Guidelines for the Conservation and Sustainable Use of Biodiversity in Tropical Timber Production Forests

Revised June 2006

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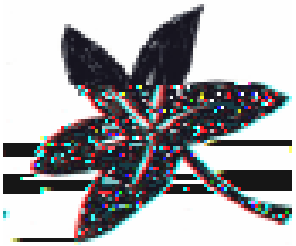

Acronyms

CBD: United Nations Convention on Biological Diversity
CIFOR: Center for International Forestry Research
CITES: Convention on International Trade in Endangered Species
CPF: Collaborative Partnership on Forests
FAO: Food and Agriculture Organisation of the United Nations
FSC: Forest Stewardship Council
FMU: Forest Management Unit
FRA: Forest Resources Assessment – An FAO global forest monitoring programme
GMO: Genetically Modified Organism
IPCC: Intergovernmental Panel on Climate change
ITTO: The International Tropical Timber Organisation
IUCN: The World Conservation Union
IUFRO: The International Union of Forest Research Organisations
NFP: National Forest Programme
NGO: Non-Governmental Organisation
NTFP: Non Timber Forest Product
SFM: Sustainable Forest Management
UNFF: United Nations Forum on Forests
WWF: Worldwide Fund for Nature

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Introduction

Tropical forests are of enormous importance for the conservation of the world's species. They contain more species than other biomes and a high proportion of these species are threatened. The recent IUCN Global Species Assessment states that "…for many species the habitat degradation that accompanies selective resource exploitation, or that occurs in habitats next to cleared areas, can have serious negative consequences". The importance of tropical forests is shown in the following diagrams.

Figure 1. Numbers of threatened mammals, birds and amphibians occurring in each biome (proportion of threatened species indicated in red).

Source: IUCN Red List and Global Species Assessment (2004)

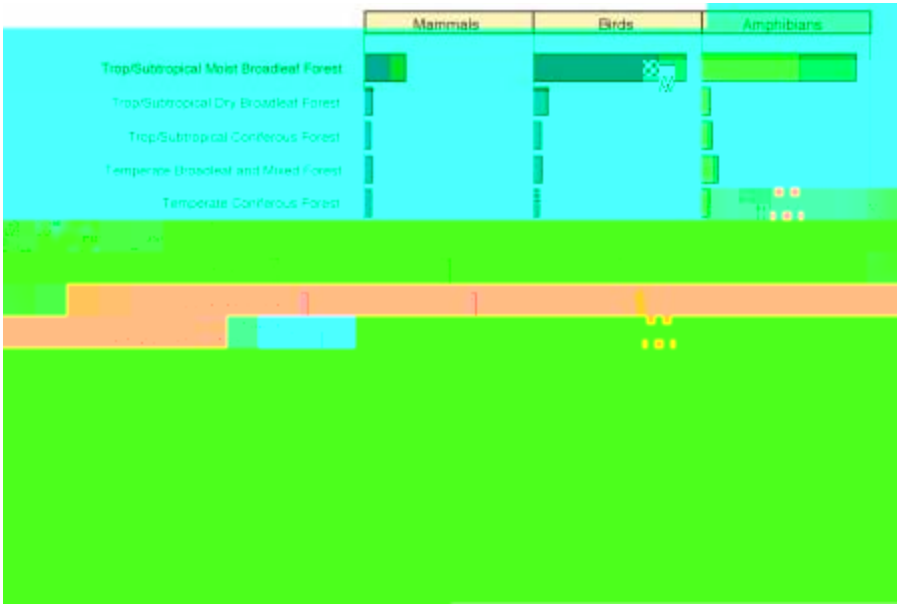


Figure 2. Numbers of threatened mammals, birds and amphibians endemic to each biome (proportion of threatened species indicated in red).

Source: IUCN Red List and Global Species Assessment (2004)

The goal of these Guidelines is to help foresters respond to the gravity of this situation. Bad forest management is one of the world's greatest threats to biodiversity; good forest

desirable practice in one place today may not be optimal in the same place at some point in the future or even in another location today. Management of forests and their biodiversity will not remain static over long periods. Forest management will need to be more adaptive and

Conservation biology and tropical production forests

Some interesting studies of the impacts of logging on biodiversity have been conducted in recent years. In general it has been shown that when best logging practices are applied many species of plants and animals can persist and even thrive in logged forests. In areas where biodiversity features of special conservation concern occur precaution must be exercised and the physical impacts of logging minimized. More research is needed on logging impacts but in the meantime forestry activities must continue on the basis of the limited information that is available. There is a particular need to conduct research on real life situations and learn from real life experience. This means having biodiversity monitoring measures in place that are linked to forest management so that the managers can adapt their practices and researchers can measure the effects of these adaptations on plant and animal populations.

*The crucial questions that scientists must strive to answer are **what** attributes of the forest biodiversity are priorities for protection within logged forest; then **how** this might be achieved, and how to monitor **whether** this is happening in particular cases.*

What is biodiversity

UNEP has defined biodiversity as 'the total diversity and variability of living things and the systems of which they are a part'. This leaves open the question of how much priority should be given to the functioning of the ecological "system" and how much to the list of species that make up that system. Tropical forests are so diverse that it is impossible to explicitly monitor and manage all the living organisms that they contain.

Biodiversity is integrated with the other, physical and social, ecosystem components. The physical environment includes the local and global climate, soils, and watercourses. These are often monitored alongside species diversity when forest health is assessed. Even water and nutrient cycles are poorly understood in tropical forests.

Maintaining a diversity of forest and habitat types in an undisturbed state may be the best way of conserving biodiversity. But this may not always be true, many species are adapted to disturbances similar to those caused by logging. Likewise, storing samples of all variants of all species from some forest in a gene bank or a garden will not completely compensate for loss of that forest. The forest as a whole with it the functions – the products derived from it, the watercourses and nutrient cycles – will be missing. Local, endemic species may be very significant to humanity for cultural reasons but may contribute very little to the function of a forest, its biomass or productivity.

