

Local Experiences in Indonesia

THE ENVIRONMENT AND THE ROLE OF TRADITIONAL KNOWLEDGE

A case of fair and sustainable "environmental management" by traditional Dayak communities*

By Matheus Pilin**

The experience and knowledge of traditional local communities in managing natural resources in traditional forest areas, practiced over generations, should be an example to us all. The following are examples of cases of traditional Dayak community sustainable forest management, based on customs that consider closely sustainability aspects.

1. **Farming Systems** (*hamuh, mih, uma, and ba lako*).

Among the Dayaks, the farming system is carried out wisely, with years of experience. A sub-ethnic group of the Dayaks, the Dayak Simpangk in Banua Simpangk-Ketapang, before opening up a forest area for farming, hold a ceremony called *nudok angko tautn*, to welcome the new agricultural year.

This tradition is held to request a sign from the Gods that their farming will be prosperous and not face disaster. This is then followed by *ngusok/nurutn tangor*, that is, a survey of prospective sites, requesting the permission of *Mendkedum Jembalang Tonah* and *puyaknggana*. *Ngusok nurutn tangor* is carried out to find fertile land, avoiding springs, honey-wood trees, resin wood and sacred sites.

Three days after conducting the survey, they carry out *pamonok*, that is, listening for the sounds of certain birds and other animals such as antelope, bears, turtles and scaly anteaters, to find out whether they have been given permission or not. If the sounds of these animals are not heard, then the land may be opened.

All the sub-ethnic Dayak groups pay close attention to the direction of the wind when burning the underbrush, to prevent the fire from spreading to other areas.

Certain groups are forbidden to farm on the peak of hills/slopes of mountains, so that the animals, medicinal plants and other natural resources in those areas are utilized in a sustainable manner. In other cases, they may only farm to 100m from the edge of a river.

2. "**Kebon Gotah Buah Janah**"

Traditional Dayak communities grow trees such as local rubbers, durian and coffee, growing complimentary crops alongside them. In this way, the community obtains multiple benefits:

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apart from the rubber, durian and coffee, they can also harvest vegetables, medicinal plants and so on.

3. Honey Trees

The honey tree is one type of tree that may not be felled or destroyed by the community, because, apart from having a socio-religious value, it also has a socio-cultural and communal value. The socio-religious value of the honey tree is usually stronger in sacred areas. The socio-cultural value is indicated during the harvest, through a special song sung as a person climbs the tree and in the equal sharing of the resulting honey between the heirs, even if they do not harvest the honey themselves. Because of this, the traditional Dayak communities protect, respect and revere these trees. Even if a honey tree is situated in the middle of a field, it still may not be touched. If this rule is violated, the person is punished according to customary law.

4. Traditional Protected Forests

The traditional communities have long had protected areas, called *tonah colap torutn pusaka*. These areas are protected and controlled traditionally. The general criteria for these types of areas are that they are: hills, mountains, contain many medicinal plants, flora, fauna and/or building materials. These areas have been determined and passed down through the generations, protected according to tradition.

5. Sacred Pools

Traditional Dayak communities not only have sacred areas on land but also sacred pools in rivers. For example, there are small pools within rivers that are considered mystical, full of various types of fish. Even if the current is weak, the river is low and almost dry, the fish still live. If there is a large flood that washes everything else away, the fish do not disappear. Places such as these are protected, cared for and respected, by not felling any trees nor farming around those areas and carrying out ritual ceremonies.

6. Reforestation

The *mokunt tonah* and *nungkat gumi* are ritual ceremonies carried out by the Simapnkg Dayaks in order to regenerate traditional forests managed by the community. The *nungkat gumi* ceremony is conducted every 7 years for 7 days and nights. Upon completion of the ceremony, all members of the community *pantakng ponti* for 3 days. Every member is prohibited from picking the tree crops, fishing within 7 bends upstream or downstream of their washing area, cutting or eating fresh game, whistling, partying, etc. There are proven cases where the land has become fertile, the plants grow well, the rivers are full of fish and the community interacts with nature, becoming closer to the land, after this ceremony is carried out.

The above cases describe how traditional communities, particularly the Dayaks in West Kalimantan, have a basic principle in managing natural resources and the environment in their customary areas. This basic principle covers: sustainability, collectivity, bio-diversity, subsistence and adherence to traditional laws.

