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**A CRITICAL EVALUATION OF THE TROPICAL FOREST INDUSTRY  
IN THE REPUBLIC OF CONGO AS IT CONFORMS TO THE  
INTERNATIONAL TROPICAL TIMBER ORGANIZATION  
SUSTAINABLE MANAGEMENT OBJECTIVES**

**By**

**Pierre Vincent Bondoumbou**

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**A Thesis Submitted to the Faculty of the  
SCHOOL OF RENEWABLE NATURAL RESOURCES**

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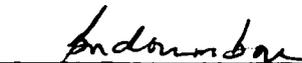
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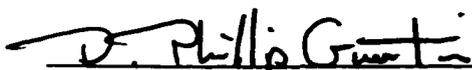
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## **ABBREVIATIONS**

**AAC - Annual allowable cut**

**CIB - La Congolaise Industrielle de Bois**

**FAO - The Food and Agriculture Organization**

**FSC - The Forest Stewardship Council**

**GTZ - Deutsche Gesellschaft für Technische Zusammenarbeit**

**ITTA- The International Tropical Timber Agreement**

**ITTO- The International Tropical Timber Organization**

**MEF - Ministère de l'Economie Forestière**

**MAEEFP- Ministère de l'Agriculture des Eaux et Forêts et de la Pêche**

**PAFN - Programme d'Action Forestier National**

**PFE - The Permanent Forest Estate**

**SOCOBOIS - La Société Congolaise des Bois**

**TFAP - Tropical Forest Action Plan**

**UFA - Unité Forestière d'Aménagement**

**UNDP- United Nations Development Program**

## ABSTRACT

One of the innovations in the management of forest resources in the 1990s is the use of criteria and indicators (C&I) as a tool to measure the sustainability of forest management practices in general, as well as, specific forest related activities such as timber industry. The International Tropical Timber Organization has developed a set of criteria and indicators for the measurement of sustainability in natural tropical forests. This study uses these criteria and indicators to critically evaluate the current status of the forest industry in the Republic of Congo as it conforms to the ITTO sustainable management objectives. The study identifies both the progress made to achieve the ITTO "objective 2000", and weaknesses that need to be addressed in order to reach an overall sustainable forest industry. Recommendations are made to correct the identified weaknesses.

## INTRODUCTION

The Republic of Congo is located in the central part of the African continent. The natural tropical forest covers about 19.537 million hectares (FAO, 1999), or about 57.2% of the territory. The forest industry is one the most important industries in the country, and is second after the oil industry in terms of both the volume and value for exported products.

As forests have emerged during the past two decades as a priority consideration on the international agenda from various perspectives, "national policy-makers and the international community face the challenge of reconciling forest-related national policy objectives with regional and global environmental concerns and responsibilities"(Tan Sri Dato' et al. 1995). The main goal is the conciliation of efforts to reduce degradation of natural tropical forests by promoting sustainable resource management practices.

The recommendation by the International Tropical Timber Organization "Guidelines for the sustainable management of natural tropical forests" (ITTO, 1992a), adopted by the UN conference on environment and development held in Rio de Janeiro in 1992, outlined the "non-legally

binding principles on the management, conservation and sustainable development of all types of forests" (UNCED, 1992). These guidelines promote and encourage sustainable sound national forest policies and practices by the international community.

The Republic of Congo, as with most African timber producing countries, is a member of the ITTO, and adopted its national tropical forest action plan in 1992. This is a national forest policy, which integrates ITTO's guidelines focused on sustainability.

Achieving sustainability in the forest industry practices is a long-term process. The ITTO established "the target 2000" as the date for a global evaluation of actions toward sustainability, while encouraging members to report on the progress made in achieving this goal in their own country.

In this context, questions that need to be addressed for the Republic of Congo are; (1) what is the current state of forest industry practices with respect to sustainable goals, (2) what are the possible weaknesses, and (3) what are issues that may need attention in order to achieve the sustainability goals?

**A critical evaluation of the forest industry at the national level as it conforms to the ITTO guidelines will help answer these questions. This is the focus of this thesis.**

### **STUDY OBJECTIVE**

**The ITTO guidelines for sustainable management of natural tropical forests are presented as a set of principles and possible actions covering a wide range of issues from general forest policy to forest industry operation. Application of these guidelines are supposed to help achieve the following five goals: (1) establishment of a reasonable and permanent forest resource base for forest industry and others forms of forest utilization; (2) ensure the continuity of timber flow from the forest resource base; (3) ensure that the forest industry operations will be performed with minimal environmental impact; (4) promote positive socio-economic effects from the forest industry activities; and (5) establishment of an adequate institutional framework for all forest activities. With respect to these ITTO goals, the objective of this study is to critically evaluate what the Republic of Congo has done or is doing to conform its forest industry to the requirements for sustainability.**

## METHODOLOGY

The critical evaluation of the forest industry in the Republic of Congo, in this study, is made on the basis of the ITTO's criteria for the measurement of sustainable tropical forests at the national level. These criteria are: (1) state of the forest resource base; (2) continuity of the timber flow; (3) level of environmental control; (4) socio-economic and financial effects; and (5) institutional framework. For each of the five criteria, I will address the following three questions. (1) what is the importance of the criterion with respect to the sustainability of forest industry; (2) what are the ITTO's requirements for sustainability of forest industry under each criterion and the indicators to measure it; (3) what has the country done or what is being done to meet the ITTO's requirements for each criterion? To conclude, a discussion is made to critically evaluate the accomplishments, to identify the probable weaknesses in the implementation of the ITTO's guidelines, and finally recommend measures to improve the situation.

## LITERATURE REVIEW

This review will provide a background on the problems tropical forest countries are facing in the last two decades. It reviews the major aspects of these problems as the international community, through specialized forestry oriented organizations such as the FAO and ITTO, identified them. The strategies to deal with the problems and tools being used by ITTO to implement and evaluate a more sustainable management of tropical forests are also reviewed.

The degradation of natural tropical rainforests has been one of the major concerns of the international community. The major problem is the recent rate of deforestation in the tropics which is unprecedented (Park, 1992). Most deforestation has transpired in this century, especially since the 1970s. In 1979 an estimated 75,000 square km of tropical forest was lost annually (Myers 1994a). In 1991, this loss had reached 132,000 square km or 1.8 percent of remaining forest coverage of roughly 7.5 million square km (Myers, 1994b). Shifting agriculture has been identified as the main cause of this accelerated deforestation. It accounted for 54 percent of tropical forest clearing by 1980 (approximately 70% and 50% in tropical Africa and Asia,

respectively) (Lugo and Lowe, 1995). Timber logging is the second most important human influence on tropical forests (Johns, 1997). It affects 50,000 square km of rainforest annually according to Johns, but 45,000 square km each year according to Myers. There are, of course, other causes, such as population growth, poverty, construction of infrastructures, or conversion of forests for grazing (Barrow, 1994). Palo (1994) demonstrated a strong correlation between population density and forest cover in different tropical countries of the world, (also see Rudel, 1994). The patterns and trends of tropical forest degradation in the different parts of world have been well documented (Brown and Peace, 1994; Myers, 1994a; Jepma 1995; Sponsel et al. 1996; Barraclough and Ghinire, 1995; Rudel and Horowitz, 1993; FAO, 1990.).

Efforts have been made toward understanding the problems behind the causes of the degradation of tropical forests. The Food and Agriculture Organization (FAO, 1985) classified these problems into three groups.

The first group deals with the technical and biological problems inherent in the management of complex heterogeneous forest resources about which knowledge is rudimentary or often lacking. The structure, composition, and silviculture characteristics and needs of tropical forest

species are still not adequately known and understood. Tropical forests are not uniform in species composition or in structure, but consist of many different forest types. Since the nature and composition of each type determines to a large extent its value and the appropriate regeneration technique to adopt, the forest manager should ideally have some knowledge of the various forest types and their important silvicultural features (Nwoboshi, 1982). Available knowledge is lacking. Silviculture practices in Africa for instance “have aimed essentially at forest enrichment, the maintenance or increase in number per unit area of economically desirable species, usually removed by commercial exploitation” (Hiag et al. 1958). The regeneration of some of the commercially valuable trees remains an unsolved problem in tropical silviculture and the expanded use of the so-called “lesser-used” species is a current topic in wood science (FAO, 1985).

The second group is the technological, economic, managerial and organizational problems of the forest industries and trade. People have greater capacity than ever to harm tropical forest with their technology. The use of technology gives people greater access to forests allowing for rapid and radical transformation of tropical forestlands to others uses, and radical transformation of many species and even forests (Lugo et al. 1995). Heavy

machinery compacts the soil and, in most operations, trees surrounding those being harvested are also damaged. Up to two-thirds of the non-marketable trees are damaged or destroyed when marketable trees are extracted (Colchester, 1993). However, such technology when used appropriately, gives people a greater capacity to overcome, redirect, or even prevents environmental damage. Unfortunately, the positive side of the technology is not always used efficiently.

The economic aspect of the tropical forestry problems is partly due to the selective timber logging practices. One of the characteristics of the tropical forest is its high biological diversity. There is usually a large number of tree species per unit area. The selective cutting both in species and size is spread over large areas with low output per unit area. In Malaysia for instance, of 2,500 tree species are found in the rainforest zone, only 600 species are currently marketable and the species occur at the rate of 11 to 13 trees per hectare on the richest part of the forest (Nwoboski, 1982).

According to the same author, only 60 species out of the 560 recorded in Nigeria are currently considered commercially important. In the Republic of Congo, about thirty-two species out of three hundred are of the first commercial class of value, sixty-six others are of second and third class of

value (see Appendixes D1&D2). For this reason, overall profitability of harvesting such a forest is insufficient to generate investment for restoring or increasing the productivity of the resource base (FAO, 1985).

In most developing countries, a forest without industry is essentially of no financial value to a government, although its social and environmental value may be considerable. Small labor- intensive production units, with a minimum of sophistication, characterize most of the forest industry. Such industry is found to be less competitive. It lacks adequate domestic markets, marketing capability and managerial capability. In addition, it is confronted by significant trade barriers consisting of tariffs, quotas, quality standards and phyto-sanitary regulations imposed by the importing governments (Gale, 1998). Therefore, the forest industry does not always provide sufficient benefits to the people or economy of the different countries, as they would expect.

The third group is the social, institutional and political problems. The social aspect of the problem is that landless people seeking places to grow food and cut firewood carry out tropical deforestation. It stands to reason that larger populations will require greater land areas and that more tropical forests will have to be eliminated to satisfy increasing human needs (Lugo,

1995). As mentioned earlier, Palo (1994) demonstrated the strong correlation between population density and level of deforestation. The institutional aspect is related to the outdated forest policies and legislation. In many tropical countries, forest policies and legislation still date back to colonial days with emphasis on forest protection and collection of forest revenues (FAO, 1985). Such policies are not appropriate to deal with the new emerging social, economic and environmental problems mentioned earlier.

The international symposium on tropical forest management held in 1989 in Feldafing, Germany, suggested a more detailed diagnostic of the major problems facing the tropical countries (Bruenig and Poker, 1989). The following are the most recognized: (1) low technical standard of operations due to inadequate legislative enforcement and control, and consequently excessive and unnecessary waste and destruction of forest and lands resources; (2) inadequate scientific knowledge of the ecosystem, its structure, functioning and function, dynamics and reactions; (3) natural, economic or socio-political inaccessibility of some tropical forest regions, where destruction mainly by shifting cultivation goes on unabated; (4) lack of skilled man-power at all levels of conservation and management; (5) lack of interest in long-term forest management, especially as a result of

**insecurity of tenure and lack of personal incentives; (6) poor, ad-hoc and passive marketing of lesser known species, timber of small dimensions and lesser quality, non-timber products; (7) poor quality of processed timber of all kinds; and (8) effects of tariff and non-tariff barriers. The tropical forest degradation is, therefore, a complex environmental issue, having technical, social, economic, political, environmental and organizational roots and consequences.**

**Considering the collective needs of the tropical countries and in light of the above review of prospects and problems the FAO, UNDP and World Bank, within the scope of Tropical Forestry Action Plan (TFAP), proposed in 1985 a strategy to respond to the challenge of tropical forest degradation. The ultimate goal of the strategy is to ensure the viability of the life support systems for human population, thereby assuring long-term welfare and high quality of life. The main targets for tropical forest resource management were identified as (Bruenig and Poker 1989): (1) conservation of the ecosystems for purposes of the non-material benefits to humanity and nature; (2) sustainable utilization of the tropical rainforest for long-term benefits; and (3) rehabilitation by recultivation or natural succession of degraded forest lands in areas, where not enough forest area is left to meet**

present and future needs for product and non-product benefits. It is also recognized, that there is need to immediately stop and effectively prevent the future destruction of forest by: (1) establishment of an adequate permanent forest estate of national forest; (2) integration of forest with other forms of land use; (3) public awareness and consideration of the multiple benefits from the tropical forest; and (4) active and positive participation of the local people in the conservation, management, utilization and development of the forest in their various legal forms (state forest, communal forest, private forest).