There are major divergences between people who advocate different approaches to biodiversity conservation. The mainstream conservation community holds strongly to the view that all species and variation within species should be maintained in a forest – at least at the

commercial plant or animal species have been built into logging practices. For instance the Reduced Impact Logging – RIL – guidelines focus on commercial trees, regeneration, and soil and water quality and not on species conservation. Forest certification standards in tropical countries have emphasized minimizing damage to biodiversity but have rarely been based on scientific knowledge on species and habitats.

Biodiversity objectives for tropical production forests should balance the concerns of all stakeholders – priorities should include the following:

- Indicators of ecological functions: for instance species whose presence or absence indicates how the ecosystem is functioning? Examples are canopy cover, sensitive understorey species, and regeneration of sensitive canopy trees.
- Globally rare species or varieties for whose survival the forest is significant.
- Species which have a strong influence on other species. These have sometimes been called 'keystone species'.
- Locally or globally valued species, such as species with commercial or subsistence value or cultural significance.

Local conservation priorities should be additional to global priorities, not alternatives. In many situations global conservation priorities will conflict with potential local benefits. Mechanisms will then be needed to compensate local users.

Forest exploitation will inevitably lead to a change in forest biodiversity. As far as possible this should be managed change, where the trade-offs between profit and biodiversity losses are negotiated between stakeholders. A good strategy should strive to define achievable conservation outcomes without imposing excessive limits on productive activities.

Conservation of " native commercial species"

Indigenous commercial timber trees and non-timber forest products – NTFPs – are obviously part of biodiversity. The inventory and sustainable management of these commercial species has been the focus of classical forest management. Exploited species require particular types of management that depend on their ecology. Sustained yield management of these species has been a priority for decades. However, the regeneration, dispersal, growth and other aspects of the ecology of many of these species are often poorly known. Data from Permanent Sample Plots – PSPs – have proved useful in improving understanding of how forests as a whole behave. In some cases, PSP data from one continent have been applied to similar, but different species in other parts of the world.

Concerns about the genetic diversity of timber trees are a relatively new issue. There are approaches that can be adopted that should help conserve genetic variation within logged species, some of these are considered normal practice for sustainable production forestry.

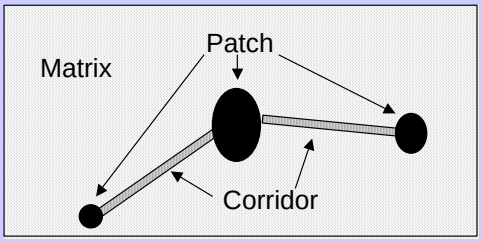
1. At a fine scale, protect significant proportions of trees of economic species within exploited populations - i.e. maintain some mature trees in logged forest. It may be useful to prioritize extremely large trees for this, as they cause most damage when felled; are often hollow; and, for wind-dispersed species will be more effective sources of seed than smaller trees.
2. Ensure that networks of protected patches ('provenance areas' or 'set-asides') include representatives of all main forest and habitat types (e.g. swamps, mountains, rocky areas). These are then likely to include those parts of populations of widespread commercial species that contain unusual genes. A broad range of protected forest types will contain representative samples of little known living organisms such as fungi, arthropods, amphibians etc. Such networks of seed stands and set asides should complement protected areas. They can provide corridors between totally protected areas.

and these clearly form a very large and essential part of the habitat of the majority of wild fauna and flora. A high quality matrix of production forest between the protected areas should increase the probability of reproduction, dispersal and survival of many species in both the protected patches and the matrix itself. Hence, there has recently been an increasing focus on the importance of the matrix of non-protected areas and on the interaction between reserve and off-reserve areas.

Therefore conservation strategies cannot focus exclusively on a single category of forest but

Box 3 : SOME IMPLICATIONS OF CONSERVATION BIOLOGY FOR TROPICAL PRODUCTION FORESTS

Providing the matrix: Tropical production forests often provide the matrix within which protected areas are located. The following diagram shows the potential relationship between protected areas, corridors and the production forest matrix.

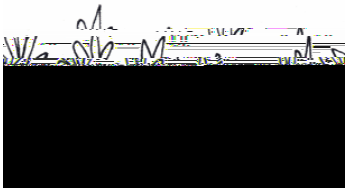


Enhancing the effective size of populations in the patches. Large populations have a generally lower risk of extinction, and tend also to have higher levels of genetic variation than small populations. Inflow of individuals and genes from the matrix may help to reduce local extinctions in patches. The vulnerability of species in forest fragments is directly related to their ability to use the matrix: not surprisingly, those that can move and feed in the matrix are less sensitive to fragmentation. Forest patches act as a source of species for reinvading fallow land when opportunities arise; fallow patches near to forest reserves in Ghana are more biodiverse with forest species than those further away. They include more of the vestiges of fragmented forest (as the forest has often been cleared inwards towards the centre of patches) as well as being actively colonised from the remnant patches. More information on these dynamics is vital, but maintaining forest trees and patches may have surprising benefits.

Regulating movement. Corridors should promote dispersal of some species between patches, helping the ecosystem in the long term to respond to changes, e.g. in global

The need for Adaptive Management

Good forest managers are constantly oberving their forests and interpreting changes that



What has been achieved since 1993?

All of the Guidelines for forest management that have been adopted by the ITTO – those dealing with natural production forests, planted forests, the restoration, management and rehabilitation of degraded and secondary tropical forests, and fire management – contain provisions for the maintenance of biodiversity. These are however mostly stated in quite general terms. In most cases, notably in the most recent Guidelines – those addressing Restoration, Management and Rehabilitation of Degraded and Secondary Forests – there are a number of principles and recommended actions relevant for biodiversity conservation scattered amongst the different objectives of the Guidelines. The prominence of references to biodiversity in the principles and recommended actions in all of the Guidelines, and not just in the 1993 Biodiversity Conservation Guidelines, is an indication of the great importance that ITTO members have given to biodiversity conservation in the past decade.

The ITTC adopted its current ***Guidelines on the Conservation of Biological Diversity in Tropical Production Forests*** in 1993. The Guidelines were produced at a time of intense international debate on tropical forest conservation and use, much of it centred on the Earth Summit at Rio de Janeiro in 1992. The Guidelines were just one of a number of international initiatives that occurred at that time to promote biodiversity conservation.