Why does Environmental Degradation occur?

There are three main elements that, when together, cause environmental degradation. These three elements are environmental policies, the forest development concept and institutions.

The level of forest degradation is closely tied to development models centrally determined and orientated towards a capitalistic economy. The forest development concept has, until now, not paid attention to aspects of diversity. This is caused by a lack of understanding of among experts and cooperation with local institutions when creating traditional community participation as well as a lack of understanding of the social dynamics of traditional communities. Therefore, they tend to take shortcuts by utilizing formal organizations such as LKMD, Bina Desa and others.

At the beginning of the 1970s, forests in Kalimantan had not experienced any major degradation. Why? Because until then there had never been an excess of flammable material and the traditional communities had been disciplined in guarding, protecting and respecting traditional forest areas. After extensive exploitation of the forests by HPH, HTI, plantations, logging concessions and transmigration settlements, the amount of flammable material has grown. HPH leave behind leaves, twigs and dry branches on the forest floor, clogging up thousands of natural springs. HTI land clearing causes drastic changes in land structure. This is also the case with logging concessions and transmigration settlements, that have stirred up the rivers, making them muddy, unable to be drunk, uninhabitable for fish, etc. Is the air still clean? Is the large spectrum of life still intact? Does the knowledge, experience and wisdom of the local communities still exist? None of this can return if lost.

Supporting Policies

1. To support the implementation of community-based sustainable forest management, there are five prerequisites: (1) creating institutional mechanisms able to solve problems faced by traditional communities in developing local natural resources; (2) improving community certainty in developing a forest management system with a people's dimension and resting on community knowledge/experience and tenure rights to local agrarian resources; (3) giving full power to local institutions in natural resource management; (4) supporting local institutions, rather than creating new ones that only undermine local institutional functions and (5) limiting the role of experts and external institutions to supporting, rather than supervising.

REDUCING THE GOVERNMENT'S SCOPE OF AUTHORITY IN FOREST MANAGEMENT IN INDONESIA

By: Ade Cahyat*

Background

Based on recalculations of a forest production area of 46.7 million hectares, 30% of this area was declared 'deforested'. The calculations were carried out based on 1997-1999 Landsat image data. Whoever the people responsible for this deforestation, we can reach the conclusion that the problem is mainly caused by the failure of government forest management and control carried out.

Why is the government control function so important? This is because the government's scope of authority in forest management in Indonesia is too great, while the government itself faces many difficulties in carrying out its tasks, functions and authority.

Government's Scope of Authority in Forestry Regulations

The government's scope of authority in the forestry sector can be seen in Article 4 sections (1) and (2), Act No.41 1999, that is:

- (1) All forest within the Republic of Indonesia including all natural resources are controlled by the State for the greater welfare of the people.
- (2) *Control of the forest by the State as stated in section (1) gives the government the authority to:*
 - a. *regulate and organise all matters related to forests, forest areas and forest products;*
 - b. *determine the status of a certain area to be forest area or forest as not forest area; and*
 - c. *regulate and determine legal relations between people and the forest as well as regulate legal actions concerning the forest.*

From the above explanation we can see that the government's scope of authority covers forests, forest areas and forest products. According to the East Kalimantan Regional Landscape Plan, the size of state forest areas in East Kalimantan covers 70% of the total Province at 21.1 million hectares. Forests and forest products covers the entire region, both those within and outside the forest areas. We can thereby obtain a picture of the government's great scope of power and authority in this forestry sector.

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In the meantime, there are many problems the government faces in carrying out its functions and authority. At least three problems have been the cause of the government's failure in its functions of forest management supervision and control. They are:

- (1) The limited number of park rangers compared to the size of the forest itself;

According to Poffenberger (1999), the ratio of park rangers to forest in Indonesia is between 1:100,000 hectares to 1:300,000 hectares. From this data we can see that it is extremely difficult for park rangers to control an area as large as 100,000 to 300,000 hectares per person.

- (2) The difficulties park rangers face in accessing the forests;

The majority of forest areas in Indonesia still lack good roads and most access to the forests is by the rivers. As a result, it is extremely difficult for park rangers to carry out their tasks of supervision and control well. On top of this, the number of facilities in the form of land or water vehicles owned by the government (both the Forestry Department and the Forestry Regional Offices) are also limited.

