ENHANCING SUSTAINABLE FOREST MANAGEMENT IN INDONESIA

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Abstract

This paper gives an overview of the problems of forest management and proposed strategy to enhance sustainable forest management in Indonesia. The increase of the population number leads to need of land to support their activities, particularly for agriculture, pasture, settlement, etc. Since forest is the major land-use in Indonesia, deforestation is inevitable.

Deforestation rate in Indonesia increased, from 0.3 percent in 1970's to 0.6 percent of total land in 1980's, causing socio-economic and ecological consequences.

Based on the awareness of the multiple forest functions concerning the ecological, social and economical aspects, declined forest land area might lead to local and global catastrophes. Hence forest resources should be stabilized or even the area should be increased through declining deforestation, increasing reforestation areas on degraded land, etc. In addition the forest should be maintained based on the principles of sustainable forest management.

Efforts in sustaining forest existence and forest management in Indonesia have been started since long time, but the success of these efforts is still to be increased by enhancing sustainable forest management.

Keywords: sustainability, sustainable development, sustainable forest management, Indonesia, land-use plans, production forest, natural forest management, Industrial Forest Plantation, Social Forestry, criteria and indicators, environmental education, monitoring, the role of University and NGO's.

1. Introduction

Forestry has a very important role in Indonesia because this country has huge forest resources. More than 60 percent of the total land is covered by forest (FAO, 1990). These forests have to fulfill many functions either in social, economic or environmental sectors, and on local as well as on global scales.

Due to the wide range of geographical conditions, Indonesia is covered by various forest types, each of them having a unique flora, fauna and ecosystem. Diversity of the Indonesian forests is high since the country is situated in the humid tropical climatic zone and exists of two parts of zoo-geographical regions divided by Wallace's line (Whitmore, 1990). Based on a wide range of soil variability, land form, land-use pattern and distribution of the people, type and extend of forest cover result in uniqueness of several geo-ecosystems.

Since 1967, a National Development program started to increase the people's prosperity. Some developing sectors, particularly the agricultural sector, needed land for extension of their activities. Consequently conversion of forest land into other land-uses was inevitable, because forest was the dominant land-use type. At the same time guidelines for management systems of natural forests (Indonesian Selective Cutting System/Tebang Pilih Indonesia) were issued. This system was updated in 1989 into Indonesian Selective Cutting and Planting System/Tebang Pilih Tanam Indonesia, in order to achieve a sustainable forest management. Nevertheless the deforestation process is still going on (Pratiwi, 1996).

Efforts to sustain the tropical forest existence and its productivity have started in Indonesia by launching reforestation programs dealing with several aspects. Besides that, some policies related to forest management were stipulated and implemented. Success of those efforts is still limited due to several reasons (Pratiwi, 1996). Therefore efforts are still to be done in order to enhance a sustainable forest management, with as ultimate goal to sustain the existence of forests, their products and their functions.

Forest policy in Indonesia has been developed since the 19th century, when the population density was still low. It mainly concerned policy related to the management of teak plantation forests on Java. Nowadays population pressure and wood consumption are much stronger and therefore challenges of the forest policies are higher and have to be linked with policies of other sectors, which are integrated in the national development programs.

In 1990, the law on the conservation of living resources was passed. Its three main purposes are protection of life support systems, preservation of plant and animal
species and sustainable utilization of living resources (article 5). Related to this regulation, sustainable forest management has to be done more consistently.

This paper aims at the determination of a strategy which enhances a sustainable forest management so that the existence of Indonesian tropical forest and its products and functions can be sustained.

2. Concept of sustainability

The term of sustainability became popular since it was introduced in 1987 by the WCED. There are many definitions of sustainability, according to different aspects of human life.

Sustainability requires a balanced relationship between human needs and the finite size and resource capacity of the earth. Therefore, generally speaking, the notion of sustainability has three key components: the environment, economic growth, and human welfare (WWF, 1993). In this study, attention will be given mainly to sustainability related to sustainable development and sustainable forest management.

Sustainable development is defined by Philippe (1990) as the process of change in which the exploitation of resources, the direction of investments, the orientation of technological development and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspiration. Furthermore he points out that from the economic point of view, sustainable development is the entire combination of conditions and factors contributing to the maintenance of income growth, and to the improvement of standards of living and well being. Therefore, sustainable development is the level of welfare that is to be sustained or perpetuated through economic, institutional

and technical change (James et al., 1989). Sustainable development is economic development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED, 1987). This process involves many aspects of economic activities like: control of population growth, encouragement of technical change, the optimal increase in stock of factors contributing to the production of well being, pricing of resources reflecting their relatively scarcity, a change in the pattern of production and consumption in order to maintain the stock of scarce resource for future generation (Gomez, 1992). However, the fundamental problem is that human activity is decoupled from the rest of the landscape, because natural constraints to population and economic growth have been largely ignored.

Sustainable development implies the achievement of a steady state society (Baly, 1973; Lugo, 1974 (as cited in Lugo, 1991)). This means that sustainable development should improve the quality of human life within the carrying capacity of the supporting ecosystem (WWF, 1993), for example by using energy and resources more efficiently and considering the limits of growth (Lugo, 1991). In this case, Lugo (1991) defines development as a change in patterns of resource use, which sometimes results in unacceptable natural and social environmental conditions for which redevelopment maybe necessary. Furthermore he states that factors, influencing the achievement of sustainable development, are:

1. the degree of dependence on external subsidies:
   - increasing external subsidies of nations can compensate for internal shortages and sustain intensive development;
   - when there is too much dependence on imported resources, sustainability is vulnerable to two conditions:
     1.1 internal reserves of resources will be depleted because they must always match in some way imported resources; and
     1.2 local control of the economy is lost, particularly when shortages of critical resources develop in far away markets because of interruptions of transport systems or when improving labor and technology causes social change;
2. the depletion of resources and accumulation of waste. Recycling help maintains non-renewable resources and minimizes the production of stressors caused by the accumulation of waste.

