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RESEARCH AND EDUCATION TO SUPPORT THE SUSTAINABILITY OF FORESTRY IN INDONESIA

Dudung Darusman
(Lecturer and Dean of the Faculty of Forestry, Bogor Agricultural University)

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Abstract

This paper will show, firstly, a growing importance of forestry as an economic sector, while at the same time, also a growing problem of deforestation and forest degradation in Indonesia. The problem has not only caused by the weaknesses in forest management practices, but also by landuse competition with others sectors, such as agriculture, setlement, mining and industry. Therefore, it must be all sectors and all professionals concern. Foresters have to make forestry competitively more profitable and beneficial to all people, so it is not rational for the people to convert forest land to non-forestry landuses. While, non-forestry professionals have to develop land saving technology and management, so it can leave more part of the land to be covered by forest. For the forester, this paper proposes some relevant efforts to face the problem, which have to be supported by relevant research and education.

FORESTRY IN THE INDONESIAN ECONOMY

According to Forestry Landuse by Concensus (1982), forest research in Indonesia which covered about 75 % (144 million hectars) of the land area, was classified into : protection forest 31 million Ha, conservation forest 19 million Ha, production forest 64 million Ha, and conversionable forest 30 million Ha.

Since the beginning of Development Era, in 1970's, forestry in Indonesia has shown a very important role and contribution to the national economy. The FAO Team who worked for the Ministry of Forestry had studied the role of forestry in Indonesia. The report, which was published by the Ministry of Forestry (1991) shows that during the last 25 to 30 years, forestry in Indonesia has undergone rapid changes.

In the early sixties, timber production was confined mostly to teak plantations in Java and limited number of valuable species in the more accessible natural forests of the Outer Islands. Since then, the major scene of forestry actvities has moved from Java to the Outer Islands. During the period, annual log production increase from 1.4 million cubic meters in 1960 to 31.4 million cubic meters in 1989, originating mostly (about 96 %) from natural forests.

Forestry has become particularly important for foreign earnings in Indonesia. Export earnings from forest products has reached about US $ 4 billion in 1989 (about US $ 6 billion in 1993). In 1987, the share of forestry in total foreign earnings was about 16 %, or about 27 % of non-oil exports.

The study also shows that forestry together with forest-based primary and downstream industries, is an important sector in Indonesia economy even without taking into account the various non-market benefits arising from forests and forest activities. In 1987, forest management contributed 1.2 % to Indonesian GDP (Gross Domestic Products), and the forest-based industries for another 1.5 %, bringing the total for the forestry to 2.7 %. In the same year, agriculture and fishing contributed 25.5 %. In 1987, forestry and forest-based indusries contributed approximately 1.2 % to total employment. At the meantime, the benefits from environmetal services provided by forests are seemed equally, if not more important.

SUSTAINABILITY OF FOREST AND FORESTRY

Along with the growing contributions of forestry to the national economy, it has been a growing problems and challenges in sustaining the forest and forestry in Indonesia. The problems are not simply about how to manage the forest, but also about how to manage the relative importance of forestry for all people in the country.

Sustainable forestry means an everlasting forestry as an activity or as an economic sector. It is about the existence of forest utilization or forestry business. It is about the management of regional and national development. While, sustainable forest means an everlasting forest as a resource or ecosystem, which is about the management of forest.

It will not be any sustainable forest without sustainable forestry. Of course, there will be no sustainable forestry without sustainable forest, but sustainable forest could be supported, pushed and protected by sustainable forestry.

The sustainability of forest landuse has been much misunderstood as merely a problem of technology and management of forest resource utilization, where most of the people believe that the decrease of forest resource, or deforestation, has been caused by unappropriate technology and mismanagement of forest resource. The fact shows that deforestation in Indonesia has been caused by some other factors, as reported by MOF (1991), as follows.

Table 17. *Annual Rate of Forest Landuse and Land Class Change in Indonesia (1982-1990)*

Factors	**Ha per year**	**%**
1. Development of estate crops such as rubber and oil palm	*160,000*	*12.2*
2. Transmigration and related infrastructures	*300,000*	*22.8*
3. Shifting cultivation	*300,000*	*22.8*
4. Normal forest fire	*100,000*	*7.6*
5. Foerst fire caused by unproper forest utilization (the case of 1983)	*378,000*	*28.8*
6. Illicit logging, spontaneous transmigration, mining, and others	*77,000*	*5.8*
Total	**1,315,000**	**100.0**

It cannot be denied that there are some unproper management of forest resource (i.e. forest management practices) done by forester (mostly are not real forester, but forest concessioners), but for sure it is not enough talking about forest sustainability without giving serious attention on the other 57.8 % threats, which caused deforestation in Indonesia.

