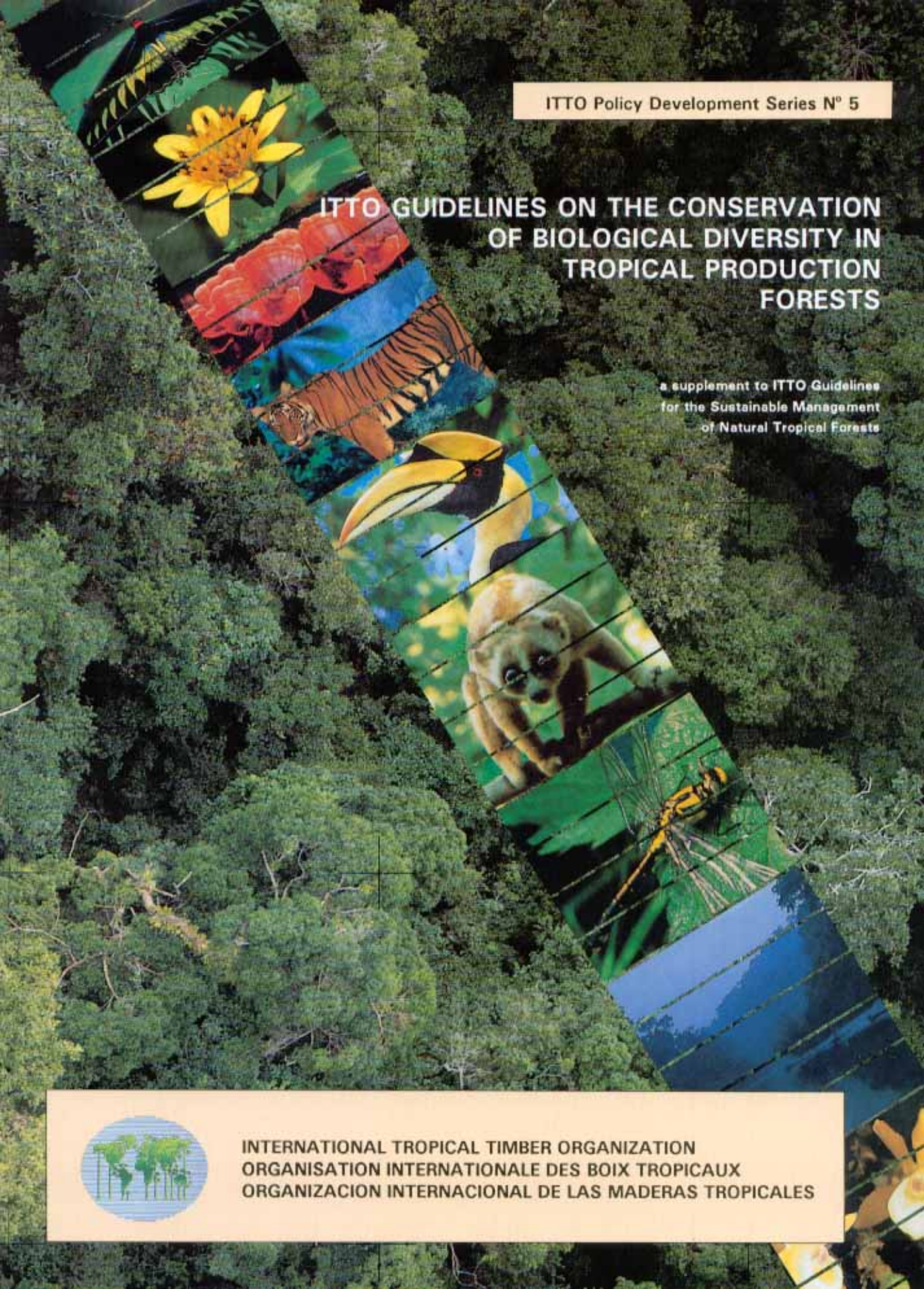

ITTO Policy Development Series N° 5

# ITTO GUIDELINES ON THE CONSERVATION OF BIOLOGICAL DIVERSITY IN TROPICAL PRODUCTION FORESTS

a supplement to ITTO Guidelines for the Sustainable Management of Natural Tropical Forests

INTERNATIONAL TROPICAL TIMBER ORGANIZATION
ORGANISATION INTERNATIONALE DES BOIX TROPICAUX
ORGANIZACION INTERNACIONAL DE LAS MADERAS TROPICALES