The single most significant biodiversity initiative at this time was the adoption of the ***Convention for the Conservation of Biological Diversity – the CBD.*** Since then, the CBD has devoted considerable effort to questions related to forest biodiversity and has recently adopted an ***Expanded Programme of Work on Forest Biological Diversity*** which sets goals and objectives for the conservation of forest biodiversity and includes a number of measures that particularly target issues of biodiversity in managed forests (see Annex I). In 2000 the CBD also adopted, ***12 Principles for the Ecosystem Approach*** to biodiversity conservation and these are relevant to forest management. They set biodiversity conservation in the context of local developmental needs and stress the importance of maintaining ecosystem functions, achieving sustainable economic benefits, exploiting local and traditional knowledge and looking at landscape-scale issues in managing natural systems. More recently the CBD has adopted the ***Addis Ababa Principles and Guidelines for the Sustainable Use of biodiversity.*** These address a number of issues relating to biodiversity in managed systems and are relevant to the issue of Sustainable Forest Management (SFM) as defined by the UNFF, the ITTO and in the various ***Criteria and Indicators (C&I) for SFM***. In preparing the Guidelines in this paper we have tried to reflect the spirit of the targets of the Expanded Programme of Work on Forests, the Ecosystem Approach and the Sustainable Use Principles, and the progress made towards SFM. The general tendency has been for the CBD to give more and more attention to issues of biodiversity conservation in managed systems and thus for its agenda and that of the ITTO to converge.

The emergence and ongoing debate on forest certification has had major significance for biodiversity in production forests. This began with the establishment of the Forest Stewardship Council – the FSC – in 1993. There are now a number of global, regional and national certification initiatives and all of them give attention to the need to conserve biodiversity in any forests that are to be recognized as being sustainably managed. The FSC's set of Principles and Criteria for the certification of sustainable forest management is widely known. It establishes 10 Principles illustrated by a number of Criteria and several of these address directly or indirectly the need to maintain biodiversity. The central statement on biodiversity is contained in Principle 6 – Environmental Impact – Criterion 2 which states:

Other changes that have occurred in the past decade have had an impact on biodiversity in tropical production forests. There has been a continuing loss of tropical forests, mainly through conversion to agriculture. Fires have destroyed or degraded large areas of tropical forests. Infrastructure development has intensified throughout the tropics and many areas that were remote and inaccessible in the early 1990s are now penetrated by roads and railways. In many countries forest management has been decentralized to local communities and this has had both negative and positive impacts on biodiversity.

The rights of local populations to benefit from the biodiversity that occurs in their traditional lands has been the subject of both international debate under the CBD and also of local programmes to exploit the economic value of wild species for medicines and as providers of the wild relatives needed for breeding improved crop varieties. Recently there has been interest in mechanisms for making environmental service payments to local communities and to individuals who bear the cost of biodiversity conservation programmes. So far it has proven difficult to make these effective.

Many countries have revised their forestry laws in the past decade and in most cases these new laws give greater attention to the need to conserve biodiversity. Biodiversity issues are now routinely addressed in forest management plans in many countries and this has certainly been influenced by the ITTO Guidelines as well as by the needs of certification bodies and the pressure exerted by civil society organizations.

Various forms of global change are having impacts on forest biodiversity and some of these changes are still little understood. Economic integration and the reduction of trade barriers are driving processes of increased economic efficiency and this is resulting in a far higher proportion of the world's timber coming from planted forests – this is a trend that is expected to continue. Planted forests may contribute to reducing the pressure for logging of natural

Principles, Guidelines and Recommended Actions

Principle 1: Sovereignty and societal choice Rights and responsibilities for biodiversity lie primarily with the states and societies within whose territories the biodiversity is located therefore biodiversity use and conservation are a matter of societal choice and should reflect national and local aspirations.				
Guideline 1.1: National, regional and local biodiversity strategies, plans and regulations that reflect national and local priorities should be respected in planning production forestry.	**Recommended action 1.1.1** Check all national plans and laws for references to biodiversity conservation needs that might be impacted by the forest management programme.	**Main Responsibility**		
	Recommended action 1.1.2 Species and areas of conservation concern should be identified and this information publicly disclosed and taken into account in forest land allocation.			
	Recommended action 1.1.3 Stakeholders impacted by biodiversity conservation measures should be identified and consulted from the beginning.			
	Recommended action 1.1.4 Biodiversity strategies, plans and regulations should be widely available for consultation for instance on the internet and in electronic and printed forms.			

Government Forest and Environment Agencies

Forest managers, concessionaires etc.

Specialised Biodiversity Organisations, International NGOs, research institutes etc.

Educational and technical training institutions

Local NGOs, civil society and community organisations

Principle 3: Knowledge, learning, technology transfer and capacity building

Although there have been some isolated successful attempts to conserve biodiversity in tropical production forests the knowledge of the ecology of these forests and of the responses of different elements of biodiversity to management interventions is still limite

Guideline 3.5: *Monitoring programs for biodiversity in tropical production forests should be conducted in ways that facilitate learning and adaptive management and that make information on achievements and failures widely available*	**Recommended action 3.5.1** Encourage the participation of all stakeholders and of technical specialists in biodiversity monitoring programs. Disseminate the information acquired widely to help researchers and forest managers to understand the relations between biodiversity and forest management. **Recommended action 3.5.2** Review existing procedures and	**Main Responsibility**		

Guideline 4.2: *It is desirable to retain as much of the natural biodiversity of any forest under management as possible in order to ensure the continued functioning of the forest ecosystem. This is especially important given the impending risks posed by global climate change invasive species and new pests and diseases.*	**Recommended action 4.2.1** Planners should ensure that forest zoning and management maximize the retention of native plant and animal species and within species variation as well as habitat heterogeneity and connectivity.	**Main Responsibility**		
	Recommended action 4.2.2 Where possible forest management should be carried out at scales that allow for the maintenance of contiguous blocks of forest large enough to support viable forest ecosystems and their component species.			h