- (3) Lack of incentive for park rangers to carry out their functions of forest management supervision and control;

The lack of incentives for park rangers to carry out their functions of supervision and control is caused by there being no direct relation between park rangers and the forest they protect. The sustainability or not of the forest does not directly influence them or their family's private lives as their daily lives are not directly related to forest resources. Because of this, the majority of park rangers do not have any direct concern to carry out their tasks of forest management supervision and control.

Power Sharing Opportunities in Forest Management between the Government and Forest Communities in order to Overcome Problems

From the three problems mentioned above, it is clear that it is extremely difficult to attain good forest management supervision and control if it is only the government conducting such supervision. For this reason, new policy alternatives must be found by giving institutionalized legal authority to the communities within and surrounding the forests so that they can function also as forest management supervisors and controllers.

At the moment it is fairly difficult to find community groups that have strong institutional mechanisms. This is caused by the village institutionalisation regulation carried out by the government through Act No.5 1979 concerning Village Administration. Yet Act No.22 1999 on Regional Governments has since replaced this law. Act No.22 1999 states that within the village administration there must be at least two institutions, one with legislative and the other with executive functions and open opportunities for the creation of other institutions in the village if required by the community. With a regulation such as this, it is expected that a *check and balance* mechanism will occur within village administration. Until now, this *check and balance* mechanism has been unable to run properly because the functions of the legislative institute were usually carried out by the Community Village Institute (LMD). This did not

function efficiently, as the Village Head was leader of the executive institution and also doubled as head of the LMD.

With an opportunity to strengthen the institutional mechanism at the village level as set out in Act No.22 1999, an opportunity is also opened up to hand over the functions of forest management supervision and control, including communal forests, to village administrations inside and surrounding the forests. In this way, it is expected that these supervision and control functions can be carried out efficiently and successfully because the village administration represents the communities directly concerned with sustaining the forest. The implementation of forest management supervision and control of communal forests can then be carried out through a communal supervision and control mechanism.

In order to increase the effectiveness of implementing these functions, the right to carry out these activities must be given to the institutions of communities that live in and around the forests through institutional mechanisms within the already improved village administration.

Background information

COMMENTS ON THE RESEARCH PAPERS CONCERNING THE PHILIPPINES

Ruperto P. Alonzo

I come to this forum wearing two hats. The first is that of an academic professor and researcher who participated in both a World Wildlife Fund-sponsored study on “Root Causes of Biodiversity Loss in the Philippines” and, more recently, the IGES study - in particular, aspects relating to the timber trade in the Philippines. The second is that of a government official for the past two years in our national planning agency, the National Economic and Development Authority (NEDA), where one of our oversight functions is to monitor environmental concerns.

Section 4 of Dr. Yamane and Dr. Matsumoto’s paper on “Structural Analysis of Forest Loss in the Asia-Pacific Region” discusses both proximate and underlying causes of forest cover loss, and I agree with the list of proximate causes that the paper identifies: export-oriented, unsustainable commercial logging; forest conversion for commercial logging; frequent forest fires caused by local people and the failure of industrial plantations. However, the paper offers the same list for root causes and here I would like to offer a few additions.

Root causes of forest loss in the Philippines may be grouped into two categories. Some of these factors are macro in nature and others are area-specific. Of the macro factors, some lie within the natural resources and environment (NRE) sector, others lie outside this field. Within the NRE sector, for example, the improper valuation of forestry resources may be said to be the root cause of massive commercial logging for exports that occurred from the 1950s to the 1970s. Forest charges were not high enough to reflect the true value of the resources. A related factor is the failure in the assignment of property rights to Philippine forests.

Outside the NRE sector, the demographic factor is certainly a significant root cause. The Philippines has the fastest population growth rate in the region. Rapid population growth has far-reaching effects on the environment. Population pressure in the rural areas has resulted in land fragmentation and increasing landlessness among the rural poor. Because of the slow growth of economic opportunities in urban areas, the rural landless often have no option but to encroach on forests, establishing shifting or permanent cultivation. Thus, population growth combines with poverty, slow economic growth and free, unregulated access to common-property resources such as forests and fisheries, causing immense damage to the environment. The situation has not been helped any by the slow implementation of the Agrarian Reform Program.