ITTO Policy Development Series 5

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## FOREWORD

The Food and Agricultural Organization of the United Nations estimates that 26 percent (3.4 billion ha) of the earth's land surface is covered with forests. This percentage is approximately the same for both the developing and the developed world. However, developing countries are home to most tropical forests and these represent slightly more than half the global forest estate. These luxuriant forests are the habitat of more than 50 percent of the plant and animal species found on our planet which over the years have shaped our lives and civilization. Indeed, many tropical forest species have contributed to the development of world agriculture. However, tropical forests are facing rapid destruction and
degradation estimated by FAO at a rate of over 0.8 percent per annum between 1980 and 1990. This rate implies that tropical forests have diminished by one tenth of their area during the last twelve years.

For years, the conservation of biological diversity was expected to be secured through the establishment of totally protected areas (TPA) encompassing the full range of biodiversity. However, the establishment of TPA is subject to serious constraints, such as difficulties in acquiring large forest areas, inability to ensure appropriate coverage of all forest types, and frequent encroachment. As a result, the extent of TPA and the pace of their establishment has been very low. It is now acknowledged that the conservation of biodiversity should best be addressed in the framework of a holistic conservation strategy, involving all activities associated with forest resources. In this light, timber production should
be carried out in such a way as to maintain biodiversity, or to minimize its loss. In this connection, the role of the International Tropical Timber Organization (ITTO) is to promote the conservation of biodiversity in tropical production forests as an integral part of sustainable forest management.

It is with great pleasure that I present these ITTO Guidelines on the Conservation of Biological Diversity in7fropical Production Forests as a complement to the ITTO Guidelines for the Sustainable Management of Natural Tropical Forests, already published as ITTO Policy Development Series No. 1. The objective of these Guidelines is to provide a practical description of key issues in biodiversity conservation, to record technical considerations for policy formulation," and to guide the implementation of such activities. These Guidelines are consistent with the Non-Legally Binding Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of All Types of Forests and the Convention on Biological Diversity concluded at UNCED in Rio de Janeiro, Brazil, in June 1992.

The Guidelines are the result of international collaborative efforts which involved specialists of ITTO Member and Non-Member countries and international NGO'S. This process has facilitated the development of Guidelines that could be accepted as an international standard and used as a technical reference for addressing biodiversity conservation issues in tropical production forests.

I am convinced that these ITTO Guidelines on the Conservation of Biological Diversity in Tropical Production Forests which are now an essential and integral part of the ITTO Guidelines for the Sustainable Management of Tropical Natural Forests are a very significant step towards achieving the ITTO objective "to encourage the development of
national policies aimed at sustainable utilization and conservation of tropical forests and their genetic resources, and at maintaining the ecological balance in the regions concerned", as provided for in the International Tropical Timber Agreement of 1983.

B.C.Y. Freezailah
Executive Director

Yokohama, Japan
15 September 1993

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# 1. INTRODUCTION

At its Eighth Session in Bali in Indonesia in May 1990, the International Tropical Timber Council adopted Target 2000 through which its member countries set themselves the goal of ensuring that by the year 2000 all trade in tropical timber would come from forests that are managed sustainably. This goal was set in relation to objective 1(h) of the International Tropical Timber Agreement of 1983 which is: *"To encourage the development of national policies aimed at sustainable utilization and conservation of tropical forests and their genetic resources, and at maintaining the ecological balance in the regions concerned."*

Forests managed for timber and/or non-timber products do provide habitats for many, in some cases the majority, of the plant and animal species found in pristine, unmanaged forests. The number of species persisting is dependent on a variety of factors, predominantly on the degree of intervention and modification of the original ecosystem. In some cases of low-intensity utilization, forests may, at least in the short-term, have greater diversity than undisturbed ecosystems. Species composition will have changed, however, and some rare or specialized species may be lost.

Biological diversity is important both in its own right, and for the functional support it provides for the total forest ecosystem, and hence ultimately, for sustainable timber production. However, due to deforestation and forest degradation it is increasingly at risk. The principle objective of the ITTO Guidelines on the Conservation of Biological Diversity in Tropical Production Forests is therefore to optimize the contribution of these forests to the conservation of biological diversity that is consistent with their primary objective, namely the sustainable production of timber and other products.