Guideline 4.5: *Private or community forest owners need to be provided with technical support in order that their activities are consistent with biodiversity conservation objectives.*

Recommended action 4.5.1
Forest or biodiversity conservation agencies should provide technicaGuideare

Guideline 5.2: *National land use planning processes, forest laws, logging manuals etc should all explicitly address issues of biodiversity conservation in forests at all spatial scales.*	**Recommended action 5.2.1** Forestry regulations and plans must be checked against national laws and programmes to conserve biodiversity and with commitments under the different international environmental conventions.	**Main Responsibility**		

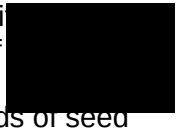
Principle 6: **Institutions, Forest Tenure and Access Rights.** Achieving biodiversity conservation goals in production forests may be favoured by improved institutional arrangements both at the level of large scale land allocation and at the level of local peoples' resource access and land tenure rights				
Guideline 6.1*: Forestry and Natural Resource Management agencies need to have the technical capacity to address biodiversity conservation needs. This can be achieved by training or by hiring specialised staff or by collaborating with specialist agencies with competence in biodiversity matters.*	**Recommended action 6.1.1** Ensure that technical capacity to inventory and monitor biodiversity is available to forest management agencies and forest operators.	**Main Responsibility**		
	Recommended action 6.1.2 Build partnerships between forest managers and specialized agencies with technical competence to inventory and monitor biodiversity.			
Guideline 6.2: *Local populations need to have biodiversity use rights that meet their economic and cultural needs whilst ensuring the maintenance of biodiversity. Favorable tenure and resource use rights may benefit biodiversity by providing incentives for conservation.*	**Recommended action 6.2.1** Ensure clarity of boundaries of local use areas and of use and access rights for timber, non-timber forest products, fish and wildlife.			

Guideline 8.3: *Some species are strongly interactive or play a key role in the ecology of other species or and have important influences on the overall ecology of a forest and on the survival of other species. Elephants, Apes and pollinator and seed dispersing species play these roles*

Guideline 8.6: *Fires often play an important role in enhancing or reducing forest biodiversity. The fire ecology and susceptibility of a*

Principle 9: Management planning and biodiversity

Well balanced forest management respects biodiversity and the physical environment, nonetheless, any intervention during management will have impacts on biodiversity. The management planning process is vital in determining the degree of modification of biodiversity that will be tolerated and in setting goals for biodiversity conservation. The management plan determines the balance between the needs of various

	Recommended action 9.5.4 The potential impact on biodiversity of all silvicultural treatments should be considered – for instance non-commercial or malformed trees may have biodiversity values and should not be systematically removed. A balance should be sought between stand improvement measures and retention of biodiversity in the forest.	**Main Responsibility**  		
Guideline 9.6: *Hollow trees should be retained as they will continue to be a seed source, provide important habitats for a wide range of animal species and are generally of low commercial value.*	**Recommended action 9.6.1** Check trees for hollowness prior to felling, and avoid felling hollow trees unless they have high commercial value.			
Guideline 9.7: *Unnecessary removals of nutrients to the forest ecosystem should be minimised.*	**Recommended action 9.7.1** Logs may be debarked in the forest and debris left on site to enhance soil nutrient and organic matter status but only in situations where this does not expose the logs to insect damage that may reduce their commercial value.			
Guideline 9.8: *Selective logging that [illegible] their genetic variability. Special populations and within species timber species.*	**Recommended action** The retention of different age classes and especially of a viable population of those timbe[illegible] that are commercially pre[illegible] should receive special att[illegible] from forest managers. Where possible and where justi[illegible] regeneration strategy of[illegible] be timed to follow periods of seed production.	 		

Box 6 : REDUCED IMPACT LOGGING (RIL)

It has been known for decades that considerable ‘collateral damage’

	Recommended action 9.8.2 Some valuable commercial tree species do not have a regular age class distribution and the special management needs of these species must be addressed by competent agencies.	**Main Responsibility**		

Guideline 9.9: *Disruption of the canopy cover may be important in*

Box 7 : ALIEN INVASIVE SPECIES

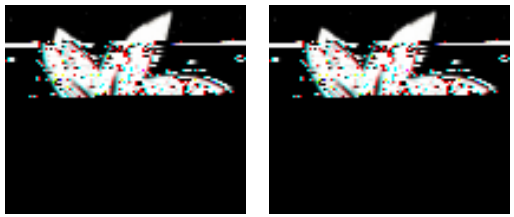
When forests are disturbed they may be subject to invasion by undesirable plant and animal species. This is becoming an increasing problem now that global transport systems are so interconnected and rapid. Seeds and other propagules of plants are transported in soil, in association with other plants or animals, on people's shoes or vehicle tires etc. Some of these species may lack natural predators in their new habitat and may out-compete local species and become weeds. Invasive alien plant species include fungi, herbaceous plants, shrubs and trees. Changing climates are expected to cause some species to start behaving like invasives in areas where they have existed in a benign state for many years.

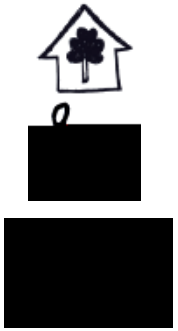
Invasive alien species are in general believed to constitute one of the biggest risks to biodiversity conservation. They are already the most serious problem on many islands. In the past tropical forests have tended to be dense and closed and difficult for exotic species to invade. Now with increasing fragmentation and logging damage and in some situations with increasing frequency of fires they are becoming more of a problem. Forest managers and conservation agencies need to be alert to the risks posed by invasive aliens and to respond rapidly if they are detected.

Some tree species that are deliberately introduced into new parts of the world for plantation and agroforestry schemes have the potential to become invasive. *Azadirachta indica*, *Cedrela odorata* and *Leucaena leucocephala* trees are highly useful, valued and actively planted in some regions, yet become troublesome weeds, causing serious economic damage in other situations. *Acacia mangium* has become an aggressive invasive species in some area where it is planted in SE Asia whereas elsewhere it does not propagate itself outside the plantations.