To achieve these goals, it is essential that basic scientific knowledge and appropriate technologies be provided from applied research. This can be done by (1) establishment of a data base of development of expertise and understanding for environmentally, economically and socially sustainable management of tropical rainforests and (2) development of site-specific appropriate techniques of silviculture, utilization and future processing of forest products.

Several initiatives have been put forth to implement a global strategy for addressing the challenge related to this particular environmental problem. They include, but are not limited to, the creation of the

international institutional framework for cooperation regarding the tropical forest issues, implementation of special forestry programs, and publication of scientific works that foster understanding and management of specific issues related to the tropical forests. As the result of regular meetings of the Committee on Forestry of the United Nations Food and Agriculture Organization, producing and consuming tropical timber products countries reached, in 1983, an "International Tropical Timber Agreement"(United Nations, 1984) as a means to promote more sustainable use of tropical forests. The objectives of the agreement were specified in Chapter I, article 1, paragraphs (a) to (h) which encourage international cooperation on all aspects of the tropical timber economy. The agreement provided, in chapters IV, VII and IX for the establishment of an International Tropical Timber Organization (ITTO).

On the basis of the agreement, the Tropical Forestry Action Plan (TFAP) was created through the joint efforts of FAO, UNDP, World Bank and World Resources Institute (WRI). The TFAP is the largest ad hoc forestry initiative to date (Tarasofsky 1995). Coordinated from 1985 by FAO, the "TFAP" is a forest planning process, conducted in several tropical timber producing countries which resulted in the adoption of forest policies

compatible with sustainable objectives in five program areas: forestry and land-use; forestry-based industries development, fuel-wood energy; conservation of tropical forest ecosystems, and institutions.

In addition, the FAO published several technical works, which serve as guiding tools for foresters in the handling of specific aspects related to the earlier mentioned problems. The guidelines for forest policy formulation by Husch (1987) and the "FAO model code of forest harvesting practices" by Dykstra and Heinrich (1996) are good examples.

The contribution made by ITTO in the coordination of international efforts amongst tropical country members of the organization, resulted in the publication of the "ITTO guidelines for the sustainable management of natural tropical forests (ITTO, 1992a) and the criteria for the measurement of the sustainability of tropical forests"(ITTO, 1992b). The international conference on environment and development held in Rio de Janeiro adopted "Agenda 21", which called for the application of non-legally binding forest principles. The member countries of ITTO have agreed on "the objective 2000" as the date for producing timber only from sustainable managed forests.

**The ITTO guidelines are to meet one of the objectives of the International Tropical Timber Agreement, objective (h), which states: “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 region concerned” (United Nations, 1984).**

**The guidelines are presented as a set of 41 basic principles and related them to 36 possible management actions considered to be essential for achieving the sustainable objectives for this kind of forest (see, Appendix A.1). The basic principles and actions cover all aspect of forest harvesting from the policy and legislation framework, forest planning, socio-economic and financial impact and environmental considerations. Principle 1 calls for a strong and continued political commitment to sustainable forest management at the highest level (actions 1 and 2). Principle 2 calls for appropriate legislation to support the agreed upon forest policy. The establishment of the permanent forest estate called for in Principle 6 is to ensure the protection of land for nature and ecosystem conservation, production of timber and other forest products. Provisions were made for detailed inventories in Principle 13, and for rationally set management**

objectives and for yield regulation in Principle 17. The socio-economic aspects of forests are addressed in Principles 29, 34, 37-40.

The guidelines are designed to foster the five essential conditions or processes by which, sustainable forest management can be assessed. These key conditions are the ITTO criteria for measurement of the sustainability of natural tropical forests. They are the (1) forest resources base, (2) continuity of timber flow, (3) level of environmental control, (4) socio-economic effect, and (5) institutional framework. The present evaluation of the timber industry in the Republic of Congo is based on the above stated criteria. The ITTO criteria and indicators are tools for assessing trends in tropical forest conditions and forest management (Wijewardana, 1998). They provide a common framework for describing, monitoring and evaluating progress toward sustainable forest management.

## EVALUATION OF THE INSTITUTIONAL FRAMEWORK

Identifying the causes behind the degradation of tropical forests, the Food and Agriculture Organization observed that the forest institutional framework in most tropical countries was outdated. The forest policies and legislation in many countries dated back to colonial days with the emphasis on forest protection and collection of forest revenues (FAO, 1985). Such an institutional framework is not appropriate to deal with the emerging environmental problems discussed earlier. What is needed for the tropical countries is a strong and continued political commitment at the highest level for sustainable forest management (ITTO, 1992a) expressed in the forest policy and legislation. The formulation of a realistic concept on how to use the available forest areas and determination of precise norms for their management and conservation form the conditions that are indispensable for a sustained forest industry (Schmithusen, 1986). It is the role of forest legislation to translate these concepts and principles into obligatory provisions. The ITTO guidelines (see Appendix A.1) suggest through the Principles 1, 2 and 3, five possible actions to consider when a member

country of the Organization is reformulating its institutional framework.

These actions are expressed in the term of requirements as follow.

### **ITTO Requirements for the Institutional Framework**

The requirements for the institutional forest framework are supported by three basic principles. The first principle calls for a strong and continued political commitment for sustainable forest management, which should be expressed in the forest policy. The second principle calls for an appropriate forest law and regulation to support the forest policy that must be in harmony with law concerning related sectors. And the third principle calls for establishment of a mechanism to regulate revision of the policy and related laws in the light of new circumstance or available new information. To assess how the tropical members' countries of the Organization are meeting these requirements, the ITTO has defined seven indicators to evaluate the institutional framework (see Appendix A.2). This study is limited only to the forest industry aspects. For this reason, the institutional framework in the Republic of Congo will be evaluated on the following indicators: (1) relationship of national forest policy to ITTO guidelines; (2)

adequacy of the legislative framework to implement forest policies and management plans; and (3) adequacy of the legislation to regulate harvesting.

### **Implementation of the ITTO Requirements**

#### **A National Forest Policy Requirement**

The acting Congolese forest policy, "tropical forestry action plan for Congo", was adopted in 1992. The policy was formulated with the technical assistance and financial support of the FAO, UNPD, GTZ and other international agencies. Because of the involvement of international expertise, the forest policy is found to be in compliance with the principles supported by FAO as well as by ITTO. A review of the strategic objectives for the development of forest industry in the Congolese forest policy (PAFN), chapter 4, sect.4.2 (MAEEFP, 1996), supports this affirmation, although the environmental issues were not covered sufficiently.

### **The Forest Law and Legislation Requirement.**

**The current forest legislation is made of a set of four basic laws; (1) The law 004/74 (MEF, 1974a), (2) the law 005/74 (MEF, 1974b), (3) the 32/82 (MEF, 1982), (4) the decree 84/910 (MEF, 1984). These laws existed before the adoption of ITTO guidelines. Therefore, they are not fully in accord with these guidelines, although, most of the principles claimed in the ITTO guidelines are expressed. Schmithusen (FAO, 1986) argues that “The laws provide the necessary instrument for introducing long-term management practices and support more consistently rational utilization of forest resources”.**

**In order to comply with the guidelines, and more importantly, to take into account the new national forest policy (PAFN), the forest administration has been working since 1994 on the new law, the final draft of which was approved in June 1998. The review of the draft indicates that, the majority of the principles recommended by the ITTO guidelines are covered by provisions, while a few of them are ignored.**

**The following are the basic principles covered by the new law (Draft) (MEF, 1998a): (1) The establishment and maintenance of the public forest estate; (2) provisions providing a forest inventory before harvesting**

activities, sect. 36, 37 (MEF, 1998a); (3) regulation of harvesting activities, sect. 43, 44, 45, 60 (MEF, 1998a); (4) procedures for access to the resources (permit granting), sect. 61- 68 (MEF, 1998a); (5) provisions for financial and human resources, sect. 82 - 89, 96 and (6) provisions for community consultation and participation, sect. 14, 17, 23 (MEF, 1998a).

The principles not covered by provision in the new law are:(1) environmental assessment; (2) environmental regulation for forest industry; and (3) Code for forest industry practices. This suggests that the new law would not fully express ITTO concerns, if it were adopted as drafted.

### **The Forest Harvesting Regulation Requirement**

The existing forest law already provided provisions for forest regulation and procedures for the forest operators to access the resources in the Decree 84/910 of 10/19/1984 (MEF, 1984), articles 75 and 76. These provisions have been maintained in the new law, articles 44 and 45. For the purpose of forest regulation, the law requires that the allowable annual volume cut be established for each forest management unit (UFA), on the basis of inventory data. The law provides procedures for the forest service to control and monitor the application of forest regulation requirements as well

as provisions to prosecute forest industry companies for failure to comply with these requirements.

## EVALUATION OF THE FOREST RESOURCE BASE

As mentioned earlier, the Food and Agriculture Organization reviewed the status facing natural tropical forests in developing countries and identified two major issues of concern with respect to their impact on the forest resource base. The deforestation rate reached an unprecedented (Park, 1992) 132,000 square km per year in 1991. The timber logging activities affect a large area (40,000 to 45,000 square km annually) with negative environmental impacts. In the Republic of Congo, the FAO reports that 30,000 hectares are being lost annually (also see the ITTO (1997) annual review and assessment of the world tropical timber situation). The timber logging data suggests that the area affected by this activity is around 100,000 hectares annually (78,000 hectares in 1991 according to World Resource Institute). The ITTO guidelines for sustainable management of natural tropical forests suggest a strategy to deal with these problems. Three key elements are proposed in the strategy: (1) develop for each member

country of comprehensive land use planning; (2) establish permanent forest estate on both public and private lands; and (3) develop, as feasible forest plantations. These elements constitute the basis for the evaluation of the forest resource base in those countries.

### **ITTO Requirement for the Forest Resource Base**

The ITTO's requirements for the forest resource base in tropical countries formulate the guiding principles and possible management actions, the objectives of which are to stop the rapid destruction of the forest resource base, rehabilitate the forested area already degraded, and rationally use the remaining forests.

The first requirement for the resource base is the development of a comprehensive land-use planning process. The goal of land-use planning is to be an interface between forestry and agriculture and aims at conserving the resource base for agriculture, integrating forestry into agriculture (agroforestry) and a more rational use of land (FAO, 1985). The initial priority for land-use planning is to determine and physically mark the zone boundaries of the permanent forest estate (Ferguson, 1996). Another aspect

of land-use is to delineate that forest estate into land-use zones to meet future demands for the various uses.

The second requirement is to stop the future degradation of forest resources by establishing a permanent forest estate (PFE). The permanent forest estate is suggested “to include land to be protected; land for nature conservation; land for production of timber and other products; and land to fulfill combination of these objectives”(ITTO, 1992b).