On the macroeconomic policy front, a repressed financial system up to the mid-1980s, coupled with a failure to check inflation, led to a high interest rate regime. These high interest rates favored early cutting of trees (so that returns on investment could be recovered faster) and discouraged reforestation (as the present value of returns to investment for this activity would be very low).

I mentioned earlier that there are area-specific factors as well, for clearly, as we look at the different major island groups in the Philippines, the amount of forest cover left varies across the islands. Palawan, because of its remoteness and inaccessibility, has the most remaining forest cover. The relatively poorer commercial quality of forest trees on this island has also proved a blessing from the viewpoint of forest conservation. Cebu, meanwhile, lost most of its forests during the Spanish conquest of the 15th to 19th centuries, when the Spaniards developed a shipbuilding industry on the island to provide ships for the galleon trade.

I also have some comments on the paper by Dr. Inoue et al., particularly on the concept of “community” versus “outsiders.” Sometimes there is a tendency for one to “idealize” or “romanticize” the situation. But in many cases, the community is not homogeneous. Social relations within the community may change over time. There may be significant in migration and out migration, changing the “face” of the community. Thus, we find social tensions developing in some parts of Indonesia and the Philippines. It is also possible for local leaders to

be co-opted by “outsiders.” The contrasting experiences of Banaue and Sierra Madre cited in the Inoue paper is an example of how no two communities are the same. Similarly, the NGO “community” is far from homogeneous, and not all NGOs are benevolent.

Of course, we conduct an assessment of the problems in order to attempt to correct them through policy, and the paper by Dr. Guiang defines the main objectives of forest management policy: (a) maintaining and expanding forest cover; (b) promoting equity in access to forest resources; (c) fostering biodiversity and (d) ensuring a sustainable supply of goods and services from forest resources. However, while it is easy to identify these objectives, it is not that easy to define policies that will lead to their attainment.

Nevertheless, I have no quarrel with the policy recommendations resulting from the different studies presented at this workshop. However, it would help for us to bear in mind that “government” may mean several things. For one, there is central or national government and there are local governments. In the Philippines, at the local level, there are provinces, municipalities and cities and barangays (villages). Even within the national government, there are different ministries or departments whose objectives or mandates may not necessarily be mutually supportive. For example, the Ministry of Agriculture may see its mandate as food self-sufficiency, which means land for cultivation. The Ministry of Housing and Urban Development would want more land for human settlements, while the Ministry of Natural Resources and the Environment would wish for more land to remain as forest.

Finally, I should note that policy-making is a complicated process. If we wish to change policy, it is not sufficient that we present what should be done; we should also point out how it should be done. For example, to institute policy reform, we have to ask ourselves: do we need new legislation by Congress, or would an administrative or executive order suffice? We have to go to the extent of drafting the law or the executive or administrative order and its implementing rules and regulations to ensure that the policy reform is the way we want it. We then need to conduct advocacy to ensure it remains that way. We must identify all stakeholders, both potential losers and gainers, and then we must identify compensatory mechanisms or safety nets for the potential losers in order to ensure equality and incentives for all to carry out the policy as intended.

DEFORESTATION, REHABILITATION AND PROTECTION OF FORESTS

--Comments on Indonesia --

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National Circumstances

Indonesia, which is located in the tropical belt, is the largest archipelago in the world and known as a tropical maritime country with a coast line 81,000 km long. It consists of 17,508 islands that stretch along the equator from a latitude of 06⁰08' N to 11⁰15'S, and a longitude of 94⁰45' to 141⁰05'E. It covers 3.1 million km² of territorial waters, and 2 million km² of land. When the Economic Exclusive Zone (EEZ) of 2.7 million km² is included, the total territorial area of Indonesia becomes 7.8 million km².

Indonesia's natural resources are among the world's richest, including hard-wood forests, flourishing fisheries as well as significant reserves of minerals, natural gas and oil. Although Indonesia covers only 1.3 per cent of the earth's surface, it includes 10 percent of the world's plant species, 12 percent of the world's mammal species, 16 percent of the world's reptile and amphibian species, 17 percent of the world's bird species, and 25 percent or more of the world's fish species.