These guidelines are based on the Report of an International Technical Working Group established in accordance with Decision 6(X) of the International Tropical Timber Council. The terms of reference for this Working Group required it to prepare guidelines for "The Conservation of Biodiversity in Tropical Production Forests" to complement the "ITTO Guidelines for the Sustainable Management of Natural Tropical Forests" and the "ITTO Guidelines for the Establishment and Sustainable Management of Planted Tropical Forests".

In meeting these terms of reference, the Working Group's report was based in large part on a Pre-Project Report on "Realistic Strategies for the Conservation of Biological Diversity in Tropical Forests" which was prepared for ITTO by the International Union for the Conservation of Nature and Natural Resources - IUCN. This report summarized the outputs from a workshop conducted in conjunction with the General Assembly of the IUCN which was held in Perth Australia in December 1990. On the basis of the workshop discussions, a set of draft guidelines was prepared, revised by IUCN and sent for consideration by the Working Group when they met in Switzerland in October 1991 to formulate an amplification of the principles relating to the conservation of biodiversity implicit in the existing ITTO Guidelines on sustainable management in tropical forests. These constitute the international reference standard established by ITTO for the development of more specific national guidelines. The details of these national guidelines are matters for national decision by individual timber producing countries, in accordance with their national objectives and land use strategies.

# 2. KEY ISSUES IN BIODIVERSITY CONSERVATION IN PRODUCTION FORESTS

Before outlining a series of general principles and recommended actions for the various aspects of biodiversity conservation in tropical production forests, it is useful to examine the key issues associated with the conservation of biological diversity in these forests. These issues include the nature of biological diversity itself; the nature of the threats to biological diversity in tropical forests; the key role of forests set aside and totally protected for the purposes of species and ecosystem preservation; the role of production forests in the conservation of biological diversity; and the contribution of biodiversity conservation to the sustainable management of tropical forests.

## 2.1 What is Biological Diversity?

Biological Diversity or Biodiversity is not just the number of species in a particular area. Rather, it is the total variety of genetic strains, species and ecosystems that are found in nature. For practical purposes Biodiversity is normally subdivided into three major hierarchical categories - variation at the genetic level within a particular species; species diversity or the number and proportion of different species in a particular area; and ecosystem diversity that describes the variation in the assemblages of species and their habitats.

Tropical forests are extremely rich in plant and animal species. Biodiversity does not just refer to trees, birds and mammals but to all groups of organisms. Most of these are invertebrates and microorganisms and although less conspicuous, some of them may be essential to the functioning and sustainable production of the forest.

Another key feature of biodiversity is the fact that it is not a static entity. It is continually changing as evolution gives rise to new species and changing ecological conditions cause others to disappear. Tropical forests are also not static ecosystems maintaining a fixed climax species composition over time. All forests have been subject to modification in the past by climatic, geomorphological and human influences throughout their evolutionary history, and these modifications themselves have influenced current patterns of biodiversity. Modifications caused by inter alia timber harvesting, silvicultural operations or fire are important aspects of this dynamic development of the forests.

## 2.2 The Benefits of Biodiversity

The diversity of nature is the source of biological wealth and the foundation of the material wealth of human societies. It has been the basis for selective development of our food crops, a wide range of direct goods and services and much of the raw inputs and genetic materials for industry, agriculture and medicine. Collectively, these benefits are worth many billions of dollars each year. People spend additional billions of dollars each year to appreciate nature and its diversity through recreation and tourism.

All human societies - urban, rural, industrial and non-industrial - continue to depend on a wide array of ecosystems, species and genetic variants to meet their ever changing needs and the needs of the markets they supply. The diversity of nature is also a source of beauty, enjoyment, cultural and spiritual inspiration, understanding and knowledge and provides the foundation for much human creativity.

Through their evolution over millions of years, plants and animals have made the Earth a fit habitat for humanity and the other forms of life we know today. Plants and animals help maintain the chemical balance of the Earth, and stabilize climate. They also protect watersheds and renew the soil. Furthermore, we are only beginning to understand these roles and know too little about the relative importance of different ecosystems or the species which compose them.

### 2.3 Threats to Biodiversity

Any disturbance of a forest, whether by natural agents or caused by people, will alter it as a habitat for animal and plant species. Small-scale disturbances may in some instances enhance structural, floristic and faunistic diversity. However, large-scale disturbances tend to simplify the ecosystem and result in a loss of genetic diversity within a species, loss of species and reduced available habitat and as a consequence may result in an overall loss of biodiversity.