Chromolaena odorata and *Mikania cordata* can become persistent nuisances in disturbed forest, by dominating the soil seedbanks, they benefit from lack of co-evolved predators and are encouraged by repeated fires. They represent a hazard to biodiversity in logged forest.

Some of these invasive species choke out regeneration of indigenous species and may become so dominant that they require massive investments in forest restoration. Eradication of established aliens is vastly more expensive than prevention. Prevention should focus on limiting the transfer of propagules e.g. on lorry tracks and wheels from 'infected areas' and in avoiding using unsterilised soils or pots from other locations or used for other species.



Guideline 9.11: *Hunting and gathering in production forests should be regulated. Although some hunting and gathering for subsistence needs may be tolerated, large scale hunting and gathering for commercial use should be prevented and transport of bush meat etc on logging trucks should be banned.*	**Recommended action 9.11.1** Hunting and gathering for subsistence use should be monitored and tolerated at reasonable levels. Measures to regulate commercial hunting and NTFP gathering should be put in place. Such commercial activities should only be allowed when there is a capacity to establish sustainable harvest levels and regulate offtake. Forest managers should support measures for controlling harvesting and transport of bushmeat and NTFPs in the forests that they manage.	**Main Responsibility** 		
Guideline 9.12: *Logging operations may modify the habitat or change the distribution of some species that are important resources for local people. Logging may increase the likelihood of conflicts between people and wildlife, for instance elephants and apes. Forest managers may have to take special measures to mitigate these conflicts.*	**Recommended action 9.12.1** Management plans should anticipate potential conflicts with wildlife that result from logging activities and include measures to mitigate any risk – dangerous or crop-raiding animals may have to be controlled.			
	Recommended action 9.12.2 Large scale logging operators should ensure that supplies of meat from domestic sources or sustainably produced fish are available for their employees so as to reduce the demand for bush meat.			
Guideline 9.13: *Potential and emerging threats to biodiversity must be anticipated and contingency plans prepared to ensure that technically sound responses can be put into place rapidly when the need arises.*	**Recommended action 9.13.1** Assess potential threats to biodiversity and develop action plans to address them. Ensure all actors are informed of their roles in implementing these plans and receive any necessary training.			

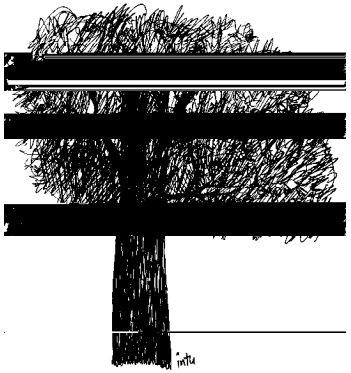
	Recommended action 9.13.2 Ensure that clearly defined communication pathways exist to initiate management responses to emerging threats to biodiversity.	**Main Responsibility** 		

Box 8 : HUNTING IN TROPICAL RAINFOREST

Vertebrate game species in tropical forests are of crucial socio-economic importance as sources of protein and income for rural people. However, over-hunting across the humid tropics is causing local extinctions of many species. The causes are associated to forest loss, increased commercialization and human population growth in Africa, Asia and Latin America. The increased access for hunters to remote forests as a result of road building, particularly exacerbated by extractive industries such as logging, also contributes to over exploitation of wild meat. Hunting and trade in wildlife are linked to other opportunities available for food and income generation. A general rule is that rural communities consume more wild meat than urban communities, either because of availability or preferences. Therefore, acceptable substitutes and/or income increase could in theory reduce unsustainable hunting. It is also clear that successful solutions involve multidisciplinary approaches and collaboration in all levels, involving local people, governments, scientists and companies. For instance, the private sector may have an important role in conservation of wildlife, either via public-private partnerships or full private ownership and operation, including providing financial and technical resources in areas where governmental presence is scarce. In a large logging concession in Congo, an education program has helped logging company staff to establish no-hunting zones, restrict transportation of wildlife and providing feasible alternative protein source for workers and their families. In private land in the Brazilian Amazon, partnerships between logging companies and NGOs have established a program for monitoring of fauna. Priority actions involving the reducing use of wild meat include:

- Promoting of interdepartmental and interagency cooperation within governmental sectors
- Assessing the level of dependence on wild meat by local communities and establishing appropriate solutions
- Determining the drivers of the wild meat trade at national and international levels and increasing consumer access to domestic meat sources
- Including local people and the private sector in education programs and decision-making processes
- Preventing the use of wire snares and high-calibre firearms
- Establishing hunting zones through participatory process, including using local people and private companies to help control these areas
- Law enforcement, especially effectively enforced bans on the hunting of vulnerable species
- Promoting public awareness to educate hunters, traders and consumers about implications for sustainability of biodiversity and rural livelihoods
- Enhancing local capacity and good governance to implement above actions efficiently.

Guideline 10.4 *Management that favours natural processes and native species can enhance soil conditions and provide other ecological benefits which will favour the productivity and resilience of the plantation.*	**Recommended action 10.4.1** Minimise pesticide and herbicide use in plantations wherever it is practicable to do so.	**Main Responsibility** 		
Guideline 10.5 *Where economically viable use native tree species or mixed species plantations to enhance the biodiversity value of the plantation. When exotic species have to be used, choose those which provide the best habitat for native biodiversity.*	**Recommended action 10.5.1** Choose species or species mixtures for plantations that provide habitat for native biodiversity.			
Guideline 10.6: *Measures should be taken to ensure that plantation forestry does not facilitate the introduction of invasive species and this could impact negatively on both the plantations and on neighbouring managed or natural forests*	**Recommended action 10.6.1** Minimize risks of introducing and propagating alien tree species that may become invasive. Care should be taken in selecting and testing any new species of varieties for plantations			



Annex I

PROVISIONAL INDICATORS FOR ASSESSING PROGRESS TOWARDS THE 2010 BIODIVERSITY TARGET

Convention on Biological Diversity – Web site

A: Focal area	B: Indicator for immediate testing	C: Possible indicators for development by SBSTTA or Working Groups
Status and trends of the components of biological diversity	Trends in extent of selected biomes, ecosystems and habitats	
	Trends in abundance and distribution of selected species	
		Change in status of threatened species (Red List indicator under development)
		Trends in genetic diversity of domesticated animals, cultivated plants, and fish species of major socioeconomic importance