Indonesia is currently the fourth most populous nation in the world, after China, India and the United States. The total population was 183 million in 1990, increasing to 191 million in 1994. The population growth rate was 2.3 percent during the period of 1971-1980, decreasing to 1.98 percent during the period of 1980-1990, and 1.66 percent from 1990-1995. It is projected that the total Indonesian population will exceed 300 million by the year 2030.

Indonesia was considered very successful with its national development program, particularly alleviating poverty. In the 1970's around 60 percent of its population (or some 70 million people) were in absolute poverty. By 1990, the number of the poor had dropped to about 27 million, or only 15 percent of the total population. In 1994 the figure dropped further to 25 million or 13 percent of the population.

Urban areas have been growing rapidly during the last two decades. Urbanization is highest on Java where nearly two-thirds of Indonesians live. In 1970, urban population was still less than 15 percent and subsequently increased to 22.4 percent in 1980 and reached 34.3 percent in 1994. It is estimated that the figure may reach 50 percent by the year 2020.

The recent monetary crisis that hit Indonesia in the second half of 1997 caused a lingering economic crisis and recovery is hardly likely to occur in the near future. The national economic growth dropped from the average 7 percent to less than 0 percent in 1998 and 1999 accompanied by a soaring inflation rate. This economic crisis has dwindled the financial capacity of most of the nation, government and private sectors alike, and Indonesian commitment to participate in climate change issues is now much determined by available external support.

Deforestation, Rehabilitation and Protection of Forests

As in many other countries, forests in Indonesia have economic, social, environmental and nation in general and particularly local communities. When these multiple roles are unbalanced, and one is prioritized over the others, forest sustainability is threatened. This has been the case in Indonesia over the past 25 years, where resource extraction and development pressures have affected large areas of forest. Overall, the National Development Planning Board (BAPPENAS) has highlighted the following pressures on Indonesia's forests ;

1. Population growth and distribution
2. Forest conversion for mining and plantation development
3. Disregard or ignorance of traditional land tenure and resource utilization rights
4. Transmigration programs
5. Industrial and agricultural pollution wetland forests
6. Degradation of mangrove forests due to conversion into aquaculture ponds
7. Direct over-harvesting of timber and other forest products
8. Introduction of exotic species

Various factors cause deforestation in Indonesia, but many are related to development and production issues. Figures for deforestation rates vary depending on the sources and method of analysis, but are estimated to be between 0,6 million ha per year (Dick, 1991) and 1.3 million ha per year (FAO, 1991). The World Bank (1990) estimated deforestation at 0.9 million ha per year, while the Natural Forest Inventory under the Ministry of Forestry indicates an average deforestation rate of 0.8 million ha per year (World Bank, 1994). Table 13.3. provides a summary of estimated deforestation rates.

Programs sponsored or encouraged by the Government, such as estate crops, transmigration and swamp development account for 67% of all deforestation. In several of these estimates, small-holder conversion of forest land for agricultural use is a major cause of deforestation. However, a distinction needs to be made between spontaneous migrants who cause a change in land use and traditional shifting cultivators who use and reuse the same area of secondary forests with long-term rotation cycles. The second largest cause of deforestation is commercial forest harvesting, mainly logging. The next most important cause of deforestation is forest fires, which damaged some 3.6 million ha of forest in East Kalimantan in 1982 and almost one million hectares all over Indonesia in 1987.

Although large forest fires are usually uncommon in Indonesia, particularly in the outer islands, the frequency is increasing.

An important feature of deforestation is the conversion of forest land for other development purposes. This results from demand for land for development and crop production, which has prompted the government to set aside 30 million hectares of convertible forests. Djajadiningrat (1992) estimated that some 12 million hectares of the convertible forests have been turned into agricultural lands and 4.8 million hectares into mining operations, thus some 13.2 million hectares of convertible forests remain. This conversion is termed 'planned deforestation' by MOF.

A major concern in forest conversion is the issue of how much forest should be converted. Other important issues are the purposes of conversion, how the lands are converted, whether conversion results in sustainable land use. The effect of this land conversion on poverty alleviation and employment generation, and the environmental impacts must also be considered. For instance, conversion occurs not only in lowland and dry hill forests but also in swamp areas that are ecologically more sensitive. Some 800.000 ha of mangroves, for example, have been set aside for brackish water shrimp pond development.