In general, the management of a forest for timber production and many other purposes requires the modification of the natural ecosystem to provide access, to remove forest products and in some cases, to increase the yield of commercial species. Inevitably, some of the original forest species will then be at least locally lost. Total biodiversity may remain the same as other species colonize the modified forest environment. However, the colonists are often common and widespread while the displaced species are often old-growth specialists, many with restricted ranges. The net result therefore is often a qualitative change in diversity favoring generalists species at the expense of old-growth specialists.

Converting natural forests into other land uses has far more drastic impacts on biodiversity than sustainable management for timber production. A very large proportion of the world's forests are allocated for the production of timber and this situation is likely to persist. The future of much of the world's forest biological diversity depends upon the way in which these forests are managed.

### 2.4 The Key Role of Totally Protected Conservation Areas

In the light of the benefits of biodiversity and all of the above threats, prudence demands that people and human societies keep as much biodiversity as possible, while at the same time ensuring that the areas appropriate for the production of timber or other benefits are sustainably managed to meet their primary production objectives. However, detailed information on the ecology of all forest species and their response to disturbance is frequently not available. Thus, there is often little information upon which to base conservation programs.

In this uncertain situation, the safest strategy for conserving biodiversity is to establish large undisturbed protected areas covering representative examples of all forest types and ecosystems. Totally Protected Areas (TPA's) such as Strict Nature Reserves, National Parks and other equivalent areas (See Appendix 1 for details) must therefore be seen as the corner stone of any systematic conservation programme. However, for a number of reasons TPA systems by themselves cannot be expected to conserve all biodiversity.

Few countries are able to allocate sufficient areas to total protection to guarantee the preservation of all animal and plant species and their intraspecific genetic variation. In most countries, totally protected areas do not exceed 4-8 percent of national territory and individual areas are generally small. When species exist in small isolated populations they are susceptible to extinction caused by random environmental events and genetic deterioration. If natural forests are

only retained in small isolated protected areas then many species will inevitably be lost.

In many tropical countries, for practical purposes TPA's are usually identified on the basis of the distribution of mammals, birds and trees, or even broader environmental classification systems. The utility of these designation systems for conserving invertebrates and microorganisms and the full genetic diversity of the trees, birds and mammals is unknown.

On a regional basis there is movement and migrations of many organisms between forest areas. Many of these, such as fruit eating birds and many insects, are functionally important to the forest ecosystem as a whole because of their role as pollinators and dispersers. Their movements are often not fully known and, again, it is unlikely a TPA network itself would be able to incorporate all these movements. Loss of natural or near-natural habitat outside the TPA network that support these migrants or nomads will result in the reduction of their populations and effect the overall functioning of the forests throughout the region. This is particularly important for keystone species which play a role in the life cycle of others, such as the major timber trees.

### 2.5 The Value of Sustainably Managed Production Forests in Biodiversity Conservation

There is a broad consensus that it is possible to manage tropical forests for production of timber and other products while still maintaining considerable biodiversity values. Thus, while tropical forest lands may be extremely fragile when people attempt to convert them to other uses, the forests themselves are often reasonably robust in their ability to recover from localized and periodic disturbance.

Such disturbances in the past have been caused by agents such as tree falls, storm damage, earthquakes, fire and low intensity forms of shifting cultivation, and they have contributed to the present patterns of diversity of the forests. Selective harvesting of timber trees and subsequent protection of the forests constitutes a form of disturbance which might therefore be expected to be compatible with the conservation of much of the biodiversity of the forests.

Theoretically, sustainably managed production forests represent the best compromise between the desirability of conserving species and the need to use land to generate wealth and employment. Production forests often represent a more tangible economic asset to societies in poorer countries than do TPAs, and are therefore more likely to be respected. In view of the worldwide decline in total forest area, even modified forests will have an important part to play in preserving habitat, species and sub-specific diversity. It is not possible to design forest management systems which would conserve all biodiversity, but we can apply known principles to minimize loss.

However, the contribution of production forests to the conservation of biodiversity can only be fully realized within an integrated national land use strategy, which assigns appropriate attention to biodiversity conservation in specific areas of forest, in accordance with their composition and location, taking account of the TPA system.