Principle 4 of the Rio Conference on Environment and Development (UNCED, 1992), mentions that "in order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it". Principle 8 indicates that "to achieve sustainable development and a higher quality of life for all people, states should reduce and eliminate not sustainable pattern of production and consumption, and promote appropriate demographic policies". From these principles it means that sustainable development must therefore encompass environmental, social and economic factors. Rehabilitation of lands and resources by properly management practices is very important in sustainable development programs.

Generally speaking, discussing sustainability in forestry sectors mainly relates to ***sustainable forest management***. In the beginning, sustained yield was a very popular term, i.e. as a yield that a forest can produce continuously at a given intensity of management. Therefore sustained yield management implies continuous production, so planned as to achieve at the earliest practical time a balance between increment and cutting (Mc.Dougall, 1990; Hagglund, 1990). However, sustained yield is nearly impossible to find (Poore et al., 1989), and timber yield is not a primary indicator of a forest ecosystem's health (Johnson and Cabarle, 1993). So, defining sustainability narrowly as the production of a

continuous yield of marketable timber is a mistake, even if non-timber forest products are taken into account (Johnson and Cabarle, 1993).

Understanding sustainable forest management is more wise and wider than discussing only sustained yield. Sustainable forest management not only concerns timber yield, but also other aspects, like ecological and social-economic aspects. Such as Bruenig and Poker (1989) say, that wise use of forest for long term economic and ecological benefits, is very necessary in sustainable forest management. Johnson and Cabarle (1993) argue that sustainable forest management should keep human uses of forest at a level compatible with the maintenance of the ecological processes that sustain them. Even if timber production is the primary management objective, sustaining some level of environmental services and biological diversity is very necessary, without neglecting the diverse human needs, besides those for employment and wood products.

ITTO (1992) defines sustainable forest management as 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. This definition also recognizes the importance of non-timber resources in forest management.

The Basic element 6, as formulated by the UNCED (1992) conference, of the "Principles of Forests: Non-legally binding authoritative statement of principles for a global consensus on the management, conservation, and sustainable development of all types of forest", states that a broad spectrum of forest management objectives should be promoted and recognized to meet the need of the people for energy and industrial raw material.

From ITTO and UNCED principles, it can be stated that sustainable forest management (especially in tropical forest), has to be emphasized as multiple-use and/or concerns with ecological and socio-economic aspects.

With regard to ecological aspects, it means that forest management should be practiced without:

1. undue reduction of its inherent values and future productivity; and
2. undue undesirable effect on the physical environment.

Whereas from the socio-economic point of view it means that forest should give continuous contribution to the government revenues, local employment and industry. Lanly (1992) argues that economic feasibility is sometime blamed as the obstacle of sustainable forest management. However, since the survival of the tropical forest depends on their advantages over alternative land-uses, a sufficiently comprehensive and deep economic analysis of the forestry option is a key to sustainable forest management. Therefore it can be stated that the fate of the sustainable forest management will depend upon the success to apply ecological and socio-economic aspects.

ITTO identified the requirements for a successful sustained management of tropical forests (IFAP, 1989 (as cited in Soemitro, 1992)):

1. a firm political resolve by the government to achieve sustainability by the year 2000;
2. a secured and stable forest estate;
3. an assured and stable market;
4. adequate resource; and
5. good research and information to allow sound planning, silviculture and management.

ITTO's objective for the year 2000 is that all forest products in the world timber trade should come from forests under sustainable management. This target is clearly an important and vital component in the implementation of the UNCED follow up process.

Freezailah (1993) points out that there are three aspects of target 2000, which need special attention:

1. the ITTO producing members should be qualified for global funding support from private and public sources; in order to assist them to attain that target;
2. the target 2000 may be considered to global forests in general, to set 2000 as the target year when all forests will be under sustainable management, especially as regards their environmental quality; and
3. tropical and temperate forests are interlinked in at least one important function, namely, as carbon reservoirs to counteract the probable onslaught of global warming which will adversely affect us all.

However, Soemitro (1992) underlines that it is impossible to sustain the forest resource when poverty is still hanging around. It means that, to be sustainable, the forestry sector has to involve social, cultural and employment aspects. Employment problems often happen as a lack of alternative employment in non-agricultural sector. Therefore surplus of labors can appear, and ultimately, when forest is the main land-use, people will try to find their daily need into the forest.

An alternative to solve this problem is involvement or employment of the rural people, living in adjacent forest areas, e.g. by applying agroforestry systems in forest plantations, on a bufferzone unit or by integrated production systems (plantation and natural forests), and employment in agro/forest industries, etc. The involvement of people, living in and around the forest, and the sufficient attention given to their needs and interests in the design and implementation of related programmes will encourage sustainable forest management.

Finally, sustainable forest management will succeed, if the political and institutional environments are supportive. This means that forestry institutions have to be able to implement forest policy and laws. Supervision, communication, and enforcement should be strengthen. Foresters play a very important role to carry out their duty.