In REPELITA VI, it is estimated that permanent forests amounted to 113 million hectares. Of this, only 92,4 million hectares are intact, among which 46,1 million hectares comprise of production forest, and 18,7 million hectares of convertible forest. FAO (1991) concluded that even if optimistic long-term forecasts are used, by the year 2030 some 20-25 per cent of the forest cover of 1990 would be lost, mostly in production and conversion forests. Assuming the worst scenario, in which total deforestation is 800.000 hectares per year, while reforestation and rehabilitation fails substantially, Indonesia would lose another 5.600.000 hectares of forest by 2003 and 19.200.000 hectares by 2020. Again assuming the current forest cover of 92,4 million hectares, that would leave Indonesia with only 73.200.000 hectares of forest by 2020.

The above scenario can be avoided through forest rehabilitation, re-greening (covering lands outside forest areas) and reforestation (within forest areas) programs. By 1993, re-greening had covered some 4,4 million hectares while through reforestation, about 460 thousand hectares of new forests had been planted (REPELITA VI). In addition, over three million hectares of industrial timber estate has been established to increase forest cover and ease pressure on natural forests.

FAO / GOI (1991) estimated that, in the past, only 40 per cent of the reforestation and re-greening targets could be realized due to funding and human resource constraints. Also, the percentage of trees planted that actually survive needs to be established as monitoring of both programs is almost non-existent. The following statistics confirm the weak capacity for reforestation in Indonesia. Between 1989 / 1990 and 1993 / 1994, 278.213 hectares of INPRES reforestation was planned, but only 245.758 was implemented, and an OECF-assisted reforestation fund was used to plan 100.000 hectares of reforestation, but only 57,137 was realized, 46,800 hectares of reforestation was planned with the collected reforestation fee (DR), only 38,354 hectares was carried out (Statistik Kehutanan Indonesia, 1995). ICEL, an Indonesian NGO, estimated that only 53.000 hectares of land have been reforested each year in Indonesia since 1989.

Likewise, the role of industrial timber estate development (HTI) in increasing forest cover must also be analyzed with caution. Forestry Statistics (1995) show that between 1989 / 1990 and 1993 / 1994, only 1.052.356 hectares of HTI had been developed. In addition, HTI carries its own problems. Although the idea of HTI was originally to rehabilitate natural forest and provide alternative timber sources, the fact is that it largely plants exotic species in a monoculture system.

Thus it will face potential pest problems and actually decrease the biodiversity of the forests. While the government's policy is to establish HTI on degraded lands, the reality is that HTIs are

established in moderately degraded logged-over forest areas or even community forest lands, thus creating more harm than good in terms of biodiversity conservation.

Natural regeneration of the forest has not been seriously considered, although this process ensures the recovery of forest biodiversity. In some areas, moderately-logged forests can regenerate naturally in several years, as long as they remain relatively undisturbed. This natural regeneration has been practiced by traditional shifting cultivators, particularly by the Dayak people of Kalimantan, through the fallow system. At the national level though, such a process has not been attempted, particularly due to the tremendous demand for land for development and production. Logged forests are often quickly turned into plantation estates, industrial timber estates or small farms.

In terms of forest protection, the government has set aside almost 25% (49.6 million hectares) of its land area as “totally protected areas” (TPA). This consists of protected forests (30.8 million hectares) and conservation areas (18.8 million hectares), including national parks, game reserves, hunting parks and grand forest parks.

Protected forests are areas that protect the surrounding regions in terms of water management, flood and erosion prevention and maintenance of soil fertility. Conservation areas are regions with unique ecosystem, flora and/or fauna.

The sustainable management of protected areas encounters several constraints such as lack of public participation, lack of a management framework, shortage of human resources, an inconsistent policy framework, the need for regional income, insufficient funding and lack of law enforcement. In addition, not all the areas designated as protected forests are forest-covered. Because of a demarcation problem, some reserves even overlap with timber concessions (MoF, 1995, FAO/GOI, 1991).