### 2.6 The Functional Role of Biodiversity in Production Forests

One of the major values of retaining biodiversity is to maintain important ecosystem functions such as mineral cycling, pollination and maintaining a balance of organisms such that the likelihood of major outbreaks of pest species is reduced. Even small, apparently insignificant organisms can play a major role, and conservation of high overall levels of diversity is a prudent for achieving sustainable forest production with low levels of risk.

# 3. POLICY AND LEGISLATION

The success or failure of forest resource management is greatly affected both by the laws and policies that relate to the forest sector, and by the structures and staffing of the agencies that have been established to secure their implementation. This may require action to strengthen attention to biodiversity conservation in national education and training programs. In order to promote the conservation of biodiversity in production forests, it is essential that biodiversity issues are given appropriate recognition in policy and legislation by the application of the following principles and recommended actions.

Principle 1

National forest policy and legislation should recognize biodiversity conservation as an important goal of forest management. Programs must be developed to assess the importance of biodiversity in all forest areas, including those utilized for timber and other non-wood forest products, and to determine the degree of priority to be assigned to biodiversity conservation in each specific area.

Recommended Action 1

Provide a national agency, or reform and strengthen existing institutions to include biodiversity conservation in their mandate.

Principle 2

The national agency responsible for forests should have both the mandate and the capability to ensure that forests are managed for all values including biodiversity in an integrated system, with allocation of priority to production and conservation objectives as appropriate to the particular forest area. It should also assist in the integrated management of private and customarily held forests, according to the objectives laid down in the national forest policy.

Recommended Action 2

Provide this agency with sufficient human and financial resources to effectively achieve integrated biodiversity conservation involving both the TPA and production forest systems.

Principle 3

Inventories need to be undertaken to describe, quantify and monitor biodiversity in all production forests which are assessed as sufficiently high priority in national conservation strategies to warrant such action. Where possible and feasible, these inventories should be incorporated within existing timber management inventories.

Recommended Action 3

Develop practical biodiversity appraisal systems to guide forest land use allocations at both the landscape level and within the management units of production forests. Where forest exploitation or changes in forest land use are occurring rapidly, give attention to the development of rapid appraisal systems that can provide guidance to forest planners in a relevant time period.

Recommended Action 4

Develop and adapt practical techniques, such as environmental impact assessment for assessing the consequences of different forest management techniques on biodiversity. Incorporate biodiversity monitoring into on-going management programs for all forests.

# 4. PROMOTING THE ROLE OF SUSTAINABLY MANAGED PRODUCTION FORESTS IN CONSERVING BIODIVERSITY AT THE LANDSCAPE LEVEL

Because some key elements of a nation's biodiversity are expressed at an ecosystem level, the conservation of overall biodiversity ultimately requires management at the broad landscape level to cover all major ecosystem types. In addition, the effects of land-use activities in a particular area can have a significant effect on the biota of other areas.

Careful land-use planning can, however, be used to both promote the retention of biodiversity at the ecosystem level and to minimize the external impacts of particular land-use activities on biodiversity values in other areas. However, to do this, forests and other key components of the landscape need to be managed as a single inter-related system. This, in turn, is best achieved through an integrated system of protected areas, production forests and sympathetically managed agricultural and urban lands.

The following principles and recommended actions outline some of the key considerations needed to establish such an integrated approach to biodiversity conservation and land-use planning and management.

Principle 4

The different categories of land that need to be kept under permanent forest cover include lands for nature conservation and ecosystem preservation (TPAs), fragile lands requiring protection forests, natural production forests and planted production forests - see Appendix 1 in both the ITTO Guidelines on the Sustainable Management of Natural Tropical Forests and the ITTO Guidelines on the Establishment and Sustainable Management of Planted Tropical Forests.

Recommended Action 5

Identify, survey and delineate the various categories of the Permanent Forest Estate and develop complementary management plans in consultation with forest dwellers and surrounding populations, taking into account their present and future needs for agricultural land and their customary use of the forest.

Principle 5

Research in conservation biology has indicated that there is a direct relationship between the size of a protected area and the number of species it will conserve in the long-term. Such studies have also indicated that increasing the perimeter to area ratio of a TPA will reduce its effectiveness as a conservation unit. This is due to "edge effects" which favor generalists species rather than species with more specialist habitat requirements.