3. Problems

Physical, social and economic conditions as well as information system conditions related to the forest management are different between Java/Bali and other islands, therefore problems appears in the implementation of sustainable forest management are also different. There are still some problems in the implementation of that sustainable forest management on those two regions, but the problems in the outer islands are still more significant than on Java/Bali. Therefore inventories of those problems are focused on problems on the outer islands. Some important problems are inventoried as follows:

1. since forest is major land-use, increasing development of other sectors, especially agricultural sector, cause conversion of forest land into other land-uses;
2. basic information, such as topographic maps, potential forest inventory data, etc. are inadequate; hence planning, especially planning for field operation cannot be done properly;

3. legal status, area demarcation, and future land allocation of the forest concession areas are uncertain, therefore the concession companies tend to neglect some obligations to be done for sustainability of forests and their products;
4. wide range of Indonesia's tropical forest gives a wide variability of the ecosystem and biodiversity. Based on the uniqueness of those ecosystem and biodiversity, Indonesia's forest can be divided into several forest ecosystems. Every forest ecosystem needs specific approach in order to maintain its sustainability;
5. increment values of group of species (especially commercial species) on each ecological unit are very limited. Hence it causes some difficulties in determination of rational basis of cutting rotation of sustainable forest management; and
6. input of the local people in forest management planning is little, besides that the local people are also little involved in the operation of forest management. Therefore conflicts between local people and management may appear during operation of forest management.

According to the observation during research activities, these nationwide problems have not been solved. These problems need to be solved in order to sustain the existence of Indonesia's tropical forests and their products and at the same time to support the sustainability of the national development. Efforts to solve those problems are designated to enhance the implementation of the forest management. To do so an alternative strategy is proposed.

4. Proposed strategy

The proposed strategy for enhancing sustainable forest management is simplified in Fig. 1.

In line with the broader objectives of national sustainable development program, which are defined by the National Development Planning Agency (BAPPENAS), Indonesia has objectives to utilize and to manage forest resources, without neglecting resources and environmental conservation, by sustainable forest management.

Major elements for enhancing sustainable forest management are recuperation of basic information which is managed in an information system; determination and evaluation of the management goals and programs based on an adequate data base, available in the information system; implementation and monitoring.

Each element corresponds with institutions which are mostly included in the Ministry of Forestry, and with other institutions such as universities, other ministries and Non Governmental Organizations (NGO's).

4.1 Sustainable forest management

Regarding to the objectives of the national forest development program, goals and program of the sustainable forest management have to be formulated, based on adequate database by a particular agency. According to the organizational framework of the Ministry of Forestry (Fig. 1), the responsible agency is the Secretary General of the Ministry of Forestry. This agency has some bureaus which are related to programs determination of the Ministry of Forestry. The Bureau of Planning is suitable for implementing this tasks. It is supported by the Bureau of Law and Regulation, the Bureau of

Cooperation and Investment and the Bureau of Finance. Goals and programs, dealing with sustainable forest management, have to agree with the general outline of National Sustainable Development Policies and should be compatible with some problems appearing in the field. Besides that some forest policies on global scale have to be taken into consideration. Goals and programs have to be based on database from several

sources which are recuperated in an Information System in order to make data retrieval and management casier.

4.2 Information system

Indonesia's forest resources are a huge national asset. Therefore forest data management is an important element in supporting sustainable forest management program and the development of a nationwide forestry database is necessary. Those data should be managed in a computerized information system such as Geographic Information System (GIS), in order to make data entry, processing and retrieving more efficient.

A particular agency in the Ministry of Forestry should be appointed for data management. The Directorate General of Forest Inventory and Land-Use is suitable for implementing this task. This agency has to coordinate agencies and regional offices of the Ministry of Forestry, and other agencies of other ministries such as: the National Survey Coordination Agency, the Central Soil and Agroclimate Research, the National Land Agency, etc. at any levels, for coordination of data and other information.

Data and information, that should be collected, include all essential factors related to forest management, such as:

1. physical conditions of the forest land comprising physiography/topography, soil characteristics, and other soil land-uses in the forest area;
2. forest resources potency: type of forest ecosystem, biodiversity (diversity of flora and fauna at any level), forest products (wood and minor products) and services (amenities, climate amelioration, soil and water conservation, etc.);
3. population in surroundings and inside forest; and their physical, economic and psychological relationships to the forest and forest products; and
4. legal status of forest lands and other institutions which are related to the forest land-uses.

The data should be as recent as possible, and as realistic as possible in a proper quality for good analysis. The detail of the data/information should be adequate to support planning at any level.

Since a topographic map is an essential basic map for planning activities, the scale of this map has to be put into serious consideration, because the scale determines the detail of the information. The suggested scale of topographic map is 1 : 50,000 or bigger for Five Years Working Plan (Rencana Karya Lima tahun or RKL) and 1 : 20,000 for Annual Working Plan (Rencana Karya Tahunan or RKT) (Pratiwi, 1996). In addition the location map for the location orientation is 1 : 250,000; and for the specific construction plan, a detailed topographic map is necessary.