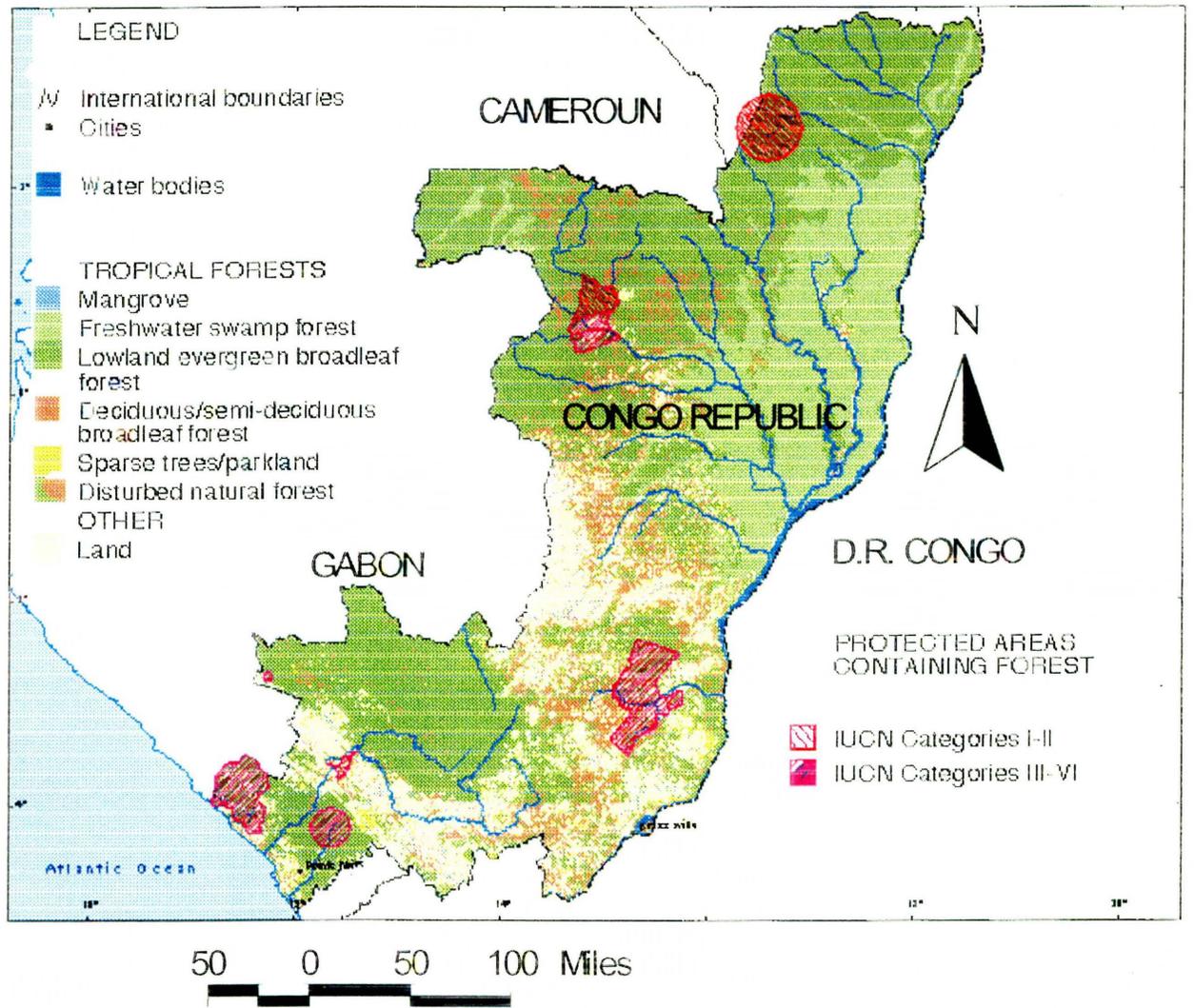
The third requirement suggested by ITTO is the development of a consistent forest plantation program necessary in the maintaining, restoration and development of the forest resource base. The plantation can be established to both recreate a forested area where the forest has been removed and to improve the degraded forest.

Indicators are proposed by ITTO to evaluate the management actions that support the resource base (see Appendix A2). These indicators are: (1) the existence of comprehensive land use planning; (2) the presence of the permanent forest estate; (3) the representativeness of both areas of protection and production within the permanent forest estate; and (4) the implementation of programs for the establishment of forest plantations to rehabilitate the degraded area.

## **Implementation of the ITTO Requirements**

### **Lands Use Planning Requirement.**

**The land use planning as defined above does not exist in the Republic of Congo. Public forest lands and non-forestlands are under the jurisdiction of several administrations (forest service, agriculture and grazing services, mining administration, defense and security) and rarely by private owners. Amongst those administrations the forest service is the only one to have a map with clearly defined boundaries of areas under its jurisdiction. These areas include lands for timber production and areas for wildlife management. The total forested area and non-forested lands under the management of the forest service is estimated to be about 19.537 million hectares and divided into 34 forest management units (UFA). The major land use activity in the UFA is commercial timber logging, which affects around 100,000 hectares annually. Forest protection for wildlife management is the second activity in the UFAs. The small holder in agriculture is also authorized in the conditions prescribed by the forest service. Recently, the Forest Stewardship Council (FSC) developed a map that represents the protected areas within the forest resource base in the Republic of Congo (see figure 1).**



DATUM.....: W.G.84  
 PROJECTION.....: Mercator Equatorial MEQ

Figure 1. The forest resource base of Congo

### **Requirement for the Permanent Forest Estate (PFE).**

The Congolese forest law provides the provision for the creation of the permanent forest estate. The New Forest law (MEF, 1998a) defines in Chapter I, article 4, the permanent forest estate as the forestlands affected to commercial timber harvesting, nature conservation and protection of wildlife habitat. The same law defines the non-permanent forest estate in article 12, as the forest non-affected to commercial timber harvesting, nature conservation and wildlife protection. The private forestlands are also considered part of the non-permanent forest estate because the government does not have authority on those lands. And the way these lands are being used do not guarantee the permanence of their cover. This classification of the forest domain suggests that all the forest management units (UFAs) be under the permanent forest estate. But certain low-forested areas for conservation of wildlife are outside of the UFA, and those areas according to the forest law are to be maintained in permanence intact. It can be inferred that the present UFA area is the minimum the country has in its permanent forest estate. In addition to the minimum area defined by the UFAs, the forested area for conservation of the wildlife outside the boundaries of UFA should be added to form the total permanent forest estate.

### **Representativeness of the Protected Area**

The permanent forest estate not only should include the different categories of land-use, but also should represent the variety of plants and animal community present in the country. As described in the preceding paragraph, the permanent forest estate in the Republic of Congo includes forestlands subject to different types of use and purpose. According to the Forest Stewardship Council (FSC), a total of 1,296.4 thousand hectares or 6.6% of a total forested area in Congo are recognized as protected and certified by this organization. Those areas are composed of 455.3 thousand hectares of category II defined as strictly protected, 783.7 thousand hectares of category IV and 57.4 thousand hectares of category VI both defined as less strictly protected, although the important contribution to forest conservation is recognized. However, there is no available information on whether or not those areas represent all the plant or animal communities present in the country.

### **Establishment of the Forest Plantations**

The Republic of Congo has had an extensive forest-planting program since the 1980s. Essentially, a non-indigenous tropical forest species, the

*Eucalyptus*, was planted in the non-forested area on about 30,000 hectares. In the 1990s, a very conservative forest-planting program has been implemented for both *Eucalyptus* and *Pinus*, 14,023.43 hectares between 1990 and 1995 (MEF, 1998b), and the total area of plantations for both species is estimated now to be 42,000 hectares. The only plantation of indigenous tropical forest species, the *Terminalia superba*, was established in the 1950s in their natural environment for an estimated total area of 1,500 hectares. There are presently, no other extensive forest planting activities, but there is an experimental one for testing the growth in Savanna of the *Aucoumea klaineana*, another tropical species regularly harvested in Congo.

#### EVALUTION OF THE CONTINUITY OF TIMBER FLOW

The continuity of timber flow is another criterion proposed by the ITTO for the evaluation of the sustainability of forestry in the tropical countries. In the context of the accelerated degradation of the forest resource, the first task recognized was to secure the forest resource base by implementing the management actions described in the previous chapter. Another important task is to ensure that the rescued resources in the

permanent forest estate be used in the sustainable basis. The heart of traditional forest management for timber production according to Davis & Johnson, (1996), is to ensure that the forest estate will continually provide an even flow of timber products. That is known as sustained yield in forestry. Then comes the question on how the continuity and regularity of timber flow is to be achieved. The ITTO publication, “The criteria and indicators for sustainable management of tropical forest (ITTO,1992b)” furnish some key elements for assessing the conditions for the timber flow and these elements are examined in the following paragraph as the requirements to achieve the continuity of timber flow from the forest resource base.

#### **ITTO Requirement for the Continuity of Timber Flow**

The ITTO suggests eight indicators to assess the conditions for achieving the continuity of timber flow for timber industry in the natural tropical forests (see Appendix A.2). For the purpose of the present study, four of them seem to be appropriate to evaluate the timber flow situation in the Republic of Congo. They are: (1) full regulation of timber yield, (2) silvicultural prescription for the major forests, (3) documentation of timber

logging history, and (4) production of national statistics of forest products over time.

The regulation of timber yield is one of the strategies to achieve the continuity of timber flow. Principle 17 of the ITTO guideline states: “In order to ensure a sustainable production of timber for each forest management unit, a reliable method for controlling yield regulation should be adopted ” (ITTO, 1992a). Generally, in forest yield regulation, two approaches are considered: (1) area regulation approaches and (2) volume regulation approaches. The volume regulation is of interest in this study because it is applied in the Republic of Congo. When the forest regulation is to be achieved by the regulation of volume, the annual allowable cut must be set for each forest management unit. The forest literature (Davis & Johnson, 1996) suggests several formula approaches to calculate the annual allowable cut. The formula method based on current growing stock and potential growth (Hundeshagen’s formula); the formula method based on growing stock only (Von Mantel formula); the formula methods based on growing stock and its increment (Austrian formula and Hanzlik formula). None of these formulas are applied in forest regulation in the Republic of Congo.

The ITTO propose also to achieve the continuity of timber flow by making post-harvesting silvicultural prescriptions. Silviculture prescriptions are of great importance in the achievement of the continuity of timber flow because they determine how the forest resource must be regenerated. The lack of fundamental knowledge on forest structure and dynamics of tropical forests has affected the development of efficient silviculture practices in the tropics. Despite the lack of sufficient knowledge on the silvicultural characteristics of the majority of tropical tree species, there is a growing literature on the silviculture practices in different tropical regions of the world (Lamprecht, 1989; Dawkins and Philip, 1998).

The documentation of the timber history and production of national statistics for forest products are also important in the strategy of shaping the continuity of timber flow. With lack of the basic scientific knowledge about the structure of forest and its dynamics, the information provided on the history of timber logging may be of first value during the second cycle of harvesting. They may help the understanding of the change that took place in the forest. Therefore, they can furnish the basic information for the reformulation of actions to implement for the future development of the forest resource base.

## **Implementation of the ITTO Requirements**

### **Timber Yield Regulation Requirement**

The Republic of Congo has the tradition of using the volume type of regulation, decree 84/940, article 13,15,16 (MEF, 1984). The provisions have been made in the New Forest law, draft (MEF, 1998a), for the same type of regulation. To achieve the volume regulation goal, annual allowable cut (AAC) is set for each forest management unit (UFA) being harvested, based on the results of sampling inventory for the main commercial species (decree 84/940, article, 13). Borota (1991) provides an example of such a calculation of the annual allowable cut for the Sibiti-Zanaga region (UFA 6) in the south of Congo.

At the national level, the indication on the continuity of the timber flow can be obtained by comparing the timber production to the value of annual allowable cut in the nationwide. The standing timber stock for thirty-two commercial species in Congo is estimated, according to the national tropical action program (PAFN), to be about 180 million cubic meters (MAEEFP, 1996). At this level, two million cubic meters for those species can be harvested annually, according to the same source, without affecting

the timber flow. The review of statistics of timber production (see Appendix E1 and F1) indicates that the annual production, varied in the last decade between a high of 833,000 cubic meters in 1990 and a low of 510,000 cubic meters in 1993 (MEF, 1998b). At these levels, the timber production remains far below the potential the national forest estate can supply. Figure 2 shows the difference between the annual allowable cut in the nation and the annual record of timber production during the period from 1990 to 1996.