Target 10.1: All transfers of genetic resources are in line with the Convention on Biological Diversity, the International Treaty on Plant Genetic Resources for Food and Agriculture and other applicable agreements.
Target 10.2: Benefits arising from the commercial and other utilization of genetic resources shared with the countries providing such resources

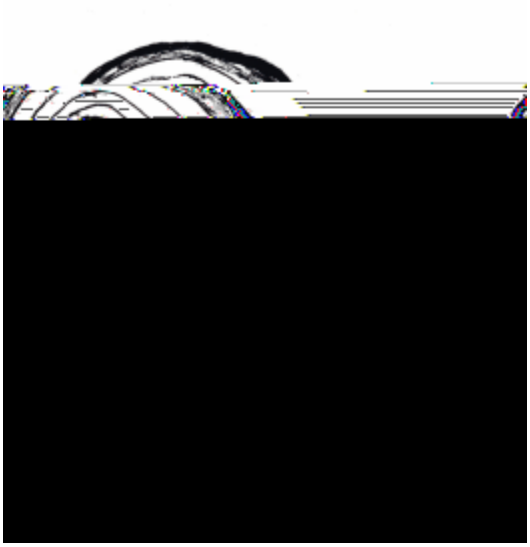
Ensure provision of adequate resources
Goal 11: Parties have improved financial, human, scientific, technical and technological capacity to implement the Convention [76]/
Target 11.1: New and additional financial resources are transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with Article 20
Target 11.2: Technology is transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with its Article 20, paragraph 4.

Annex III

CBD GOALS AND TARGETS
Convention on Biological Diversity – Web site

Protect the components of biodiversity	
Goal 1. Promote the conservation of the biological 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. Promote the conservation of species diversity	Target 2.1: Restore, maintain, or reduce the decline of populations of species of selected taxonomic groups
	Target 2.2: Status of threatened species improved.
Goal 3. Promote the conservation of genetic diversity	Target 3.1: Genetic diversity of crops, livestock, and of harvested species of trees, fish and wildlife and other valuable species conserved, and associated indigenous and local knowledge maintained.
Promote sustainable use	
Goal 4. Promote sustainable use and consumption.	Target 4.1: Biodiversity-based products derived from sources that are sustainably managed, and production areas managed consistent with the conservation of biodiversity.
	Target 4.2 Unsustainable consumption, of biological resources, or that impacts upon biodiversity, reduced
	Target 4.3:No species of wild flora or fauna endangered by international trade
Address threats to biodiversity	
Goal 5. Pressures from habitat loss, land use change and degradation, and unsustainable water use, reduced.	Target 5.1: Rate of loss and degradation of natural habitats decreased
Goal 6. Control threats from invasive alien species	Target 6.1: Pathways for major potential alien invasive species controlled.
	Target 6. 2: Management plans in place for major alien species that threaten ecosystems, habitats or species.
Goal 7. Address challenges to biodiversity from climate change, and pollution	Target 7.1: Maintain and enhance resilience of the components of biodiversity to adapt to climate change
	Target 7.2: Reduce pollution and its impacts on biodiversity

Protect traditional knowledge, innovations and practices	
Goal 9. Maintain socio-cultural diversity of indigenous and local communities.	Target 9.1: Protect traditional knowledge, innovations and practices
	Target 9.2: Protect the rights of indigenous and local communities over their traditional knowledge, innovations and practices, including their rights to benefit sharing
Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources	
Goal 10. Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources.	Target 10.1: All transfers of genetic resources are in line with the Convention on Biological Diversity, the International Treaty on Plant Genetic Resources for Food and Agriculture and other applicable agreements.
	Target 10.2: Benefits arising from the commercial and other utilization of genetic resources shared with the countries providing such resources.
Ensure provision of adequate resources	
Goal 11: Parties have improved financial, human, scientific, technical and technological capacity to implement the Convention.	Target 11.1: New and additional financial resources are transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with Article 20.
	Target 11.2: Technology is transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with its Article 20, paragraph 4.