Recommended Action 6

Within the constraints of prevailing social and economic circumstances, design TPA's to cover as large an area of natural forest as socially and economically feasible, with due attention to optimizing their shape. Surround these TPA cores with sympathetically managed near-natural production forests to minimize edge effects, and ensure the protection of ecological function.

Principle 6

Where forest clearing or disturbance becomes necessary, maintaining the connectivity between undisturbed forests will help to minimize erosion of biodiversity. In designing such connecting areas, a fundamental principle is to facilitate the movement of seeds, pollen and animals between the various forest areas and other habitats.

Recommended Action 7

Link TPA reserves by providing "corridors" of natural forest and ensuring that the habitat at known major resting sites and the known ends of migration routes are retained. Locate production forests to maximize the connectivity between natural forest TPA's at the landscape level.

# 5. CONSIDERATIONS FOR THE CONSERVATION OF BIODIVERSITY AT THE MANAGEMENT UNIT LEVEL IN PRODUCTION FORESTS.

With careful land use planning that gives particular attention to the complementary location of all retained forest areas, production forests can potentially play a key role in the conservation of biological diversity at all levels. However, whether or not this potential is realized in practice will depend in very large part on how particular production forests are managed at the operational level. The following principles and recommendations for operational management will help to maximize the contribution of production forest to the conservation of biodiversity.

## 5.1 Planning

### *5.1.1 Choice of silvicultural concept*

Principle 7

Silvicultural systems that aim to change species composition or selectively remove certain structural or floristic components of the forest can have a negative effect on biodiversity conservation. Forest areas of recognized importance for biodiversity conservation should be the subject of special action as recommended below.

Recommended Action 8

Particular care should be taken in applying silvicultural treatments to ensure that adequate populations of species which are important in food chains or in providing ecological functions (keystone species) are retained.

In the case of plantations, the use of indigenous species should be encouraged.

Recommended Action 9

Trees with hollows, standing dead trees (snags) and decomposing fallen trees all have ecological importance for a range of species and not all should be removed from the forest in any silvicultural treatment to improve timber yields.

Recommended Action 10

The use of pesticides or other chemicals should be kept to a minimum in any silvicultural treatment, and the manufacturers instructions for the use of each product should be strictly observed.

### *5.1.2 Yield Regulation, Annual allowable Cut and Rotation Time*

Principle 8

The presence of some larger and older trees in the forest, and longer intervals between the disturbances caused by harvesting operations, generally favor biodiversity conservation.

Recommended Action 11

In forest areas of recognized importance for biodiversity conservation incorporate consideration of the effects of rotation length, felling cycles, girth limits and size of the annual area cut-over in deciding the allocation of the AAC.

Principle 9

In general, a mosaic of old-growth forests in close proximity to logged forests will help to maintain biodiversity.

Recommended Action 12

When determining yield allocations and rotation lengths for particular management units, plan logging operations so that a mosaic of recently logged and old growth forests are maintained over time.

### 5.1.3 Management Inventory and Mapping

Principle 10

A system of small (approximately 100 ha) undisturbed forest reserves within the management area can have profound positive effects on biodiversity conservation that are disproportionate to their size. A system of such reserves, carefully distributed throughout the management area, can act as temporary

refuges for fauna moving away from the active logging areas and also as sources for rapid re-colonization.

Recommended Action 13

Within each major management area, a system of small virgin reserves should be designated on the management plan and maps. The boundaries of these reserves should be marked in the field where feasible.

Principle 11

Not all areas of a production forest will have equal importance for biodiversity conservation. Sites of particular importance for biodiversity conservation (key areas) will include:

* areas adjacent to TPA reserves;
* areas with populations of rare or endangered species or with high concentrations of endemic species, or with exceptional species richness;
* areas with unusual land-forms, geology or other physical features not adequately represented in TPA's;
* rivers, streams and wetland areas;
* areas with forest types not represented in TPA's;
* areas that contain biological diversity of social or cultural value, or of medicinal, agricultural or other economic value;
* areas that contain habitats frequented by migrating species.

Recommended Action 14

Management inventories should aim to locate key areas within all production forest units that are known to have higher biodiversity values as outlined in Principle 12.

Recommended Action 15

Working plans should prescribe appropriate management measures in accordance with the specific biodiversity value of these key areas. Buffer strips of no intervention should be established along streams and around lakes and wetland areas.