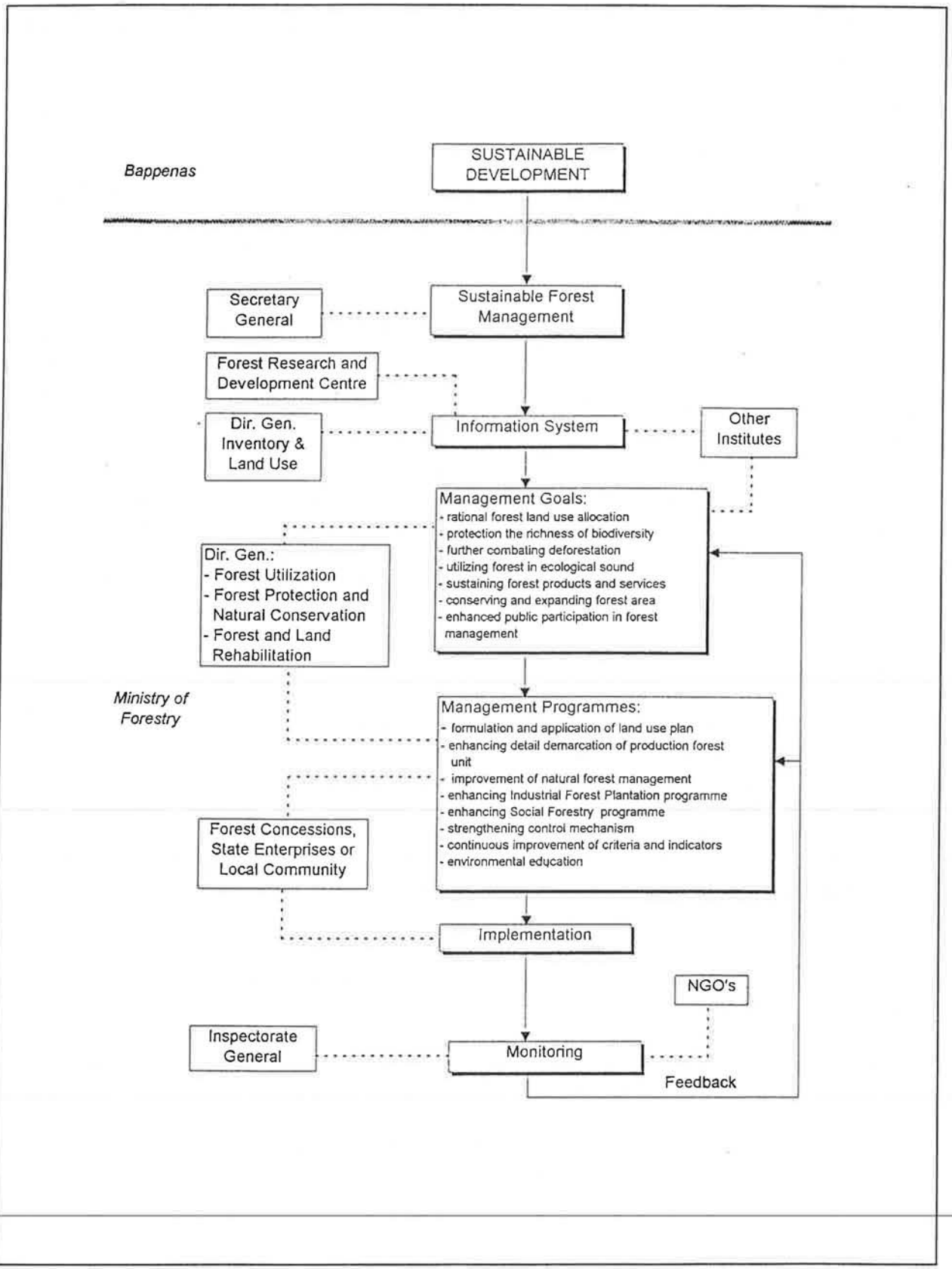

***Figure 1**: Key steps of enhancing sustainable forest management in Indonesia*

For the road network construction, the suggested topographic map is 1 : 5,000 for easy terrain or 1 : 2,500 in a difficult terrain (Korsgaard, 1985). Recently, related to this information, the Ministry of Forestry has a policy, stated in the Minister of Forestry Decree no. 236/Kpts-II/1995 on April 24th, that forest concession can be appealed by the State Enterprises and the Private Companies with a proposal completed by areal photographs on scale 1 : 20,000, and recommendation of areal confirmation by Governor with location map on scale 1 : 250,000 minimal (Kompas Daily, October 1995). By this areal photographs the topographic map, physiographic map, land-use map, and potential vegetation map can be deduced by interpretation and validation with field checking.

Physiographic maps describe the spatial position of forests and other geographical components, while land-use maps show an actual use of the forest land. That geographical information is needed in planning of forest management in spatial perspective.

At present data available concerning forest potencies, demographic, social or economic status of people surrounding forest and legal status of the existing forest land are very limited. Therefore data collection and analyses are not easy tasks, particularly with various types of data. So that the Directorate Forest Inventory and Land-Use should arrange consultations and cooperation with experts from universities and/or research institutes.

4.3 Management goals

Forest lands contain interest of some other developing sectors. Therefore determination of forest development objectives should involve some related agencies, particularly in setting up rational forest land-use allocation. Those agencies are the Ministry of Agriculture, the Ministry of Home Affair, the National Land Agency and the Ministry of State for Environment at national, provincial and lower levels.

Corresponding to the forest management objectives, they should be determined by establishing contacts with some agencies in the Ministry of Forestry, i.e. the Directorate General of Forest Utilization, the Directorate General of Forest Protection and Nature Conservation, the Directorate General of Forest and Land Rehabilitation. Besides that contact can be made to other agencies, such as the Ministry of Agriculture, the Ministry of Home Affair, the Ministry of State for Environment, etc. when necessary.

Determination of forest management objectives should be started with identification of characteristics and potencies of forest and forest lands, such as: forest types, diversity of flora and fauna, valuable wood species and its volume, valuable species for medicine and food reserves, forest land topography, catchment area, climate, soil types, etc. The relationships of forest and other environmental factors are also important to be considered such as hydrological cycles, and climate components: wind, temperature, etc. and biodiversity. The social aspects, besides employment provision, forest values for people inside and surrounding the forest are also important to be considered, such as the need of those communities to exploit the forest resources. Economic access i.e. national and international wood market conditions are also important factors, beside international concerns to the

existence of the forest. Beside that the actual problems in the current forest management have also to be taken into consideration.

According to the current study there is still a confusion in the application of policies on Forest Land-Use by Consensus (TGHK) and on Forest Concession Holder (HPH), consequently the implementation of

the current forest management occurs most of the time against the regulations which have been enacted. Meanwhile controls of the implementation are weak. So that the sustainable forest management is difficult to be carried out correctly. Besides that the implementation of the current forest management faces some problems with the local people, because the aspirations of the local people do not take into consideration the forest management programs.