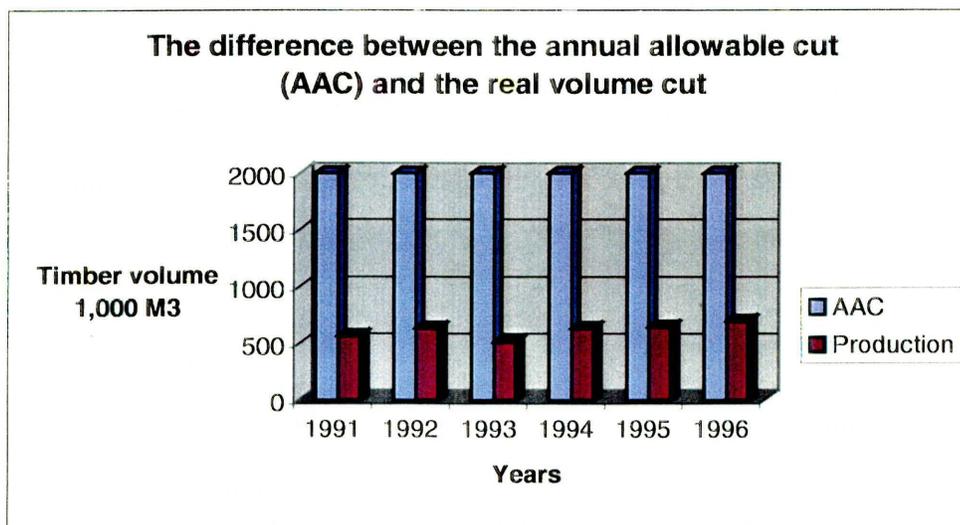


Figure 2. The difference between the annual allowable cut and real volume cut

### **Silvicultural Prescription for Major Types of Forest.**

**Specific silvicultural prescriptions for the regeneration of natural tropical forest have never been a tradition in Congolese forest industry practices. A “log and leave” strategy still predominates (Johns, 1997). That is, the natural regeneration without human intervention remains the common approach. However, there has been in the last past five years an attempt to use human intervention in the regeneration of forest in the Republic of Congo. The project, OIBT PD/77, Ngoua II, jointly financed by ITTO and the Congolese Government carried out from 1993, has amongst its objectives the study of how the “thinning like” practices in the natural forest in the Republic of Congo may help improve the natural regeneration of the commercial species. There is no definitive publication on the results of the experience yet, but the project is by itself a first attempt to introduce silvicultural practices, which is an improvement over the “log and leave” approach currently in use. Therefore, in the near future the “log and leave” will not be the only prescription for natural forest regeneration in the Republic of Congo.**

## **Documentation of Logging History and the Production of Statistics**

**The current forest law, decree 84/910 (MEF, 1984) requires in the article 17, that certain documents be produced by the forest operator every year before granting him a harvesting authorization. These documents are:**

**(1) a map at 1/20000 scale reporting the results of inventory that indicate the number of commercial tree species per hectare; (2) a map at 1/50000 scale reporting, roads, harvesting trails, parks to be constructed and water features; and (3) a file record of all trees cut during the last year's harvesting operations which must include the tree ID number, name of the species, number of logs from the tree and its volume. This information is generally available from the district forest service because the forest law requires that the forest enterprises furnish them before granting a new annual harvesting authorization. However, in the majority of cases, the same information is rarely found one or two years later. It is a lack of organizational and technical skills that the logging history is not in the appropriate form.**

## EVALUATION OF THE ENVIRONMENTAL CONTROL

Forest harvesting operations in the tropics affect areas between 45 to 50 square km each year according to Myers (1994a) and John (1997). The technology involved in those operations can have both positive and negative environmental consequences (ITTO, 1992a) for the forest itself and outside (on the watershed for example). The negative consequences include, but are not limited, to the compaction of soils by the heavy machinery, which increases the risk for soil erosion, and the damage of trees surrounding those being harvested. Colcherster (1993) reports that two-thirds of the non-marketable trees are damaged or destroyed when marketable trees are extracted. Therefore, the consequences of harvesting operation should be assessed in advance to ensure overall sustainability. Both the FAO's model code of forest harvesting practices (Dykstra and Heinrich, 1996) and ITTO guidelines (ITTO, 1992a) suggest requirements for conducting forest-harvesting operations which will result in a minimum of environmental impact for the forest and its surroundings. The requirements can be expressed in the form of a code of practices based on legislative mandate or as voluntary guidelines to achieve a desired result.

### **ITTO Requirements for Environmental Control.**

**The requirements for environmental control of harvesting operations should include: (1) elaboration of a harvesting plan before conducting forest operations; (2) definition of technical norms and environmental prescriptions for basic engineering works that support the forest harvesting operations; and (3) provision in the forest law and legislation for the assessment, enforcement and control of environmental prescriptions regarding the harvesting operations.**

**The first requirement, the planning of timber harvest, is one part of the overall planning, which is itself a component of comprehensive land-use planning. It is essential to set the stage properly to enable sustainable harvesting practices to be followed, and also to reconcile the need for greater technical control during harvesting with the need to reduce costs (Dykstra and Heinrich, 1996). The required actions in timber harvest planning, with respect to environmental impact control, must include the mapping of the forest, road engineering design, tree cutting, extraction, and transport design before the operation is implemented.**

The second requirement, the definition of technical norms and prescriptions for the basic forest engineering works, is intended to set a general framework, the basis in which the harvesting operations must be implemented. It is a kind of standard method to be observed. The answers to the questions such as what is the effective density of forest roads or what type of ground-skidding equipment to use for a particular forest environment must be established for these norms and prescriptions. The third requirement is to ensure that the forest law and regulation have sufficient provisions to minimize negative environmental impact of forest harvesting operations, to enforce a code of environmentally sound practices and to assess and control the compliance of forest operators to the regulation.

Two indicators according to ITTO can be used to assess whether or not the level of environmental control for the forest industry is adequate for the requirements for sustainability; (1) availability of environmental management prescriptions for production forests, and (2) availability of environmental assessment procedures.

### **Implementation of the ITTO Requirements.**

**The environment management prescriptions are a set of regulations or guidelines developed by the government to help foresters and forest enterprises select practices to be followed when carrying out forest harvesting operations. These practices are usually based on legislative mandate or voluntary guidelines and are intended to achieve certain results (Dykstra and Heinrich, 1996). The review of the existing forest legislation framework, the laws 004/74 (MEF,1974a); 005/74 (MEF, 1974b); decree 84/910 (MEF, 1984), as well as the draft of the new law indicate that there are no specific and clearly stated environment prescriptions for forest industry practices in the Republic of Congo. There is no mention anywhere in the laws about the observation of technical and environmental prescription or norms during the construction of engineering works or the use of specific ground equipment. The forest legislation framework does not provide either provision for the assessment of the impact of timber harvesting operations or procedures for such assessment.**

**The few environmentally sound prescriptions that can be found in the Congolese forest legislation framework are; (1) obligation made to the forest**

operator provide an annual timber harvesting plan, (2) interdiction to cut any commercial tree species not having the required harvesting diameter (decree 84/910), and interdiction to intentionally damage any tree species. The final draft of the New Forest law, does not sufficiently cover, environmental issues by provisions.

### **EVALUATION OF THE SOCIO- ECONOMIC EFFECTS**

One the goals of promoting the sustainable forest industry in the tropical developing countries is to ensure that this industry will provide continually and on a sustainable basis, the products, income and job opportunities for the population of the country while maintaining a safe and acceptable environment. A full forest regulation for instance, can provide to the country, according to Roth (1925) an opportunity for (1) a stable business planning base by producing a yearly cut of approximately equal volume, size, quality and value of timber, (2) a stable income because the timber comes from a forest growing stock no larger than necessary, (3) a balanced forest budget between yearly expenditure and receipts, and (4) a continuity of workload which ensures regular employment. The evaluation

of the socio-economic effect should therefore reveal what impacts the forest industry activities have on the forest budget, local welfare and national economy. The ITTO's guidelines suggest that a sustained forest industry is expected to satisfy the following principles; (1) be economically viable, that is taking into account the economic value of relevant costs and benefits, (2) ensure an equitable distribution of incentives, cost and benefits associated with forest management between the principal participants, namely the forest authority, concessionaire and local communities, and (3) be compatible with the interest of local people.

#### **ITTO Requirements for Socio-Economic and Financial Aspects.**

From the ITTO viewpoint, two requirements are essential to meet the above stated conditions for a sustained and positive socio-economic effect from forest industry. First, the use of forest fees and taxes as an incentive to encourage a more rational and less wasteful forest utilization and the establishment of an efficient processing industry, and to discourage high-grading and logging of forests which are marginal for timber production. Second, the application of part or full forest fees and taxes to fund budgets

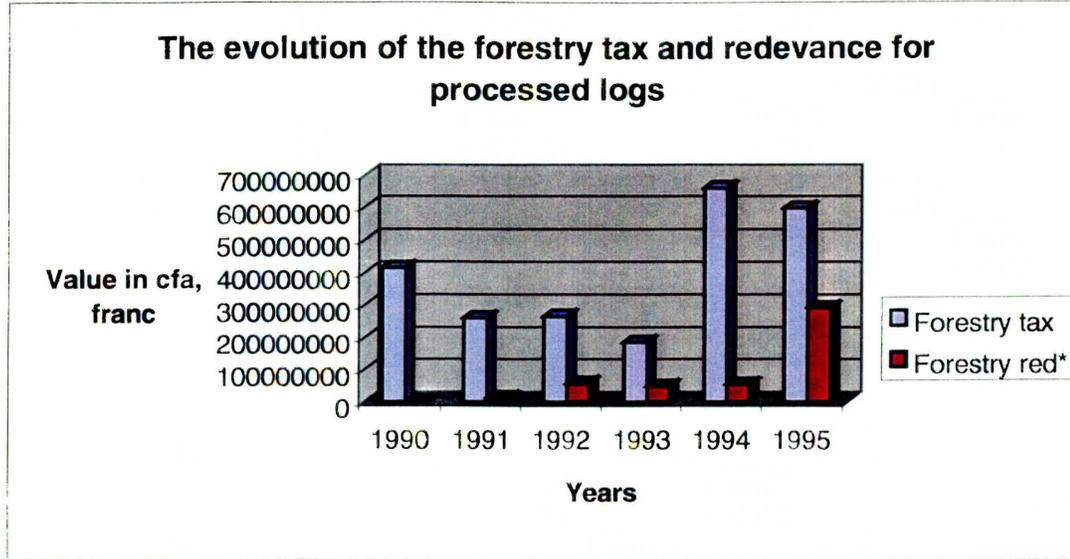
for maintaining the productive capacity of the forest resources. A third requirement can be added, the establishment of a forest industry plant as close as possible to the forest exploitation area to benefit the local communities in terms of employment and development of infrastructures.

### **Implementation of Requirement for Socio-Economic Aspects**

The current forest law has fixed two types of forest taxes to be collected on forest industry products. The first tax is called "forestry tax". This tax is paid for each cubic meter of any tree species felled at a rate varying between 2.5% to 3.5% of the market value of the tree species. The second tax called "forestry redevance" meaning "forest revenue" is paid for each cubic meter of log exported and for each cubic meter of log processed locally. The rate of tax for logs exported is variable and ranked from 3% to 33% of the tree market value and depends on two factors. First, the tree species is just being introduced into the market, then the rate is the lowest or if the tree is well known and has an important market value, then the rate is increased. Second, the location where the timber is being harvested is far from the coast, then it lessens its tax rates, in the opposite case, the tax rate

will increase. However, for the logs to be processed the tax is between 3 and 14.5% of the market value. The funds generated by the first tax, is fully allocated to budget the afforestation, forestation and forest service management activities such as inventories and forest monitoring. This fund is fully administrated by the forest service. On the other hand, the funds generated by the second type of taxes are allocated to the central government budget. All tax rates are subject to modification every six months depending on the general situation of the international tropical timber market.

In order to encourage the local processing of timber, it has been decided in the New Forest law, to not collecting taxes on logs if processed locally, because such practice will be in contradiction to the local processing policy. Figure 3 shows the evolution of the forestry tax from 1990 to 1995.



red\* = redevance

Figure 3. The evolution of forestry tax and forestry redevance for processed logs

The forest industry in the Republic of Congo is found to have an important impact on national economy. It is second after the oil industry in the terms of both the volume and value of products exported. However, its contribution into the national product remains very low and is evaluated according to the central bank of the Republic of Congo at about 4%. Figure 4 gives indication on the value of forest products exported.