Another important issue is the conflict between protected areas and local communities. In the past, reserves and national parks were established by removing the access of local communities to forests. This led to illegal encroachment upon the forests, resulting in even more damage. The 1990 Act on Conservation of Living Resources and their Ecosystems attempts to overcome this problem through a provision to establish buffer zones in protected areas where controlled harvesting of forest produce may be conducted by the communities. Alternatively, buffer zones may be used for production purposes by the community, through tree plantations or agriculture.

Thus the purpose of buffer zones is to prevent encroachment on protected areas by providing areas of production to be used by the community (FAO/GOI, 1991). This might work to a certain extent, but law enforcement is often weak and buffer zones are sometimes ‘rented’ out to outside companies for commercial purposes, thus undermining their original objective.

To sum up, sustainable use of forest biodiversity for food, medicine, cosmetics and ecotourism may become a tool for forest protection in the twenty-first century, which may secure the 49 million hectares of TPAs remaining and encourage natural regeneration of the forests. On the other hand, only if the rehabilitation target of 3.6 million hectares by 1999 is achieved can forest

cover be increased as envisaged by Agenda 21. However, in order to achieve this, several measures and changes in policy are definitely needed.

Another important aspect of Indonesia's forest management is the inadequate capacity of forest rehabilitation and conservation, as well as inadequate supervision of natural processes of forest regeneration. The reforestation rate is far below the rate of tree removal. Reforestation has also concentrated on exotic tree species rather than indigenous species. In addition, except for rattan and certain commercial fauna, not much effort has been spent on the rehabilitation of non-timber forest plants and forest animals. Although in terms of area, protected forest zones may be adequate, lack of management skills, inter-agency coordination and public participation are currently threatening the viability of national parks, reserves and protected forests.

Equitable sharing of benefits from forestry operations is also a crucial issue. The FAO/GOI Forestry study in 1991 estimated that about 12 million people live within and near the forests, although many more may depend on the forest for their livelihood. In most cases, the needs and views of local communities have not been taken into account before forestry projects are implemented, leading to conflicts and further encroachments. Policies such as social forestry in forest plantations of Java, or the "HPH Bina Desa" (Village Development scheme to be undertaken by logging companies), are based on good intentions but lack the appropriate structure and implementation.

For the local communities, the forest is not merely a source of food and income, but of knowledge and culture as well. Many of the diverse cultures among indigenous groups in Kalimantan, Sulawesi, Irian Jaya and Maluku have a special affinity with the forests. With this cultural development, knowledge about the ecology and sustainable use of the forest is generated, and is of high value today in terms of biodiversity management. For instance, at least 6.000 indigenous plants and animal species are used on a daily basis by Indonesians for food, medicine, dyes and many other purposes (BAPPENAS, 1991). Equitable sharing of benefits would ensure the preservation of this knowledge which would, in turn, help to ensure sustainable forest management.

Finally, legal structures, law enforcement and human resources are inadequate in the forestry sector. Overlapping and inconsistent laws exist such as between the Agrarian Law, which recognizes traditional laws (*hukum adat*) and the Forestry law which does not recognize traditional laws. Similarly, forestry personnel lack knowledge and skills for sustainable forest management and research capacities are still weak.

Demands for forest products and services will grow in the future, due to population increase, better living standards and free trade. Free trade, for instance, will demand more relaxed regulations to ensure flows of goods and services, perhaps at the expense of environmental measures. International and domestic demand for timber and other forest products will increase as forests dwindle and populations grow.

Indonesian forests will also increasingly become a global concern, affecting regulations and management in Indonesia. In this context, the foundation for international cooperation has been set in Indonesia through many projects. In 1989, for instance, Indonesia began a series of

forestry sector reviews, in cooperation with FAO and the World Bank, which led to the finalization of the Indonesia Tropical Forest Action Plan in 1991. As a member of the International Timber Trade Organization (ITTO), Indonesia has a number of projects supported by the ITTO, it is also a member of IUCN and party to CITES. Several bilateral and multilateral forestry projects are on-going in Indonesia, in the fields of human resource development, sustainable forest management research and community forestry. Indonesia also hosts the Center for International Forestry Research (CIFOR) in Bogor and is actively involved in discussions of the Forest Principles under the Commission on Sustainable Development. Indonesia is also party to the UN Convention on Biological Diversity and hosted the second meeting of the Conference of Parties (COP II-CBD) in November 1995. Indonesian has also ratified the Framework Convention on Climate Change (1994) and is considering ratifying the Kyoto Protocol.