Based on the results of the study on deforestation, reforestation and their related policies, some objectives of enhancing forest management in Indonesia can be proposed as follows:

1. rational forest land-use allocation;
2. protection of the richness of Indonesia's forest biodiversity;
3. further combating deforestation;
4. utilizing forest in ecologically sound ways;
5. sustaining forest products and services;
6. conserving and if possible expanding forest area;
7. enhanced public participation in forest management.

These objectives are in line with some items discussed in the United Nation Conference on Environment and Development (UNCED), 1992. Therefore further realization of these objectives can be considered as an active participation of Indonesia in the realization of UNCED objectives.

4.4 Management programs

Agencies of the Ministry of Forestry and other related agencies involved as well as the Forest Concession Holder (HPH) or the State Enterprises should coordinate to determine the sustainable forest management programs, based on the objectives which have been set up. The management programs should meet the need of the community and should be accepted by other agencies. The following ideas can be proposed for enhancing sustainable forest management in Indonesia:

1. formulation and application of land-use plans at any administrative levels;
2. enhancing detailed demarcation of production forest units;
3. improvement of natural forest management;
4. enhancing Industrial Forest Plantation programs;
5. enhancing Social Forestry programs;
6. strengthening control mechanisms;
7. improvement of criteria and indicators for sustainable forest management programs; and
8 environmental education:
   - importance of forest in the environmental systems; and
   - public participation.

4.4.1 Formulation and application of land-use plans

Increase of development activities leads to land need for developing sectors. Therefore soil and land-use have became a very complex issue in Indonesia, because large numbers of institutions are involved. Existing land-use policy aspects are mainly sectoral and often result in competing or conflicting situations over land, which tend to be solved on an *ad-hoc* basis. These are due to the fact that each development sector has its own regulation.

Related to these background the land-use plans in national, provincial and district levels have to be formulated and applied. These land-use plans should allow the allocation of land to various uses, with due account taken of its effective potential and carrying capacity. This policy is in line with the new Spatial Use Management Law, gazetted on October, 13th, 1992.

According to FAO-UNEP (1994) the National Land-Use Policy for Indonesia should aim at obtaining maximal and sustainable agricultural production (including
forestry) from the land retaining a fair balance between agricultural and non-agricultural uses based on the following principles:

1. land must be used according to its inherent potential and carrying capacity;
2. allocation of land to suitable uses whether for forestry, agriculture, urban expansion or other activities, should be regulated by an overall land-use plan, prepared on the basis of both the natural potential of the soil and the anticipated future development need of nation;
3. implementation provisions regulating the land-use planning process, the legal framework and authority for planning decisions should be vested with a National Authoritative Body with the authority and ability to override sectoral interests;
4. soil conservation practices should be based both on technical (mechanical and vegetative) means, and direct farmer participation.

The essences of those principles are in line with the Basic Forestry Law No. 5, 1967, and other forestry regulations concerning rehabilitation of critical land, regreening, reforestation and soil and water conservation. Therefore an active role of the Ministry of Forestry in formulation and application relates to the fact that current land-use in Indonesia mainly concerns forest.

According to the Explanation of the Basic Forestry Law of 1967, a general plan for forest resources development and conservation was prepared, in which forests were classified as:

- protection forest, being mainly forest on steep/slope or higher elevations, which must be protected for soil and water conservation purposes;
- production forest, being those to be used for timber production;
- reservation forest, i.e. nature and wildlife reserves; and
- conversion forest, being forest area considered suitable for eventual conversion to non-forest uses.

This forest classification was realized out by implementation of Forest Land-Use by Consensus (TGHK) on 1984, as indicated on the maps of that scale 1 : 500,000.

The criteria of that TGHK are in line with the principles suggested by FAO-UNEP (1994). The maps of TGHK can be used as primary base for National Land-Use Plan (especially for the lands under forest), but further implementation at provincial levels and district level, and also mapping need to be done on the basic of topographic maps at 1 : 100,000 and 1 : 50,000 in order to have better information. This mapping has to be followed by demarcating the mapping unit on the field and to be supported by law enforcement.

4.4.2 Enhancing detailed demarcation of production forest units

The areas of the production forests are indicated in the allocation of forest land-use according to TGHK system. The management of the production forest units is carried out by Forest Concession Holder, both

privates and State Enterprises. Each Forest Concession has a defined area. Recently the areas of concession are mostly delineated on a map with inappropriate scale and demarcation of the concession area is unclear. These conditions cause some disputes and illegal forest management practices.

To avoid those problems and to endorse sustainable forest management practices, elaboration of detailed demarcation of concession area on the field has to be enhanced. This way, the area of concession has clear boundaries. The boundaries should follow natural terrain features to make recognition in the field easier, and be delineated on topographic maps at the scale of 1 : 25,000 or bigger. This activities should be carried out by the Ministry of Forestry (the Directorate General Forest Inventory and Land-Use) in collaboration with Forest Concession Holder. Permanent concession area, which have been demarcated and mapped, need to be legalized by the Minister of Forestry Decree.

4.4.3 Improvement of natural forest management

Recently management of natural forest is held by mostly Selective Cutting and Planting System (TPTI). In the application of this system, there are still some difficulties, due to the following reasons:

1. planning is done, based on inappropriate map;
2. data of increment of commercial species are still rare; hence the cutting rotation cannot be planned based on rational basis; and
3. the Annual Allowable Cut is determined based on the rough forest inventory and total concession area.

Related to that problem, improvement of the natural forest management is needed by harmonizing concept and practices of TPTI, with the uniqueness of the ecosystem. This program can be done by the following facts:

1. study on increment values of species (especially commercial species) on their ecological units in order to have a rational basis of the cutting rotation time;
2. the concession area should only be designated in production forests;
3. Annual Allowable Cut should be based on detailed forest inventarization;
4. planning should be based on topographic maps with an adequate scale in order to have a better reference of spatial land form image. The suggested scale of the topographic map is 1 : 50,000 or bigger for Five Year Working Plan (RKL), 1 : 20,000 or bigger for Annual Working Plan (RKT) and 1 : 5,000 or bigger for road construction;
5. the protection and conservation forest in the concession areas should be clearly delineated on the map and demarcated on the field;
6. the period of forest concession area in the conversion forest has to be different with the permanent concession area; whereas the period of permanent concession should give better conditions of infestation (maybe 60 years or more).