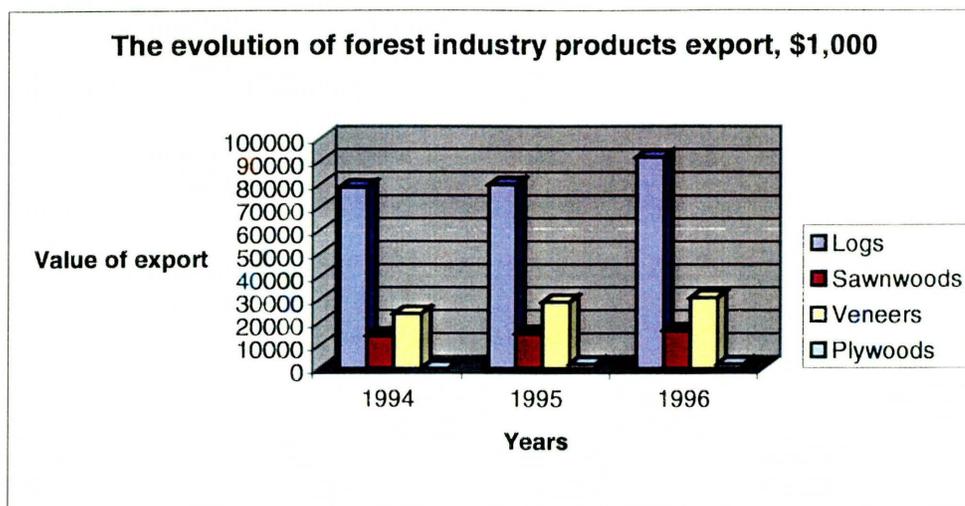


Figure 4. The evolution of the forest industry products exported.

The forest industry has an important social impact on the surrounding area where timber is being exploited. Although, there are no available statistics on the total workers employed by the forest industry in the Republic of Congo, it is a fact that two major forest industry enterprises, namely, "CIB" and "SOCOBOIS" have a great impact in the zones where they have activities. For illustration, "Kabo", previously a forest exploitation camp for CIB in the north of the Republic of Congo, has become in twenty years a small town of about 10,000 people, with modern infrastructures such electricity, schools, health center because of the forest industry plan. In the same way, SOCOBOIS, located near to the third largest city of the Republic

of Congo, has gained the reputation of being the largest industry in the area and providing stable jobs to people in the community. Consequently, the social impact is evident, although not supported by quantitative data.

## DISCUSSION

Comparison of the work being done for the forest industry in Congo by the forestry authorities to make this industry compatible with the ITTO requirements for sustainability has the following results.

**Establishing of the appropriate forest institutional framework.**

Efforts have been made to revise forest policy and to make it conform to the sustainable forest principles as suggested by ITTO. As a result of these efforts a New Forest Policy (PAFN) was adopted. Forest law has been revised to harmonize it with the New Forest Policy. Most of the principles claimed in ITTO guidelines are expressed in the terms of provisions in the forest law. However, it seems that it has not done enough to include in the forest law and regulation, the environmental code of practices for the forest

industry. There must be in the forest law or regulation, clearly defined guidelines or recommendations for forest road engineering design, tree felling and extraction techniques with respect to environmental considerations. A poor road design for instance may lead to serious environmental problems such as excessive damage to soils and streams; deterioration of water quality and loss of habitat for aquatic life and excessive damage to residual trees and seedlings. The procedure for assessing, monitoring and controlling environmental impact of forest industry needs to be clearly formulated in order to determine the degree to which a harvesting operation has followed the harvesting plan and met its stated objectives while complying with established standard of practices.

#### **Definition and Protection of the Forest Resource Base.**

As mentioned earlier, three main requirements are essential to protect and maintain the forest resources base; development of comprehensive land-use planning, action to stop the deforestation rate, and, as necessary, implementation of the forest planting programs.

There has been achievements in defining the permanent forest estate, classifying, dividing and mapping its management forest units. These results may be considered as a good start toward a more complete land-use planning process. There is, still a need to establish better land use planning for integrated land use practices such agroforestry.

Deforestation, although amongst the lowest on the African continent, still continues at the annual rate of 0.2% on average. But the deforestation in the Republic of Congo is likely to be the result of extensive agriculture practiced by small cultivators (even inside UFA) than to be the result of timber harvesting by the forest industry. For this reason, it is important to incorporate in the global strategy of land-use planning, the introduction of an agroforestry system as a means to reduce deforestation. It may be more efficient to prevent degradation of the forest resource base by giving priority to implementing progressive land use approaches while the resource base is still relatively in good shape now, than restoring it after destruction by expensive plantation programs.

Forest planting in the 1990s (about 14,000 hectares) was lower than in the 1980s (30,000 hectares) while deforestation has been sustained (40,000 hectares yearly on average). The great difference between the forest area lost

annually and the area being planted may indicate that the planting strategy for maintaining the forest resource base in a country with limited financial resource, as in the Republic of Congo, is not the best course of action.

### **Continuity of Timber Flow**

Due to the lack of forest inventory data for the entire forest resource base, the Republic of Congo has taken practical conservative measures for the regulation of timber harvesting. The annual allowable cut is set on each forest management unit (UFA) being harvested on the basis of sampling inventory data. At the national level, the actual annual timber harvest (511 thousand to 850 thousand cubic meters) is below the annual allowable cut for the nation (two million cubic meters). This is an indication that, at the national level, the timber resources are not overexploited, although, the situation in individual forest management units may be different. Therefore, it is still possible to reach a continuity of timber flow for the subsequent harvest periods if the present harvesting rate is maintained. However, there is a need to increase forest inventory (only 26.4% of forest resource base have been inventoried) in order to come to a systematic setting of the annual

allowable cut on the real volume of forest growth. Only such practices can guarantee the continuity of timber flow. There is also the need to set up a forest research program to study the silvicultural characteristics of the main tree species harvested in the Republic of Congo. This knowledge is important for determining the cutting cycle in forest regulation.

### **Environmental Control**

The environmental control of forest industry activities may be the only aspect where not much has been done. There are no clearly stated guidelines or recommendations on how the forest industry enterprises should conduct forest pre-harvesting and harvesting operations with respect to environmental considerations. That is why procedures for assessing, monitoring, and evaluating environmental impact of forest harvesting do not exist. There is a need to come to a systematic approach in assessing harvesting practices by developing and implementing environmental standard for forest pre-harvesting and harvesting works, and controlling and evaluating the impact of forest industry in the light of those standards.

## **Socio-Economic and Financial Effects**

**Although the social, economic and financial impact of forest industry in the Republic of Congo is recognized as very important (the timber product is the second product of export in the terms of volume and financial value), the industry potential is not being fully exploited. The country continues to export a large quantity of timber in the form of logs while it should encourage the local processing of these logs. Increasing the volume of timber processed locally can lead to the increase of both jobs and contribution made by the industry into the gross national product. The authority should foster the use of the forest taxes as an incentive to influence the development of forest industry in the direction that will increase its positive social and economic impact to the community.**

## **CONCLUSION**

**The Republic of Congo has taken, since the beginning of the 1990s, several practical actions in order to create the conditions for a sustainable**

forest industry. These actions include; (1) formulation of the New Forest Policy based on the sustainable forestry principles recommended by the International Tropical Timber Organization, (2) revision of the existing forest laws and regulation to make them compatible with the New Forest Policy, (3) implementation of some elements of land-use planning for better use of the resource base and its maintenance, and (4) application of conservatory measures in the regulation of timber harvesting to ensure the continuity of timber flow.

These actions are not being performed fully and completely. As such, the New Forest law and regulation do not make provision for the environmental control of forest industry activity. The land-use planning has been limited to the delineation of forest management units (UFA). Integrated land-use practices such agroforestry is not sufficiently promoted. Insufficient forest inventory data and knowledge on the silvicultural characteristics of the most harvested tree species have prevented a full forest regulation. As a result, deforestation still continues, although its rate compared to other African countries is amongst the lowest. The traditional important economic and social role of forest industry in the national level has been in some

degree maintained. Increasing the local processing of timber can reinforce this role.

In general there is a positive trend toward sustainable forest industry activity in Congo. Taking measures to correct the identified weaknesses should reinforce this trend. Therefore, I suggest the following actions be taken:

(1) **Strengthening the forest law by the introduction of clearly stated provisions on environmental assessment and control. A code of forest harvesting practices must be elaborated and implemented.**

(2) **Reinforcing the information basis for forest regulation. Forest inventory must be one of the priorities of the Congolese Forest Service in order to progress in this area. In addition, a research program for the study of the silvicultural characteristics of the major tree species harvested in the country must be expanded, as the lack of this information will negatively impact genuine forest regulation.**

(3) **Moving to integrated land-use practices. The current traditional agroforestry practices in the country must be thoroughly assessed and, as necessary, improved to meet the requirements of efficiency which makes**

**agroforestry a progressive approach for land-use with low negative impact on the forest resource base.**

**(4) Take advantage of the benefits offered by information technology to improve the land-use planning and to create a forest harvesting history.**

**(5) Improve the mechanism to regulate generation and distribution of the forest industry's income in the economy and society.**

**The ITTO "objective 2000" (producing timber only from the certified sustained managed forests) will not be achieved in the Republic of Congo. However, the present efforts, if maintained should converge to this goal in the future.**

Appendix A1.

**ITTO GUIDELINES FOR THE SUSTAINABLE  
MANAGEMENT OF NATURAL TROPICAL  
FORESTS**

**ITTO Policy Development Series 1**

# 1. INTRODUCTION

These guidelines contain a set of principles which constitutes the international reference standard established by ITTO for the development of more specific guidelines, at the national level, for sustainable management of natural tropical forests of timber production. The development, application and enforcement by individual timber producing countries.

The present reference standard is based on the report of a Working Group established in accordance with Council Decision 3 (VII). It has been elaborated on the basis of the Terms of Reference provided by the programme of work for ITTO in the field of reforestation and forest management for the year 1990, endorsed by the Council at its Seventh Session in November 1989. The Working Group Report was tabled at the Sixth Session of the Permanent Committee on Reforestation and Forest Management and adopted by the Eighth Session of the Council in May 1990. This initiative of ITTO refers to objective 1(h) of the International Tropical Timber Agreement, 1983: **"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."**

The adoption by ITTO and its member countries of international guidelines that constitute a reference standard for sustainable management of natural forests is in the best interest of all producer and consumer countries which are concerned with the efficient and sustainable development of the tropical forest resources and forest-based industries.

ITTO attaches high priority to the definition of the essential principles and associated actions which should serve to guide the development of national guidelines in each country, in order that they may conform to the international reference standard agreed within the Organization. The Organization also gives high priority to assist member countries, which may need and request such assistance, to obtain such outside technical and financial help as they may require to develop their own national guidelines.

The ITTO guidelines are presented in the form of principles and possible actions covering considerations ranging from general policy to forestry operations aspects. There available, examples of elements for possible inclusion in national and operational guidelines are given in appendices.

## **FOREWORD**

It is with great pleasure that I hereby introduce the first publication in the ITTO Policy Development Series. For our young Organization this publication represents a major milestone in our efforts to meet the overall objective of achieving management of tropical forests on a sustainable basis. It also represents a major breakthrough in cooperation between the member countries of ITTO, conservation NGOs and the trade in tropical timber which had provided valuable inputs in its formulation.

Guidelines for "best practice" in relation to the sustainable management of natural forests were first requested by the ITTO Council at its fourth session in May 1989. The Overseas Development Administration of the United Kingdom assisted the ITTO Secretariat in this task and a report was presented at the fifth ITTO meeting in November 1989. Following approval, the Council allocated funds to develop these Guidelines further as part of the action programme in the field of Reforestation and Forest Management. An international 13-member panel of experts, comprised of representatives from producer and consumer countries in tropical timber, environmental NGOs (WWF), UN Agencies (FAO), the Trade and other consultants from Indonesia, CSIRO and IIED, as established. Following a workshop in March 1990, their report was endorsed at the eighth Council session in Bali in May 1990.

The report is divided into four main sections, each stating sets of basic principles followed by actions considered appropriate for these principles. The text is intentionally kept short and concise in order to be readable to a wider audience. Because the target group is forest managers and administrators in all three tropical regions where natural forest conditions and management procedures vary considerably, actions are proposed in general terms. The framework of these Guidelines should therefore be modified and shaped into more specific guidelines which are compatible with regional and national forestry practices.

The dedication and generosity of the experts and consultants who worked to formulate the Guidelines are acknowledged. As stated, it is a major step in the ongoing process of developing sustainable forest management in the tropics. It will certainly need to be modified and expanded as we go along and gain better understanding of the complexities of managing this valuable resource. The challenge now lies in the implementation of these Guidelines on the grounds to enable modifications, as appropriate, to be made. This calls for even greater efforts, cooperation and understanding. These Guidelines will thus go along way in achieving ITTO's target to produce tropical timber for export from sustainably managed forests by the year 2000.

