall volume and changing its seasonal variations. The storage of water in dams delays and reduces floods downstream. All parts of a river's ecology can be impacted by changes to its flow respectively floods.
- By extension of the water residence time it comes to an increase of the evaporation of the water surface.
- Displacement of the running waters biocenosises.

Considering these problems, the use and damage of a dam as well as its variants and alternatives (e.g. several small dams) must be weighed exactly. Hydropower plants, no matter if big dams or run-off river projects, are not usable to combine climate change mitigation activities with enhancing simultaneously biodiversity. Therefore it is not recommended to construct dams only with the reasoning of realising a climate change mitigation project idea. Nevertheless there will be still ongoing hydropower activities, therefore, the following decision tree options are listed below to best minimise the possible negative effects on biodiversity. How less adverse impacts on biodiversity can be reached is shown in Catalogue 6.

Catalogue 6: Guidelines for Minimising Impacts caused by Hydropower and Dams

6a: Identification of most suitable location of hydropower plants

- An important determinant of dam impacts is their location within the river system. Dams near the headwaters of tributaries will tend to have fewer impacts than main-stream dams that may cause perturbations throughout the whole watershed (PRINGLE 1997 in UNEP/CBD/SBSTTA 2003, WCD 2000).
- No activities in or in surrounding areas with an significant impact on internationally protected areas (see List 1; e.g. Ramsar List of Wetlands of International Importance) or one of the nature areas where there are particularly high concentrations of species, referred to as 'hotspots', or if indirectly there will result negative impacts on these areas.
- Small and micro-scale hydroelectric schemes and individual installations can have comparatively lower environmental impacts, but the cumulative effects of many projects within a watercourse may have considerable impact on biodiversity within a larger area. Therefore cumulative impacts of small dams on biodiversity need to be considered even when may have only a small impact on biodiversity.

6b: Keeping activities at a level that minimised negative impacts on biodiversity

(further detailed information see in MCALLISTER et, al. 1997)

- Avoid blocking migratory of naturally occurring species, e.g. by fish passes.
- Maintain discharge volume as much as possible. A minimum quantity of water-flow must be assured.
- Restrict height of dams and area of reservoirs.
- Maintain natural seasonal and daily river flow cycles: Intensified draining of water from artificial lake to increase the flowing off and copy the natural flow regime can help to reduce the ecological disadvantages downstream.
- Sustain water quality - temperature, oxygen, sediment & other levels. The water quality from flowing off water of artificial lakes can be affected positively, e.g. with oxygenisation forwards or during passing the turbines and temperature control.
- Apply high environmental impact assessment standards (see List 4).
- Involve environment staff early and at high levels in planning and construction.
- Improve needed knowledge bases through research.
- Explore and reduce the impacts of dams on terrestrial biodiversity.

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