4.4.4 Enhancing industrial forest plantation programmes

Industrial Forest Plantation (HTI) program is one of the reforestation programs. It is designated to satisfy wood demand for forest based industries. Recently the major part of wood supply still originates from natural forests. Therefore deforestation on the natural forest is still going on.
The objectives of HTI establishment is not only to produce wood to satisfy the industries demand, but also to rehabilitate the unforested and unproductive forest lands, to expand the employment opportunities and business opportunities and to improve the biosphere conditions.

Reforestation rate, mostly due to HTI establishment, is only about one-third of the deforestation rate (Pratiwi, 1996). Therefore the Industrial Forest Plantation programs should be enhanced.

Problems of the HTI establishment are mostly related to the following issues.

1. determination of forest plantation purposes is strongly related to the prospect of forest based industries and forest product trade;
2. species choice is related to the purposes of forest plantation and the characteristics of the species, meanwhile the information of the species characteristics is still limited;
3. plantation management;
4. forest plantation establishment needs large amount of investment with long term return;
5. availability skilled labors;
6. type of land allocation; and
7. concession incentives.

Regarding to those problems the HTI programs should concern to:

1. strengthen the development of a sound forest based industry;
2. improvement of forest product trade, including its institution and regulation;
3. establishment of information systems to provide adequate information and prediction of forest products, species characteristics and other information in order to attract investors;
4. research and development support for species characterization, genetically improved planting material, improved nursery practices, fire protection, plantation management, etc.;
5. strengthen education and training, especially related to forest plantation management to produce skilled employment, and improvement of income and accommodation and public facilities in the plantation, in order to attract employment;
6. encourage investment from national and international banks and other institutions besides Reforestation Fee (DR) and Annual Country's Budget (APBN), to provide sufficient fund for supporting Industrial Forest Plantation programs;
7. clarification of land status (related to 4.4.1) in order to have a strong basis of long term planning; and
8. incentives including long term leases, appropriate tenure arrangement, subsidy, tax remission, etc.

4.4.5 Enhancing social forestry programs

Social Forestry programs are mostly very important in areas where population pressure is significant, because in such conditions, encroachment of forest resources is inevitable and ultimately causes watershed deterioration, etc.

These programs have been carried out since late 19th century, especially on Java. There are various culture systems related to Social Forestry, and some positive impacts, especially related to social-economic and environmental impacts have been realized. Nevertheless some problems still appear during the implementation of the program. They are mostly related to the following points:

1. dissemination of the culture systems is slow, because the pilot projects are carried out with top to down approach. As a consequence the activities are stopped when the project is finished;
2. weaknesses in planning and coordination, because these programs involve many institutions;

3. development of the culture systems, related to Social Forestry, is neglected, because culture systems are not mandated in forestry research; and
4. Social Forestry activities are stressed on Java, whereas on the outer islands problems concerning forest encroachment due to illegal people activities are also high.

Concerning those problems, Social Forestry programs can be enhanced by some activities:

1. beside the top to down approach, the bottom to up approach should be carried out in order to increase participation of the people in the community surrounding forests. Active involvement of the people in any activities from identification constraints, finding possible solution and evaluation of those solution is absolutely necessary;
2. coordination of related institutions is necessary in order to have an integrated planning, implementation and evaluation, and to avoid confusion among the people (participants);
3. research related to culture system should be encouraged, especially that one related to the uniqueness of geo-ecosystem, in order to strengthen the Social Forestry program. This activity has to be mandated to one research institution (such as the Forest and Nature Conservation Research and Development); and
4. the Social Forestry programs should be intensified on the outer islands in order to anticipate further forest destruction.

4.4.6 Strengthening control mechanisms

Programs to enhance sustainable forest management in Indonesia will not give significant results, if they are not completed by strengthening control mechanisms in any forestry sector. This control mechanism, carried out by the Ministry of Forestry, is considered still weak, because:

1. there is still limitation in number of personnel and facilities such as: transportation, accommodation, etc.;
2. there are some dependencies of controllers to the controlled site management (such as concession holders), especially related to facilities in the field;
3. low discipline of both government apparatures and management forest institutions; and
4. sanctions/punishments for the infringements of regulation are not implemented strictly.

Related to above reasons, strengthening of control mechanisms can be done by:

1. increased number of personnel and sufficient facilities for controlling activities, so that the dependency of controller to the controlled management site is weaken or eliminated. It can be done by strengthening staff and facilities of the Regional Forest Office (Kanwil); and
2. discipline of government officials as well as forest management institutions should be increased by strictly implementation of sanction/punishment for every infringement.

4.4.7 Improvement of criteria and indicators of forest management

Indonesia's forestry has proven a long standing concern to sustainable forest management, as indicated by management practices of teak forest and by laws and regulations related to forest resources, such as the Basic Forestry Law of 1967, the Basic Environment Law of 1982, the Law on the Conservation of Living Resources of 1990, etc. Therefore the content of Forest Principles Resources of Chapter 11, Agenda 21, as well as the Convention on Biological Diversity is in line with the concern of the Indonesia's Forestry. These documents indicate the need and the utility of internationally agreed criteria and indicators that demonstrate and characterize management, conservation and sustainable

development of all types of forests. In this respect, Indonesia as a member of the International Tropical Timber Organization (ITTO) has been actively involved in meetings of the International Tropical Timber Council (ITTC), the governing body of ITTO since 1990, to
determine criteria and indicators for the measurement of sustainable tropical forest management (Coto and Tarumingkeng, 1995).