These international commitments are important as Indonesia tries to face the challenges of achieving sustainable forest management. In addition, various measures and actions are needed at the national level to achieve the objectives of sustainable forest management (SFM). In reality, there are many definitions and indicators of SFM, ITTO, for instance, states that: "Sustainable forest management is a process to manage permanent forest lands in order to achieve one or more clearly stated objectives in relation to desired yield and service production from the forests continuously while minimizing the undesired physical and social environmental impacts" (Coto and Tarumingkeng, 1995).

The Indonesia Ecolabelling Foundation (LEI) defines SFM as: "a form of forest management that is characterized by "sustained yield," as indicated by a guaranteed production and maintenance of ecological, socio-economic and cultural functions of the forest for the local communities" (LEI). The definition of sustainability can also be borrowed from the definition of the Asia Pacific 2000 program on sustainable cities, which is: "a forest production which is economically productive, socially just, environmentally sustainable, politically participatory and culturally vibrant". Based on the above definitions, the general objective of the Indonesia Agenda 21 for the forestry sector is to restore and maintain the economic, ecological and socio-cultural functions of the forest. This is in line with the goals for forestry development for the second long-term (25 years) development plan contained in REPELITA (Five-Year Development Plan) VI, namely, the realization of the balanced functions of the forest as a resource for development and a life support system, operating in a sustained and efficient manner, to support sustainable development.

Like the definition, there are various concepts and indicators for SFM. The ITTO Expert Panel, for instance, put forward the following elements to indicate sustainability (Coto and Tarumingkeng, 1995) :

1. A continuous and sustainable flow of yields in the form of timber and other services from the forest.
2. Maintenance of high biodiversity within the framework of integrated land use planning in protected and conservation areas.
3. Maintenance of a stable forest ecosystem.

4. Enhancing positive impacts while mitigating the negative impacts caused by forestry activities.
5. Enhancing participation of local people while solving disputes in accordance with local customs.
6. Accommodating land use changes that may occur in the future

LEI provides the following brief indicators for SFM (LEI):

1. In terms of the sustainability of production, it is the security of resources and guaranteed production.
2. In terms of the sustainability of ecology, it maintains life support systems and biodiversity.
3. In terms of the sustainability of socio-cultural functions, it includes guaranteed access to resources; recognition of traditional rights; security of forest utilization by the local community and guaranteed community participation.

National Greenhouse Gas Emissions – Overview

Indonesia has developed an inventory of the most significant greenhouse gases for 1994. Greenhouse gases included in the inventory are CO₂, CH₄, N₂O, NO_x, and CO. Most sectors considered IPCC are covered in the inventory. In developing the inventory, the 1996 IPCC Methodology was used.

The accuracy of emission estimates of GHGs from the atmosphere largely depends on the availability and accuracy of activity data and emission factors. Among the three main sectors (energy, agriculture and forestry), forestry is the sector with highest uncertainty, whereas energy sector has the lowest. In the 1990 inventory it was reported that Indonesian forest was a net sink, however, with improvement of activity data as well as emission factors, the Indonesian forest has become a net emitter. However, the magnitude of the net emission still depends on assumptions used in defining area of logged-over forest under the growing stage. Since the forestry sector is a significant contributor to emissions and removal of carbon dioxide, the reliability of activity data and emission factors for this sector need to be verified and improved with more measurements.

In 1994, Indonesia was a net emitter. Total CO₂ emission amounted to 748.607 Gg. With the assumption that only one third of logged-over forest areas and agricultural plantations was recovering, total CO₂ removal from Indonesian forests was 52 percent of total emission. Thus, in 1994, net emission of CO₂ was about 382,881 Gg. Furthermore, total emissions of CH₄, N₂O, CO and NO_x were about 6,409; 61; 11,966 and 928 Gg respectively. The main source of CO₂ emissions was from the forestry and energy sectors. These two sectors contributed to about 97 per cent of total CO₂ emissions. CO₂ emissions from the forestry sector was mainly caused by burning of biomass during forest and grassland conversion activities.