Annex IV

Examples of National Initiatives

Ghana

The total managed forest reserve area in Ghana is 1,643,100 ha. Within these Forest Reserves the Ghana Forestry Commission is currently implementing a comprehensive forest protection strategy based on aissefBTegstrathforlorisum ()-7.02 0 07 survey. The objectiathis that the ge
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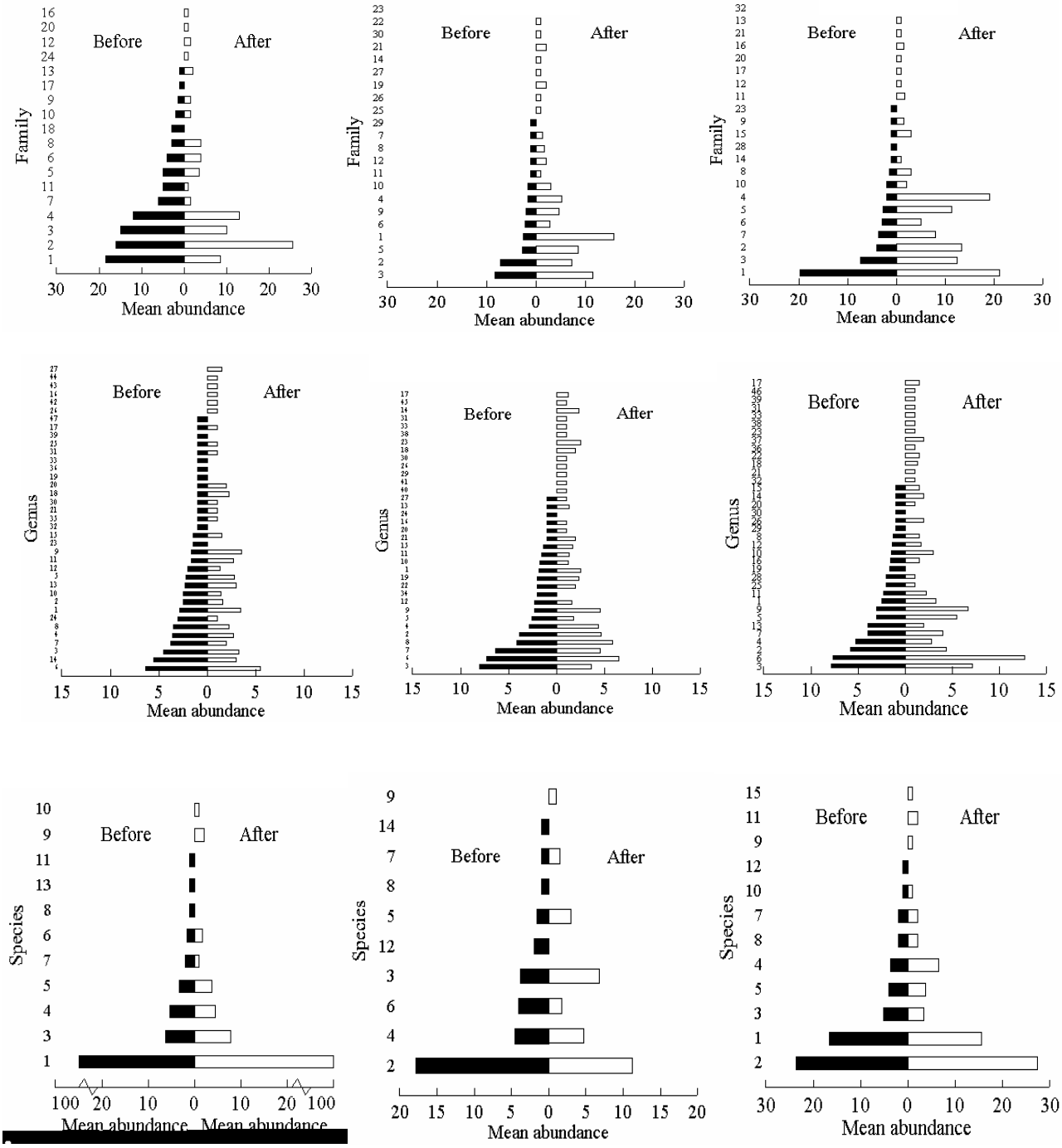
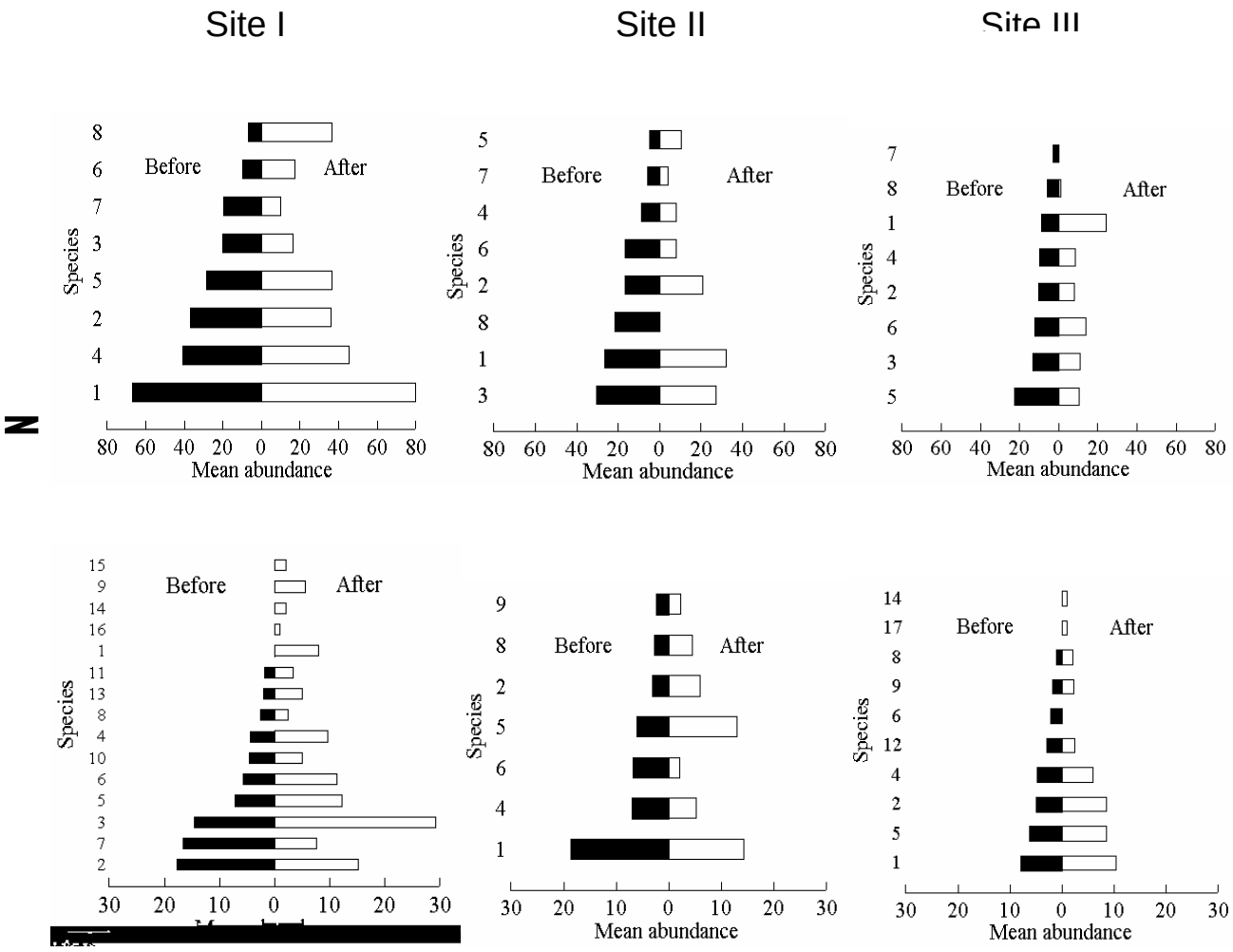
Site II

Site III

Arachnids





unlogged forest
logged forest

Azevedo-Ramos et al. 2005 not published.