Criteria are standard references for the measurement of sustainable forest management, while indicators are measurement devices to monitor the process. Therefore assessment and evaluation, using those criteria and indicators, require some data.

Realizing the need of criteria and indicators of sustainable forest management, the Minister of Forestry has issued Decrees No. 252/Kpts-II/93 and No. 576/Kpts-II/93 for management of natural production forest. According to those decrees, the criteria for management of natural forest include aspects of forest resources, sustained yield, conservation, social-economic and institutional issues.

Forest resources indicators:
1. forest areas which have been legalized as forest region;
2. inventoried forest areas;
3. guaranteed biodiversity in the forest region.

Sustained yield indicators:
1. documentation of history of forest management;
2. determination of rotation and "etat" felling according to forest potency;
3. determination of silvicultural system according to forest type;
4. arrangement of target and utilization of production according to variation of forest resources.

Conservation indicators:
1. determination of conservation areas in the natural production forest;
2. management of conservation area in the natural production forest;
3. environmental impact assessment (Analisis Mengenai Dampak Lingkungan or AMDAL) carried out according to the regulation;
4. intensive protection and conservation forests which are held continuously;
5. effective implementation of soil and water principles according to field and climate conditions.

Social-economic indicators:
1. employment absorption;
2. business opportunities;
3. improvement of people's prosperity inside and surrounding the forest;
4. contribution to national income.

Institution indicators:
1. agreement of forest policy with national laws and regulations;
2. organization at national and lower levels, established to guarantee the implementation of national forest policy;
3. long term, middle term and short term forest planning arranged at national and lower levels;
4. control institutions established according to the need;
5. researches carried out to support all aspect as indicated above.

More comprehensive criteria and indicators for sustainable forest management (Draft) have been proposed on 1995 by the Indonesian Eco-labelling Institute, a Non Government Organization (NGO) (Soeprapto, 1995). It comprises 5 criteria, 11 key elements and 28 variables. Each variable contains several indicators for the management unit. The criteria consist of:
- clear and secure land tenure;
- production and forest regeneration;
- financial rentability of the management unit;
- the efficiency of forest resource utilization;
- professional management.

Clear and Secure Land Tenure indicators:
- integration of traditional rights and property rights in the land-use planning and determination of permanent forest estate for the management units;
- implementation of inter-sectoral coordination in the determination of permanent forest estate and its security;
- institutional mechanisms in searching solutions concerning land-use conflicts.

Production and Forest Regeneration indicators:
- determination of Annual Allowable Cut (AAC), based on local specific conditions and growth site;
- improvement of institutional rules to stimulate forest rehabilitation and regeneration;
- strengthening law enforcement and increase of economic incentive in the implementation of protected plants and animals conservation;
- strengthening law enforcement and increase economic incentive to accommodate traditional rights and customary use of forest resources.

Long term Security of Forest Investment indicators:
- improvement of institutional rule to enhance business security of the management unit;
- improvement policy on regional income allocation, including for the local people.

The Efficiency of Forest Resources Utilization indicators:
- increase of economic incentive roles in minimizing logging waste;
- increase of economic incentive roles in waste utilization;
- increase of legal framework roles in achieving of environmental standards of all forest operations;
- increase of legal framework and/or economic incentive roles in the utilization of environmental friendly logging and rehabilitation technology;
- increase of legal framework roles in the integration of forest resources utilization between management units and local communities.

Re-arrangement of Forest Product Trade indicators:
- improvement of timber industry structure in term of supply-demand balance of logs;
- improvement of pricing policy;
- improvement step by step export trading system towards free market condition.

Increase of Professionalism in Forest Management indicators:
- increase of legal framework roles in the use of professional employees in forest management;

- increase of legal framework roles in the preparation of information as the basis for decision making.

The criteria and indicators as measurement devices are still being developed in order to have adequate tools to access and to evaluate sustainable forest management practices.

4.4.8 Environmental education program

Environmental education programs are important elements for disseminating ideas in sustaining ecosystems. Forest is an ecosystem and a very important component of regional and global ecosystems. Therefore education related to efforts in sustaining forest ecosystems and sustainable forest management is very necessary.

The most important environmental education components are education topics/materials, and public participation. These components should be oriented to the success in sustaining the existence of forest and implementation of sustainable forest management.

4.4.8.1 Topic/material

Topic/material of this education should at least deal with:
- importance of forest functions in the local, regional, and global ecosystems; including impacts of forest disturbances;
- richness of the forest biodiversity and their uniqueness of forest ecosystems in Indonesia;
- social, economic, ecological and spiritual values of forests for the people, especially people inside and surrounding the forest;
- awareness of forest conservation and protection;
- principles and techniques related to sustainable forest management, including techniques of assessment and evaluation of sustainable forest management, etc.

The education should be done at any social level, both formal and informal education systems with appropriate topic as suggested above. The packages should be compromised with the type of audiences.

Formal education systems, such as schools, universities, training centers, etc. are available for a long time. The message of those topics can be included in the existing curriculum.

At the field level, informal education has an important role, and normally deals with people with various levels of age and education, and culture background. Therefore it need a specific approach in order to have success in the dissemination of the ideas. According to Trihadiningrum (1995), human action approach is the most appropriate for informal education to encourage public participation. This approach is mostly suitable for dissemination of management techniques of sustainable forest management such as agro-forestry, etc., which deals with people inside or surrounding forest.

Those people are generally critical and have a very good environmental knowledge of their area. Therefore this forum should provide a two-way communication. In this way, it yields a compromise between the tutor and the learners. For example, the selection of tree species and variety of cash crops in agroforestry is to be decided by the people (farmers), because they know exactly what they need. They are also familiar with the characteristics of the land and the most suitable crops and trees to be planted.