Yokohama, Japan  
1 November 1990

B.C.Y. Freezailah  
Executive Director

## **. POLICY AND LEGISLATION**

### **2.1 FOREST POLICY**

**Principle 1.** A strong and continued political commitment at the highest level is indispensable for sustainable forest management to succeed. (See appendix 6).

**Possible action 1.** A national land use policy aiming at the sustainable use of all natural resources, including the establishment of a permanent forest base, should be developed and adopted.

**Possible action 2.** A national forest policy forming an integral part of the national land use policy, assuring a balanced use of forests, should be formulated by means of a process seeking the consensus of all the actors involved: government, local population and the private sector.

**Possible action 3.** The organization of seminars for discussing policy, involving the above-mentioned interest groups.

Considerations in deciding a forest policy include the present proportion of land under forest; needs of protection and conservation of biological diversity (see Appendix 1); needs and aspirations of present and future generations of the population; the place of forestry in national economic planning; the various objectives of forest policy and relative importance of these; the amount of public and private forests.

**Principle 2.** An agreed forest policy should be supported by appropriate legislation which should, in turn, be in harmony with laws concerning related sectors.

**Possible action 4.** Laws and regulations at appropriate national and local government levels should be enacted, or revised as needed, to support the established forest policy, in harmony with policies, laws and regulations in related sectors.

**Principle 3.** There should be a mechanism for regulate revision of policy in the light of new circumstance and/or availability of new information.

**Possible action 5.** Provision of adequate funds for research and monitoring to allow updating of policies.

**Possible action 6.** Research on valuation of full economic benefits (total of marketed and non-marketed goods and services), provided by forests primarily managed for timber production, to enable foresters to better state the case for natural forest management for sustained timber production.

### **2.2 NATIONAL FOREST INVENTORY**

**Principle 4.** A national forest inventory should establish the importance of all forests, independent of their ownership status, for the purposes identified in section 2.1 (see also Appendix 2).

**Principle 5.** There should be flexible provisions for such inventories to be broadened to include information not previously covered, if and when the need and opportunity for such additional information arises.

## **2.3 PERMANENT FOREST ESTATE**

**Principle 6.** Certain categories of land, whether public or private, need to be kept under permanent forest cover to secure their optimal contribution to national development.

**Principle 7.** The different categories of land to be kept under permanent forest are (see also Appendix 1): land to be protected; land for nature conservation; land for production of timber and other forest products; land intended to fulfill combinations of these objectives.

**Possible action 7.** To identify, survey and boundary mark the various categories of the Permanent Forest Estate, in consultation with surrounding populations, taking into account their present and future needs for agricultural land and their customary use of the forest.

**Principle 8.** Land destined for conversion to other uses (agriculture, mines, *etc.*), and any land for which the final use is uncertain, should be kept under managed forest until the need for clearing arises.

## **2.4 FOREST OWNERSHIP**

**Principle 9.** The principles and recommendations for implementation in these guidelines apply equally strictly to national forests and privately owned or customarily held forests.

## **2.5 NATIONAL FOREST SERVICE**

**Principle 10.** There should be a national agency capable of managing the government forest estate, and assisting in the management of private and customarily held forests, according to the objectives laid in the national forest policy.

**Possible action 8.** Provide for such a national agency.

## 3. FOREST MANAGEMENT

**Principle 11.** Forests set aside for timber production are able to fulfill other important objectives, such as environmental protection and, to a varying extent, conservation of species and ecosystems. These multiple uses should be safeguarded by the application of the environmental standards, spelled out below, to all forest operations.

### 3.1 PLANNING

**Principle 12.** Proper planning, at national forest management unit and operational levels reduces economic and environmental costs and is therefore an essential component of long-term sustainable forest management.

**Possible action 9.** To make adequate provision for forest management planning capacity at all administrative levels.

#### 3.1.1 Static and dynamic inventory

**Principle 13.** The forests set aside for timber production should be the subject of a more detailed inventory to allow for planning of forest management and timber harvesting operations. The question of type and quantity of data to be gathered should be the subject of cost-benefit analysis.

**Possible action 10.** Carry out inventories, concentrating on quantities of timber currently and potentially commercial tree species of the forest for future timber production (see also Appendix 2).

**Possible action 11.** To establish representative series of permanent sample plots.

#### 3.1.2 Setting of management objectives

**Principle 14.** Management objectives should be set rationally for each forest management unit. Formulation of objectives should allow the forest manager to respond flexibly to present and future variations in physical, biological and socio-economic circumstances, keeping in mind the overall objectives of sustainability.

**Principle 15.** The size of each production forest management unit should preferably be a function of felling cycle, the average harvested volume per ha and annual timber outturn target of the operating agency (state forest enterprise, concessionaire, etc.)

#### 3.1.3 Choice of silvicultural concept

**Principle 16.** The choice of silvicultural concept should be aimed at sustained yield at minimum cost, enabling harvesting now and in the future, while respecting recognized secondary objectives.

**Possible action 12.** To gather information which provides the basis for rational choice of silvicultural practices, such as inventories and measurements from growth and yield plots, as well as data on market demand for various end uses of timber products. A true progressive silvicultural system should be developed by gradually improving on these practices as better information becomes available. The harvesting intensity and the

design of harvesting pattern should be integral parts of the silvicultural concept.

### **3.1.4 Yield regulation, Annual Allowable Cut (AAC)**

**Principle 17.** In order to ensure a sustained production of timber from each forest management unit, a reliable method for controlling timber yield should be adopted.

**Possible action 13.** The Annual Allowable Cut (AAC) should be set conservatively in the case of absence of reliable data on the regeneration and growth dynamics of tree species, especially with regard to diameter increment and response to the effect of logging on trees and soil. This applies both to tree species which, under current market conditions, are desirable or which have the potential to become commercially attractive in the future, recognizing that domestic and world markets for forest produce are under very dynamic development. In practice, this will often mean conservative setting of rotation length, felling cycle and firth limits. AS and when permanent sample lots begin to yield more reliable information about dynamics of desirable species, a reassessment of AAC should be considered.

**Possible action 14.** To make provision for regular review of AAC (5-yearly) in order to take account of replacement of original forests by managed forests and the transfer of conversion forest to other uses. In the longer term, stand modelling should be introduced to assure efficient and responsible yield regulation.

### **3.1.5 Management inventory and mapping**

**Principle 18.** A management inventory supported by a detailed map is indispensable to the preparation of working plans for each forest management unit.

**Possible action 15.** Management inventory and mapping should be carried out.

### **3.1.6 Preparation of working plans**

**Principle 19.** Working Plans should guarantee the respect of environmental standards in field operations.

**Possible action 16.** Preparation of Working Plans including the following details (see also 3.2.3):

- sequence of annual harvesting areas and allocation of all-weather and dry- weather areas;
- areas to be excluded from harvesting;
- road and extraction track layout;
- details of marking, harvesting, post-harvesting inventory; silvicultural treatments;
- fire management plan

### **3.1.7 Environmental impact assessment**

**Principle 20.** Forest management operations can have important positive or negative

environmental consequences, both in the forest itself and outside (transboundary effects). These consequences should be assessed in advance of operations to ensure overall sustainability.

**Possible action 17.** Specify conditions under which an Environmental Impact Assessment (EIA) should be required.

**Possible action 18.** Design EIA procedure and provide for qualified staff to carry out EIAs.

## **3.2 HARVESTING**

**Principle 21.** Harvesting operations should fit into the silvicultural concept, and may, if they are well planned and executed, help to provide conditions for increased increment and for successful regeneration. Efficiency and sustainability of forest management depend to a large extent on the quality of harvesting operations. Inadequately executed harvesting operations can have far-reaching negative impacts on the environment, such as erosion, pollution, habitat disruption and reduction of biological diversity, and may jeopardize the implementation of the silvicultural concept.

### **3.2.1 Pre-harvest prescriptions**

**Principle 22.** Pre-harvest prescriptions are important to minimize logging damage to the residual stand, to reduce health risks for logging personnel and to attune harvesting with the silvicultural concept.

**Possible action 19.** To draw up detailed prescriptions, including measures such as climber cutting, marking of trees to be felled and/or residuals to be retained and indications of extraction direction and felling direction.

### **3.2.2 Roads**

**Principle 23.** Planning, location, design, and construction of roads, bridges, causeways and fords should be done so as to minimize environmental damage.

**Possible action 20.** Limits to dimension, road grades, drainage requirements and conservation of buffer strips along streams should be specified (see further Appendix 3).

### **3.2.3 Extraction**

**Principle 24.** Extraction frequently involves the use of heavy machinery and, therefore, precautions must be taken to avoid damage.

**Possible action 21.** A logging plan should be drawn up including:

- areas where logging is subject to special restrictions of forbidden (flora and fauna conservation and soil protection areas, buffer strips, sites of cultural interest);
- specifications for construction and restoration of skidding tracks,

watercourse crossings and log landing (including drainage);

- wet weather limitations;
- allowed harvesting equipment;
- machine operator responsibilities (directional felling, *etc.*); marking of trees to be retained and trees to be removed (see further Appendix 3).

### **3.2.4 Post-harvest stand management**

**Principle 25.** Post-harvest operations are necessary to assess logging damage, the state of forest regeneration, the need for releasing and other silvicultural operations to assure the future timber crop.

**Possible action 22.** Carry out post-harvest inventory, establishing the need for silvicultural interventions.

## **3.3 PROTECTION**

### **3.3.1 Control of access**

**Principle 26.** Permanent production forest should be protected from activities that are incompatible with sustainable timber production, such as the encroachment by shifting cultivators often associated with the opening up of the forest.

**Possible action 23.** Access to logging roads that are not part of the national infrastructure (*i.e.* through-roads) should be strictly controlled. Consideration should be given to the possibility of managing special buffer zones, bordering the production forest for the benefit of the local population.

### **3.3.2 Fire**

**Principle 27.** Fire is a serious threat to future productivity and environmental quality of the forest. Increased fire risk in areas being logged, and even more so in areas which have been logged, demands stringent safety measures.

**Possible action 24.** A fire management plan should be established for each forest management unit, taking into account the degree of risks. The fire management plans may include regular clearing of boundaries between the forest estate and other areas, and between forest blocks within the forest estate. In areas being logged or already logged, additional safety measures such as restrictions on use of fire, keeping corridors between blocks free of logging debris, *etc.*, should be specified. Advance warning systems, including those that are satellite based, should be used.

### **3.3.3 Chemicals**

**Principle 28.** Chemicals, such as the ones used in silvicultural treatment, constitute risks both in terms of personnel safety and environmental pollution.

**Possible action 25.** Instructions for handling and storage of chemicals and waste oil

should be provided and enforced. Special restrictions are to apply near watercourses and other sensitive areas.

## **3.4 LEGAL ARRANGEMENTS**

### **3.4.1 Concession agreements**

**Principle 29.** There should be incentives to support long term sustainable forest management for all parties involved. Concessionaires should have the long term viability of their concession provided for (mainly by government controlling access to the forest); local population should benefit from forest management (see section 4); government should receive sufficient revenue to continue its forest management operations.

**Possible action 26.** Concession legislation should be adopted or reinforced to cover the following aspects: the responsibilities and authority of the forest service and the responsibility of the concessionaires; the size and duration of concession or license; conditions for renewal and termination.

Concession legislation is to include (see also Appendix 4): (a) categories of contracts, and application and granting procedures; (b) objects of the contract; (c) rights granted and rights withheld; (d) establishment or expansion of local wood-processing units; (e) felling, wood extraction and transport; (f) road construction and improvement of infrastructure; (g) forest management and reforestation; (h) forest taxes, stumpage and other fees; (i) control, supervision, and sanctions for disrespect of concession terms; (j) other general provisions; (k) other environmental considerations.

### **3.4.2 Logging permits on private or customarily held land**

**Principle 30.** For private or customarily held forests the basic approach to sustainability is the same as for government forests (see 3.4.1).

**Principle 31.** The national forest service should provide assistance to customary rights holders and private forest owners to manage the forests sustainably.

**Possible action 27.** Provide for or strengthen a forestry extension service which can provide forest management training for various categories of land-holders.

### **3.4.3 Salvage permits**

**Principle 32.** Timber from forest land to be converted to other uses, and from forest damaged by hurricanes and other disasters, should be optimally utilized. At the same time, disruption of management of the permanent production forest should be prevented.

**Possible action 28.** Devise mechanisms to provide for orderly introduction of timber from salvage operation into the market.

**Possible action 29.** Provide for volume adjustment of log removal from logging concession to account for timber, including material of below-minimum exploitable diameter, becoming available from conversion land.