**5.2. Extraction**

Principle 12

Biodiversity conservation is strongly affected by degree of canopy disruption, extent of damage to the standing vegetation and severity

of erosion.

Recommended Action 16

Reduce individual gap size as far as possible, unless specifically required for the regeneration of key species. Avoid creating very large gaps that equate to areas of local clearfelling.

Recommended Action 17

Minimize machinery and felling damage to the residual stand, undergrowth and soil.

## 6. IMPLEMENTATION

Principle 13

Biodiversity conservation can provide many benefits to the global community, to national economies and local populations. Management for biodiversity conservation may add extra costs to management of production forests but may also yield extra economic and social benefits.

Recommended Action 18

Utilize market mechanisms and economic incentives at the national and international level to encourage maintenance of biodiversity services. Taking into account the options contained in Agenda 21 adopted by UNCED in Rio, members will encourage the transfer of technology on mutually agreed terms, taking into account the special needs of developing countries and the provision of new and additional financial resources, bearing in mind principle 13 above; where appropriate.

Recommended Action 19

Efforts should be made to involve local people in the management of the forests, and to ensure that they obtain benefits, which will motivate the people themselves to use their traditional knowledge in support of the conservation of biodiversity.

# 7. RESEARCH AND MONITORING

Principle 14

The value of production forests to biodiversity and the effects of various management systems are inadequately understood. Additional information on the status of biodiversity in production forests and the efficacy of the management measures instituted to minimize its erosion is needed.

Recommended Action 20

Investigate and adapt existing systems to develop locally specific, rapid, cost-effective and efficient biodiversity surveys and monitoring systems that could be carried out by, or in conjunction with, forest inventory teams during their survey activities. Implement such systems as a part of normal forest inventory processes.

# APPENDIX 1
# CATEGORIES AND MANAGEMENT OBJECTIVES OF PROTECTED AREAS

**I. Strict Nature Reserve.** To protect nature and maintain natural processes in an undisturbed state in order to have ecologically representative examples of the natural environment available for scientific study, environmental monitoring, education, and for the maintenance of genetic resources in a dynamic and evolutionary state.

**II. National Park.** To protect outstanding natural and scenic areas of national or international significance for scientific, educational, and recreational use. These are relatively large natural areas not materially altered by human activity where extractive resource uses are not allowed.

**III. Natural Monument/Natural Landmark.** To protect and preserve nationally significant natural features because of their special interest or unique characteristics. These are relatively small areas focused on protection of specific features.

**IV. Managed Nature Reserve/Wildlife Sanctuary.** To assure the natural conditions necessary to protect nationally significant species, groups of species, biotic communities, or physical features of the environment where these may require specific human manipulation for their perpetuation. Controlled harvesting of some resources can be permitted.

**V. Protected Landscapes and Seascapes.** To maintain nationally significant natural landscapes which are characteristic of the harmonious interaction of man and land while providing opportunities for public enjoyment through recreation and tourism within the normal life style and economic activity of these areas. These are mixed cultural/natural landscapes of high scenic value where traditional land uses are maintained.

**VI. Resource Reserve.** To protect the natural resources of the area for future use and prevent or contain development activities that could affect the resource pending the establishment of objectives which are based upon appropriate knowledge and planning. This is a 'holding' category used until a permanent classification can be determined.

**VII. Anthropological Reserve/Natural Biotic Area.** To allow the way of life of societies living in harmony with the environments to continue undisturbed by modern technology. This category is appropriate where resource extraction by indigenous people is conducted in a traditional manner.

**VIII. Multiple Use Management Area/Managed Resource Area.** To provide for the sustained production of water, timber, wildlife, pasture and tourism, with the conservation of nature primarily oriented to the support of the economic activities (although specific zones may also be

designated within these areas to achieve specific conservation objectives).

Two additional categories are international labels which overlay protected areas in the above eight categories:

**IX. Biosphere Reserve.** To conserve for present and future use the diversity and integrity of biotic communities of plants and animals within natural ecosystems, and to safeguard the genetic diversity of species on which their continuing evolution depends. These are internationally designated sites managed for research, education and training.

**X. World Heritage Site.** To protect the natural features for which the area is considered to be of outstanding universal significance. This is a select list of the world's unique natural and cultural sites nominated by countries that are Party to the World Heritage Convention.

Source: IUCN/UNEP/WWF, 1991, Caring for the Earth, Gland, Switzerland, pp 192-193.