In this stage, the people indirectly participate in the decision making process, which in turn produces a *creative action.* Purbo et. al. (1984) define *creative action* as the final stage of a process, which is based on the norms translated to an action through a suitable mechanism in institutional development. This creative action is stimulated by individual or group inner commitment for the achievement of a better condition. The growth of inner commitment is basically a public education process which supports a creative change in rural development programs.

The practical stage of technology transfer in forest culture technique (such as agro-forestry) can be carried out in a demonstration plot belonging to the people group. This stage triggers a positive competition among people groups, which stimulate each individual to apply the knowledge on his own area.

4.5 Monitoring

The performance of the forest management needs to be assessed and evaluated regularly in order to encourage better implementation of forest management and to have feedback for improvement of goals and programs of forest management. Ultimately records of the assessment results are needed for recommendation of forest product certification/eco-labeling.

Standard references as measurement devices of the management assessment are criteria and indicators of sustainable forest management which have been discussed in (4.4.7). According to Coto and Tarumingkeng (1995), the available criteria and indicators of the Ministry of Forestry version have been carried out to access 11 forest concessions on Sumatra and Kalimantan. Assessment on 53 forest concessions is planned for 1995, and 200 for 1996.

The official institution, suitable to do monitoring or assessment of sustainable forest management, is the Inspectorate General of the Ministry of Forestry, but in practice this institution is assisted by independent accessories recruited from academic staff of various universities, research institutes, NGO's, and others.

Concerning to forest product certification/eco-labeling, Coto and Tarumingkeng (1995) suggest that a key factor in the implementation of these programs is the establishment of an authoritative body for the issuance of certificates. The Indonesian Eco-labeling Institute (Lembaga Ekolabeling Indonesia - LEI), as independence institution, is designated to do so.

According to this institution, the mechanism and procedure on assessment of Sustainable Forest Management in eco-labeling or certification scheme in Indonesia will be carried out in three stages of screening processes. The three designed stages are aimed at increasing efficiency in the assessment. If the management unit cannot satisfy the requirement of the first stages, further assessment need not to be continued.

In a first screening, administration assessment is done for assessing the important document of concessions as an early prerequisite met by them proposing a request
to obtain certificate. The forest concessionaires requesting certification from LEI will have to submit documents concerning to the following items:

1. reforestation fee, forest - product fee and other taxes;

2. twenty years working plan, five year working plan, annual working plan, diagnostic study on village development programs, environmental management and monitoring plans;
3. aerial photo and landsat image interpretations;
4. financial report audited by public accountant;
5. increment of forest growth data collecting from permanent sample plots.
6. administrative reports on boundary demarcation; and
7. administration reports on road construction.

Second stage, technical assessment is to collect empirical data. It is based on the Sustainable Forest management criteria and indicators of LEI, but the assessment itself will be carried out by assessor, a third party acting as inspecting agency. The assessor will carry out the field data collection based on guidelines of methodology and data analyses prepared by LEI. Output from assessor's work would be an absolute value of each relevant data and relative value on indicators requested by LEI.

In the final or third stage, LEI will endorse an expert panel, which include stakeholder, that will evaluate the results of assessment carried out by the assessor team. Based on analytical hierarchy process, LEI will decide whether the forest concession meets the requirements for certification. Before final decisions, the results will be published in the national and local mass media aimed at attracting public responses. In addition, the results will also be given to members of the Eco-label Communication Forum. Both public and communication forum responses will be taken into account by the expert panel in reviewing the previous evaluation results. Based on the process, LEI then decides whether the concession will be certified or not.

4.6 The role of unisities and NGO's

Universities and NGO's are important elements in realizing sustainable forest management programs. The universities can provide significant roles in the implementation of the programs. They can give advice in monitoring data interpretation or assessment of sustainability of forest management based on suggested criteria and indicators. Moreover improvement of criteria and indicators can be done by collaboration researches with the universities. In addition the universities can provide skilled trainers for the implementation of education and training programs. Some universities, such as the Bogor Agriculture University, the Gadjah Mada University, Yogyakarta; the Mulawarman University, East Kalimantan; the Tanjung Pura University, West Kalimantan; the Cendrawasih University, Irian Jaya; etc, have some qualified experts which can be contributed in supporting sustainable forest management programs.

NGO's, which consist of professional, hobby, and interest groups, have been recognized by government and are promoted to support government programs in the management of the living environment. These organizations are potencies in organizing public education, assisting the local and national government in
forest management (such as LEI), doing researches (TROPENBOS), helping people
to convey their interest and objectives in formulation of forest policies (WALHI, SKEPHI, etc.).

5. Conclusions

Efforts in sustaining forest existence and forest management in Indonesia have been started since long time, but the success of these efforts is still to be increased by enhancing sustainable forest management. Further efforts are still needed in order to:

- improve formulation and application of land-use plan at any administrative level;
- enhance detailed demarcation of production forest units;
- improve natural forest management;
- enhance Industrial Forest Plantation programs;
- strengthen control mechanisms;
- improve continuously criteria and indicators for sustainable forest management; and
- enhance environmental education.

Development of a nationwide forestry database is urgent. That database should be managed in a computerized information system in order to make data entry, processing and retrieving more efficient.
Sustainable forest management requires a holistic approach due to the fact that it has a complex relationship with peoples and other development sectors.
Goals and programs of forest management should be updated from time to time based on the feedback of monitoring of forest management practices.
Assessment of sustainable forest management practices, based on the criteria and indicators, is needed in order to guarantee the sustainability of forest existence and forest production, and to fulfill the requirement of forest product certification/eco-labeling.
Improvement of criteria and indicators is necessary and should be based on systematic observation and research.

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