## **3.5 MONITORING AND RESEARCH**

**Principle 33.** Monitoring and research should provide feedback about the compatibility of forest management operations with the objectives of sustainable timber production and other forest uses.

### **3.5.1 Yield control and silviculture**

**Possible action 30.** Develop design of Permanent Sample Plot (PSP) procedure (distribution, number, design, minimum measurements) and of monitoring of PSPs to increase accuracy of Annual Allowable Cut calculations.

**Possible action 31.** Assessment of compatibility of management practices and silvicultural systems by carrying out regeneration surveys, and studies on need for post-harvest stand treatment and other relevant subjects.

**Possible action 32.** To study the dynamics of main timber species to enable stand modelling.

### **3.5.2 Environmental impact studies**

**Possible action 33.** To assess compatibility of logging practices with declared secondary objectives such as conservation and protection, and with the overall principle of sustainability.

## 4. SOCIO-ECONOMIC AND FINANCIAL ASPECTS

**Principle 34.** Sustained timber production depends on an equitable distribution of incentives, costs and benefits, associated with forest management, between the principal participants, namely the forest authority, forest owners, concessionaires and local communities.

### 4.1 RELATIONS WITH LOCAL POPULATIONS

**Principle 35.** The success of forest management for sustained timber production depends to a considerable degree on its compatibility with the interests of local populations.

**Principle 36.** Timber permits for areas inhabited by indigenous peoples should take into consideration the conditions recommended by the World Bank and the ILO for work in such areas *inter alia*.

**Possible action 34.** Provisions should be made: for consultation with local people, starting in the planning phase before road building and logging commences; for continued exercise of customary rights; for concession agreements and other logging permits to cover the extent of assistance, employment, compensation, *etc.*, to be provided.

### 4.2 ECONOMICS, INCENTIVES, TAXATION

**Principle 37.** Management for timber production can only be sustained in the long term if it is economically viable, (taking full account in the economic value of all relevant costs and benefits from the conservation of the forest and its ecological and environmental influences).

**Possible action 35.** National and international marketing efforts should be intensified in order to realize highest possible value of forest products and improve utilization of the resources from sustainably managed forests.

**Principle 38.** A share of the financial benefits accruing from timber harvesting should be considered and used as funds for maintaining the productive capacity of the forest resource.

**Principle 39.** Forest fees and taxes should be considered as incentives to encourage more rational and less wasteful forest utilization and the establishment of an efficient processing industry, and to discourage high-grading and logging of forests which are marginal for timber production. They should be and remain directly related to the real cost of forest management. Taxation procedures should be as simple as possible and clear to all parties involved.

**Principle 40.** In order to achieve the main principle of good and sustainable management, forest fees and taxes may need to be revised at relatively short notice, due to circumstances outside the control of loggers and the forest agency (*e.g.* fluctuations in international timber market and currency). The national forest agency should be granted the authority to carry out such revisions.

**Principle 41.** Continuity of operations is essential for sustainable forest management.

**Possible action 36.** In order to remain operational even in adverse budget

situations, the forest authority should be granted a certain degree of financial autonomy which, among other things, should allow the accumulation of funds. This can be achieved *e.g.* by allowing the forest authority to collect part and maybe the full amount of forest fees and taxes without intervention from other government departments.

## APPENDIX A.2

# **CRITERIA FOR THE MEASUREMENT OF SUSTAINABLE TROPICAL FOREST MANAGEMENT**

**ITTO Policy Development Series No. 3**

## **FOREWORD**

As an organization, the International Tropical Timber Organization (ITTO) is dedicated to the conservation and wise utilization of tropical forest resources through sustainable management. Thus, the promotion and implementation of sustainable management of tropical forests in its producer country members is one of the key elements in ITTO's project and non-project activities. ITTO's Guidelines on sustainable management of natural and planted tropical forests and its draft Guidelines on the biodiversity conservation of production tropical forests represent serious and concerted efforts of all its member countries to achieve ITTO's Year 2000 Target. The ITTC had initiated discussions on progress towards this Target and a major review will be undertaken in 1995.

But what is sustainable management of tropical forests? There is a bewildering number of definitions. Obviously, progress can only be achieved through a definition in simple practical terms linked to operational criteria in the field. To this end ITTO convened an Expert Panel to Formulate Possible Methods for Defining General Criteria for and Measurement of Sustainable Tropical Forest Management. The Panel, comprising Experts from both producer and consumer countries and representatives from conservation NGO and the timber trade, met at The Hague from 27 to 29 September 1991. This ITTO publication contains a working definition of sustainable management of tropical forests and a list of criteria for sustainability and examples of indicators based on the recommendations of this Expert Panel.

The dedication and generosity of the experts and consultants who worked tirelessly to formulate these criteria are gratefully acknowledged. Their contribution is yet another vital step for ITTO to work towards sustainable management of tropical forests. The criteria are deliberately kept simple and field-oriented and obviously, will need revision from time to time with new experiences. It is hoped that through this publication and its wide dissemination among all foresters, particularly those experienced in management of tropical forests, appropriate amendments may be made. These criteria will help to focus current weaknesses in management, and will therefore help to identify achievable improvements in management practice. They can also provide a basis for a standard reporting system to facilitate comparison and discussions for co-operation and assistance. These criteria are thus another demonstration of ITTO's commitment to achieve sustainable management of tropical forests.

Yokohama, Japan  
25 March 1992

B.C.Y. Freezailah  
Executive Director

## **INTRODUCTION**

As part of its on-going programme to promote the conservation and sustainable management of tropical forests, the Quito Session of the International Tropical Timber Council (ITTC) adopted a multi-faceted strategy to help promote the achievement of ITTO's Target 2000 to ensure that all trade in tropical timber is sourced from sustainably managed forests by the year 2000. One of the first initiatives of this strategy was to establish an International Panel of Experts to identify possible criteria for the measurement of sustainable tropical forest management to aid producer member countries of ITTO to both assess and report on their own progress towards achieving sustainable tropical management and Target 2000.

The International Panel to develop these criteria met at The Hague in the Netherlands in late September, 1991, and considered a detailed discussion paper jointly prepared by Professor Duncan Poore of the International Institute for Environment and Development, and Mr. Mok Sian Tuan, the former Director of the ASEAN Institute of Forest Management. The Panel, consisting of representatives of both producer and consumer member countries of ITTO, conservation NGOs and the trade in tropical timber, eventually distilled out a more concise definition of sustainable management and suggested a list of criteria and operational indicators for sustainable forest management at both the national and forest management unit levels.

The Eleventh Session of the ITTC in Yokohama examined both the panel's report and the original discussion paper prepared by Mr. Mok and Professor Poore. The Council further streamlined both the definition of sustainable management and the suggested list of criteria and operational indicators. The Council also invited producing and consuming member countries of ITTO to submit papers for the purposes of refining the full text of both the definition of sustainable management and the description of criteria for measuring sustainable forest management in practice. A panel comprised of experts from the delegations of six producing member and six consumer member countries will examine these papers and all issues relevant to sustainable forest management during the Twelfth Session of the ITTC which will be held in Yaoundé in Cameroon from 6 to 14 May 1992.

This publication presents the revised definition of sustainable management adopted by the Eleventh Session of the Council together with the provisional list of criteria and possible indicators for sustainability at both the national level and the level of the Forest Management Unit.

## **SUSTAINABLE MANAGEMENT OF TROPICAL FORESTS**

Sustainable forest management is the process of managing permanent forest land to achieve one or more clearly specified objectives of management with regard to the production of a continuous flow of desired forest products and services without undue reduction of its inherent values and future productivity and without undue undesirable effects on the physical and social environment.

## **CRITERIA FOR SUSTAINABILITY**

### **Introduction**

The list of Criteria and Examples of Indicators below is neither exhaustive nor exclusive. Moreover, all of the Examples of Indicators do not need to be measured to establish sustainability or the degree to which it has been achieved.

It must be emphasized that determinations of sustainability and, therefore, use of the following list must be specific to each nation or each management unit.

### **Sustainability at the National Level**

<b>Criteria</b>	<b>Examples of Indicators</b>
The Forest Resource Base	<ul style="list-style-type: none"> <li>● Comprehensive land use planning and provision</li> <li>● Present area of the PFE in relation to national goals and target.</li> <li>● Plantation establishment targets, present age class distributions, and annual planting regimes.</li> <li>● Areas of Protection Forests and Production Forests within the PFE.</li> <li>● The representativeness of the protected areas network and the current or planned reservation programme.</li> </ul>
The Continuity of Flow	<ul style="list-style-type: none"> <li>● National production statistics of Forest Products over time.</li> <li>● Documentation of logging (area) histories over time.</li> <li>● Proposed cutting cycle lengths for major forest types, and standard concession lengths.</li> <li>● Regulation of initial harvesting rates in relation to defined cutting cycles and net area of production forest.</li> <li>● Regulation of subsequent harvesting in relation to increment data and the net area of production forest.</li> <li>● Steps taken to harmonize the first and subsequent cutting cycles and manage the transition from the first to the second cutting cycle.</li> <li>● Wood production targets over time from various sources.</li> <li>● The availability of silvicultural prescriptions for the major forest types.</li> </ul>
The Level of Environmental Control	<ul style="list-style-type: none"> <li>● Management prescriptions for other non- production components of the PFE.</li> <li>● The availability of engineering, watershed protection and other environmental management prescriptions for production forests.</li> <li>● Availability of environmental assessment procedures.</li> </ul>
Socio-Economic Effects	<ul style="list-style-type: none"> <li>● Employment patterns and trends.</li> <li>● Income generation and distribution patterns.</li> <li>● National revenue and expenditure budgets for forest management.</li> </ul>
Institutional Frameworks	<ul style="list-style-type: none"> <li>● Availability of environmental assessment procedures.</li> <li>● Existence of a national forest policy.</li> <li>● The relationship of national policy to ITTO Guidelines.</li> <li>● Adequacy of the legislative framework to implement national forest policies and management plans.</li> <li>● Adequacy of legislation to regulate harvesting and specific instruments, e.g. concession agreements.</li> </ul>

- Adequacy of human and financial resources to meet legislative and administrative responsibilities in sustainable forest management.
- Community consultation.
- Existence of management plans and provisions for their implementation.

## **Sustainability at the Level of the Forest Management Unit**

<b>Criteria</b>	<b>Examples of Indicators</b>
Resource Security	<ul style="list-style-type: none"> <li>• The legal establishment of forest areas or management units.</li> <li>• Existence of a management plan.</li> <li>• Clear demarcation of boundaries in the field.</li> <li>• The presence or absence of illegal exploitation and encroachment.</li> </ul>
The Continuity of Timber Production	<ul style="list-style-type: none"> <li>• The duration of concession agreements.</li> <li>• The presence of clear, official harvesting rules.</li> <li>• Long term soil productivity.</li> <li>• A pre-logging stand inventory.</li> <li>• The number of trees and/or volume of timber per hectare harvested.</li> <li>• Provision for monitoring the residual growing stock after logging.</li> <li>• Records of annual product outputs over time.</li> <li>• Net productive area.</li> <li>• Records of annual areas cut over time.</li> </ul>
The Conservation of Flora and Fauna	<ul style="list-style-type: none"> <li>• Protection of eco-systems in the concession or management unit.</li> </ul>
An Acceptable Level of Environmental Impact	<ul style="list-style-type: none"> <li>• The extent of vegetation disturbance after logging.</li> <li>• Extent of soil disturbance.</li> <li>• Extent and spatial distribution of riparian and other watershed protection areas.</li> <li>• The extent and severity of soil erosion.</li> <li>• Provision for protection of bodies of water.</li> </ul>
Socio-economic Benefits	<ul style="list-style-type: none"> <li>• The number of people employed.</li> <li>• The nature and extent of benefits from forestry activities.</li> </ul>
Planning and Adjustment to Experience	<ul style="list-style-type: none"> <li>• Community consultation.</li> <li>• Arrangements for Forest Management to take into account traditional forest utilization.</li> </ul>