Philippines

An ITTO project in a 75,745 ha Timber Licence Agreement in Northern Mindanao has assessed the impact of forest management activities in stands under different intensities of management and for periods of up to 30 years after logging. This project was one of the only cases where the 1993 ITTO Guidelines for Biodiversity Conservation in Tropical Production Forests were used explicitly in practical forest management activities. Baseline biodiversity data from the early years of management was not available but under the ITTO project biodiversity was studied in plots with different histories of management and in different parts of the landscape.

Biodiversity declined abruptly in the period immediately after logging but the decline was less marked where lower impact harvesting was used. The diversity of species in forests under management was lower than in undisturbed forest areas. However species abundance and diversity recovered quite quickly after logging. The biodiversity did not return to its state before logging occurred and the biodiversity was influenced by the methods of logging and of post logging management.

Given good levels of protection biodiversity eventually bounced back after logging. The biggest danger came from activities other than planned logging – agricultural encroachment and illegal logging for example. The project concluded that it would be important to determine acceptable levels of decline of biodiversity in production forests and then to make the necessary investments in management to achieve these levels.

Malaysia

Certification criteria and indicators for Peninsula Malaysia incorporated ideas from the ITTO Guidelines for Biodiversity Conservation in Tropical Production Forests. However Malaysian forestry practices have always included measures to protect biodiversity. Malaysia has a system of 72 Permanent Jungle Reserves covering 23,500 ha within the Permanent Forest Estate that are established with the aim of protecting the natural diversity of genotypes and

Conservation Value Forest or represent other kinds of forested areas. Two large set-asides, Bukit Sarang and Binyo-Penyilam Conservation Areas (approximately 12,000ha and 18,000ha respectively), contain numerous endemic, or rare or endangered species (orchids, begonias, snails, lizard, birds, mammals, etc). Native customary lands and other former shifting cultivation sites, contain forests of various ages rich in non-timber trees such as those bearing wild fruits, and forming additional feeding opportunities and cover for wildlife.

Grand Perfect's Conservation Program involves a threefold strategy:

1. Production and operations – The entire PFZ has been mapped and activities are covered by a GIS management system, through which activities in every planted compartment are planned, implemented, monitored and controlled. The mosaic pattern of planted or otherwise forested habitats is shown in the landscape level map (Fig. 1). The landscape pattern, a mosaic of natural forest and planted compartments with large and small conservation set-asides (river buffers and wildlife corridors), is recreated on a smaller scale within all planted compartments. A set of conservation rules has been developed to ensure that clearing, planting and infrastructure development minimize erosion and siltation, and minimize or exclude the use of herbicides. No pesticides are at present being used. Water quality is regularly (e.g., quarterly) monitored, both before and after planting. All data relevant to planting material (provenance, stocking density, date of planting, area planted or unplanted, etc), and data on flora and fauna (distribution, abundance, vulnerability, use) are incorporated into the GIS Plantation Integrated Management System ("PIMS"). All operational requirements have been developed with a broader, state or national application in mind.

2. Community Development – Continuing communication with more than 200 traditional longhouse communities in the PFZ is in place to ensure the sustainable harvest of forest resources (such as a collaborative study of the distribution, abundance and harvest levels of the Bearded Pig (*Sus barbatus*) the main source of protein). Community education and awareness efforts have been based on provision of natural history guides to local schools and longhouses, and discussions of wild resource use. The values of traditional skills are being recognized by employing longhouse residents as field assistants in taxonomic inventories and by providing technical training that may allow locals to be employed independently for future biodiversity assessments and monitoring.

3. Conservation - Biological inventories are conducted through long-term partnerships with local, regional and international scientific institutions. The Smithsonian Institution's National Museum of Natural History and Conservation Research Center (USA), Field Museum of Natural History (USA), Lund University (Sweden), Singapore Herbarium, Raffles Museum of Biodiversity Research (Singapore), Nanyang Technological University (Singapore), Universiti Malaysia Sarawak, and the Universiti Tuanku Abdul Rahman (Peninsular Malaysia) are among the institutions with whom Grand Perfect Sdn Bhd has signed Memoranda of Understanding, to build comprehensive species databases for the PFZ. All fieldwork is done in cooperation with the Sarawak Forest Department and the Sarawak Forestry Corporation, with whom results are shared. Local NGOs, the Malaysian Nature Society and the Sarawak Nature Society, have been invited to join in these efforts and are supported by Grand Perfect through its corporate membership. Meanwhile, Grand Perfect has been working with institutions like the Sarawak Timber Association (STA) on developing increased capacity in areas such as manpower training, fire management, and nursery management.

The Project will eventually produce five million metric tonnes of industrial wood per year, and simultaneously play a crucial role in biodiversity conservation for the State. By early 2006, a management plan for the PFZ will be completed, and used to integrate economic profitability with the maintenance landscape level biodiversity.

Indonesia

The core of the Indonesian Biodiversity Strategy and Action Plan adopted in 2003 is a system of 315 protected areas covering 22,560,545 ha. Although the ITTO Guidelines for Biodiversity Conservation in Tropical Production Forests were translated into Indonesian there appears to have been only sporadic attempts to implement them on the ground. However Indonesian forestry regulations do require concessionaires to set aside a minimum area of 300 ha for the protection of flora and fauna. There are criteria that ensure that these set asides are located in areas with high conservation value. In plantation forest estates companies are obliged to set aside 10% of their concession area to be retained under natural forest.

Recently some international conservation NGOs (Worldwide Fund for Nature, the Nature Conservancy and Birdlife international) have formed alliances with timber companies to attempt to promote biodiversity conservation within logging concessions. There are ongoing attempts to define and map High Conservation Value Forests based upon biodiversity criteria. The Indonesian Ecolabelling Foundation has been attempting to ensure that existing regulations to protect biodiversity in production forests is observed in any concessions seeking certification.