**Appendix B . The forest management units (UFA) and their inventory Status in Congo**

<b>Name of forest units (UFA)</b>	<b>Area of forest unit, (hectares)</b>	<b>Observation</b>
UFA Sud1. Pte-Noire	693,000	Inventoried
UFA Sud2. Kayes	662,400	Inventoried
UFA Sud3. Kimongo	652,200	Inventoried
UFA Sud4. Bouenza	1,146,000	Surveyed
UFA Sud5. Kibangou	639,800	Surveyed
UFA Sud6. Divenie	305,298	Surveyed
UFA Sud7. Mossendjo	1,151,200	Surveyed
UFA Sud8. Sibiti	603,800	Surveyed
UFA Sud9. Pool	3,391,250	Surveyed
UFA Sud10. Zanaga S.	1,124,400	Surveyed
UFA Sud11. Zanaga N.	380,600	Surveyed
UFA Ollombo	163,468	Inventoried
UFA Abala	425,040	Non inventoried
UFA kelle	422,976	Surveyed
UFA Tsama	390,448	Non inventoried
UFA Mbomo	309,138	Partly surveyed
UFA Ewo	745,130	Non inventoried
UFA Mambili Sud	360,116	Non inventoried
UFA Mambili Nord	591,692	Non inventoried
UFA Ouest	448,000	Partly surveyed
UFA Est	1,131,600	Partly surveyed
UFA Centre	855,600	Partly surveyed
UFA Pokola	480,000	Partly inventoried
UFA Loundoungou	390,816	Partly inventoried
UFA kabo	280,000	Partly inventoried
UFA Nouabale	386,592	National park
UFA Ipendja	461,296	Surveyed
UFA Lopola	199,900	Partly inventoried
UFA Mokabi	370,500	Non inventoried
UFA Enyelle	232,996	Inventoried
UFA Mimbele	189,200	Non inventoried
UFA loubonga	213,000	Non inventoried
UFA Missa	225,000	Non inventoried
UFA Betou	300,000	Surveyed

**Appendix C . The forest industry enterprises and their forest units of  
Operation in the Republic of Congo.**

<b>Enterprise name</b>	<b>Source of investment</b>	<b>Forest units</b>	<b>Total area, (hectares)</b>
Cotimber	France	UFA, Iopola	199,900
Likouala Timber	France, Malaizya	UFA, Betou	300,000
ITBL	France	UFA, Enyele	442.196
Cristal	France	UFA, Loubonga	213,200
CIB	German	UFAs, pokola, Kabo, Loundoungou	1,526,416
SOCALIB	Libya	UFA, Ouest	448,000
SCBO	Congo/France	UFA, Est	1,131,600
Agro-forestiere du Nord	Congo	UFA, Centre	855,600
FORESCO	Liban	UFA, Kelle	422,976
FORALAC	Portugal	UFAs, Sud7, Sud8*, Sud4, Sud2, Sud5*	429,712
BOPLAC	German, Holland	UFAs, Sud7*, Sud10*,	576,780
SOCOBOIS	German	UFAs, Sud3*, Sud6*, Sud7*,Sud10*	460,826
INNOVEST INDUSTRIES	Malaizya	UFAs, Sud7* , Sud5*	308,626

\* Part of the UFA.

Source: MEF, 1998. Direction des forests.

## Appendix C . (continue)

MAN-FAN-TAI CONGO	China	UFAs, Sud2*, Sud7*, Sud10*	229,026
ECIK	Congo	UFA Sud10*	134,200
QUATOR	Congo	UFA Sud2*	33,560
COFIBOIS	Congo	UFA Sud2*	25,500
NOUVELLE CAFAN	Congo	UFA Sud1*	13,000
KIMBAKALA	Congo	UFA Sud1*	9,300
NGAMBOU HENRI	Congo	UFA Sud1*	30,896
MAVOUNGOU ALBERT	Congo	UFA Sud1*	23,000
NGOMA Christiane	Congo	UFA Sud1*	6,000
NGOMA Joseph	Congo	UFA Sud11*	80,000
CEBT	Congo	UFA Sud8*	54,000
NZOUNGOU	Congo	UFA Sud7*	15,100
FOUTY MARTIAL	Congo	UFA Sud7*	32,000
SFD (societe forestiere dolisie)	Congo	UFA Sud7*	17,600
CIBT	Congo	UFA Sud5*	100,200
BANINA ANTOINE	Congo	UFA Sud1*	22,400
SOBODI	Congo	UFA Sud6*	40,690
GOMA&Cie	Congo	UFAs Sud10*,Sud11*	106,400
MOUNGONDO VICTOR	Congo	UFAs, Sud8*, Sud10*	165,700

Appendix D1. The main tree species regularly harvested in the Republic of Congo

N0	Commercial name	Scientific name	Family
1	Okoume	<u><i>Aucoumea klaineana</i></u>	Burseracees
2	Aiele	<u><i>Canarium achweinfmthii</i></u>	Burseracees
3	Ozigo	<u><i>Dacryo des buattneri</i></u>	Burseracees
4	Doussie/Afzelia	<u><i>Afzelia bipidesis pschyloba</i></u>	Cesalpiniacees
5	Movingui	<u><i>Diste monanthus benthianiamus</i></u>	Cesalpiniacees
6	Tola/Agba	<u><i>Gossweile rodendron balsamiferum</i></u>	Cesalpiniacees
7	Tchitola	<u><i>Oxystigma oxyphyllum</i></u>	Cesalpiniacees
8	Pao Rosa	<u><i>Swartzia fistuloides</i></u>	Cesalpiniacees
9	Limba/Frake	<u><i>Terminalia superba</i></u>	Combretaces
10	Izombe	<u><i>Testulea gabonensis</i></u>	Luxembourgiace
11	Tiama	<u><i>Entandro-phragma angolensis</i></u>	Meliacees
12	Kossipo	<u><i>Entandro-phragma candeliei</i></u>	Meliacees
13	Sapelli	<u><i>Entandro-phragma cylindricum</i></u>	Meliacees
14	Sipo	<u><i>Entandro-phragma utile</i></u>	Meliacees
15	Bosse/Guerea	<u><i>Guerea cedrata</i></u>	Meliacees
16	Acajou/Khaya	<u><i>Khaya ivorensis</i></u>	Meliacees
17	Dibetou	<u><i>Lovoa trichilioides</i></u>	Meliacees
18	Niove	<u><i>Standtia gabenensis</i></u>	Moracees
19	Wengue	<u><i>Milletia lamentii</i></u>	Papilionacees
20	Afromosia	<u><i>Pericopis elata</i></u>	Papilionacees
21	Padouk	<u><i>Peterocarpis sayauxii</i></u>	Papilionacees
22	Bahia/Abma	<u><i>Mitragyna stipulosa</i></u>	Rubiacees
23	Bilinga	<u><i>Nauclea diderrichii</i></u>	Rubiacees
24	Aniegre	<u><i>Aningeria robusta</i></u>	Sapotacees
25	Mukulungu	<u><i>Antranella congolensis</i></u>	Sapotacees
26	Moabi	<u><i>Barllonella toxisperma</i></u>	Sapotacees
27	Longhi blanc	<u><i>Gameya africana</i></u>	Sapotacees
28	Longhi rouge	<u><i>Gameya lacourtiana</i></u>	Sapotacees
29	Douka/Makore	<u><i>Tleghemella africana</i></u>	Sapotacees
30	Ayous	<u><i>Tripbochrton scleroxylon</i></u>	Sterculiacees

Source: MEF, 1998. Cahier des statistiques, annees 1990-1995

## Appendix D 2. The species irregularly harvested in the Republic of Congo

No	Commercial name	Scientific name	Family
1	Onzabili	<i>Antrocaryou klarneanum</i>	Anacardiacees
2	Emen	<i>Alstonia boonei</i>	Apocynacees
3	Aloue	<i>Khodognaphalon africanus</i>	Bombacacees
4	Safoukala	<i>Dacryodes pubescens</i>	Burseracees
5	Ebiara	<i>Berlinia bracteosa</i>	Cesalpinacees
6	Etimoe	<i>Copaifera muldbraedii</i>	Cesalpinacees
7	Faro	<i>Daniella klainer</i>	Cesalpinacees
8	Mambode	<i>Detarium macrocarpum</i>	Cesalpinacees
9	Nkassa/Tali	<i>Erythrophleum ivorense</i>	Cesalpinacees
10	Limbali	<i>Gilbertrdendron dervenei</i>	Cesalpinacees
11	Bubinga	<i>Gmbomtia tessmsnii</i>	Cesalpinacees
12	Mutenye	<i>Guibomtia arnoldiana</i>	Cesalpinacees
13	Zingana	<i>Microberlinia brazzavillensis</i>	Cesalpinacees
14	Ekaba	<i>Tetraberlinia bifoliolata</i>	Cesalpinacees
15	Ebene	<i>Drospyros crassi flora</i>	Ebenacees
16	Rikio	<i>Uapaca guieensis</i>	Euphorbiacees
17	Vesambata	<i>Oldifieldia africana</i>	Euphorbiacees
18	Oboto	<i>Mammea africana</i>	Clusiacee
19	Evess	<i>Klainedoxa Gabonensis</i>	Irvingiacees
20	Kanda	<i>Beilschmiedia obscura</i>	Lauracees
21	Essia	<i>Ptersianthus africanus</i>	Lecythydacees
22	Avrodire	<i>Turraeanthus africanus</i>	Meliacees
23	Itandza	<i>Alibizia gummifera</i>	Dabenma
24	Dabenma	<i>Pitadeniastrum africanum</i>	Mimosacees
25	Ekoune	<i>Coelocarryon pnenssii</i>	Myristicacees
26	Ilomba	<i>Pitadeniastrum africanum</i>	Myristicacees
27	Azobe	<i>Lophira alata</i>	Ochnacees
28	Angneuk	<i>Ongokea gore</i>	Ochnacees
29	Musizi	<i>Maesopsis eminii</i>	Rhamnacees
30	Olon	<i>Fagara heitzii</i>	Rutacees
31	Congotali	<i>Letestua durissima</i>	Sapotacees

Source: MEF, 1998: Cahier des statistiques, annees 1990-1995

**Appendix E 1. Logs production in the Republic of Congo by main tree species in cubic meters**

Tree species	1990	1991	1992	1993	1994	1995
Sapelli	379,828	222,146	283,666	185,782	271,417	298,620
Okoume	145,566	110,968	123,719	125,812	138,255	117,652
Sipo	48,872	31,054	50,248	26,849	35,958	39,464
Ayous	18,763	25,945	28,390	26,127	18,909	22,693
Khaya	3,697	3,211	12,379	4,492	5,545	7,638
Iroko	18,295	14,019	6,211	4,491	9,206	14,891
Bosse	2,068	969	550	4,360	5,479	6,141
Bahia	6,300	14,683	12,604	14,853	15,229	17,745
Bilinga	7,186	7,596	6,000	5,563	5,651	4,867
Dibetou	3,804	2,091	2,561	1,998	2,984	3,631
Douka	1,731	1,462	2,382	799	1,930	1,814
Doussie	2,197	2,866	1,760	2,903	3,621	3,695
Kossipo	5,760	1,993	1,532	2,354	3,612	2,512
Longhi	42,243	19,940	20,856	11,330	5,612	4,753
Moabi	4,414	4,183	4,422	4,529	4,219	3,227
Niove	29,449	27,804	9,480	29,868	28,129	26,862
Padouk	1,406	957	819	1,071	1,887	2,131
Pao-rose	461	304	215	113	329	310
Tali	744	858	15	91	597	251
Ebiara	116	15	92	934	930	768
Wengue	4,791	2,477	-	1,487	2,327	1,838
Limba	43,272	44,044	26,764	21,333	11,991	17,788
Accuminata	794	447	511	453	317	319
Afromosia	9,004	163	6,135	2,134	-	5,326
Tchitola	760	258	117	544	1,372	758
Other species	51,118	39,062	33,607	29,452	52,024	32,743
<b>TOTAL</b>	<b>832,639</b>	<b>579,515</b>	<b>635,035</b>	<b>509,722</b>	<b>627,533</b>	<b>638,437</b>

Source: MEF, 1998. Cahier des statistiques. Annees 1990-1995

**Appendix F1.**

**The statistics of forest industry production in the Republic of Congo in 1,000 cubic meters**

<b>Types of products</b>	<b>1990</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>
<b>Logs</b>	833	572	635	511	635	650	700
<b>Sawns</b>	49.6	54	53	40	52	55	55
<b>Veneers</b>	51.3	37	45	40	50	35	35
<b>Plywood</b>	0	0	2	2	1	2	2

**Source: ITTO, 1995, 1996, 1997 annual review and assessment of the world tropical timber situation.**

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