To have sustainable forest may be simplified by having good forest management practices, at which harvesting as much as growing. But, to have sustainable forestry is something else. It has to fulfill a certain level of achievement in :

1. Business efficiency :
   a. Physical production : level of wastes,
   b. Economic efficiency : competitiveness,
   c. Financial efficiency : profitability.
2. National economic efficiency :
   a. Government earnings,
   b. National income and employment,
   c. Distribution of income, employment and business opportunities among people,
   d. Development and balance of industrial investment structure,
   e. Growth and balance of development among regions.
3. Maintenance of environmental capacity : hydrology, atmosphere, soil, etc.
4. Maintenance of biodiversity : availability of genetic resources for future utilization, and the welfare of future generation.

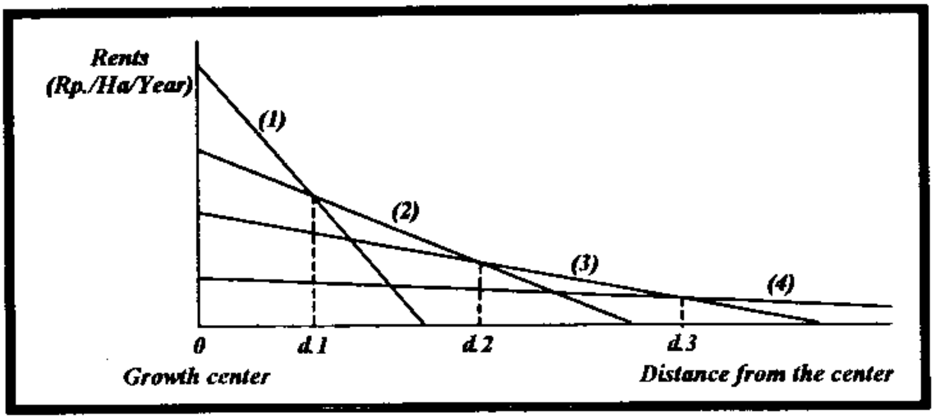
If the above level of achievement or the level of forestry efficiency are considered low relatively to other alternative landuses, on the eyes of the people, then the change of forest landuse to other landuses will be happened. The forestry will be no longer exists, because all people do not take care about doing forestry. They expect nothing (or at the least) from the existence of the forest. This is the situation which allow extinct the forest.

Do we think the people would like to destroy forest, if they do expect benefits from the forest ? On the other words, forest and forestry will always exists if it is superior to others, in term of landuse efficiency. On the other side, do we think that it would be successful to sustain our forest resource by guarding or policing it from people disturbances ? It seems to be believed that the people themselves are to sustain the resource by having their feeling of needs.

We can say that the sustainability of forestry in Indonesia is not only a matter of competitions between good and bad foresters, but also between forestry and other land uses.

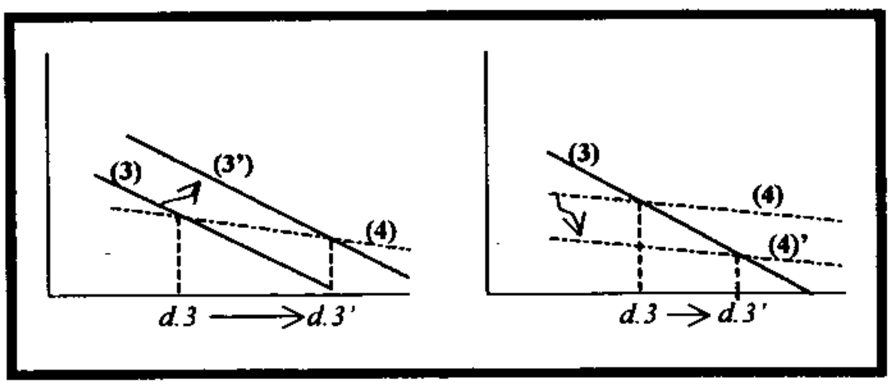
BASIC UNDERSTANDING OF LANDUSE AND ITS SUSTAINABILITY

If we believe that any regional landuse is set to achieve the maximum level of the society's welfare, then the basic concept of landuse must be based on the economic concept which measures landuse through its rentability of its possible alternatives of use. The optimum landuse must be the highest total rents created by a certain combination of alternative uses of the land. To understand this, we can look at the following graphs.

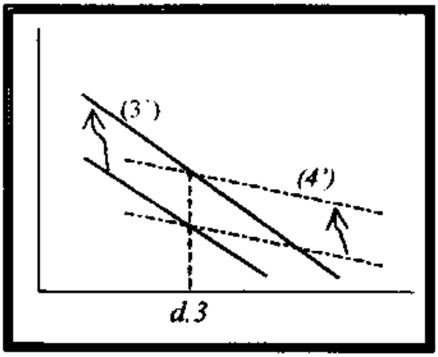


The graphs above tell us that a piece of land close to the centre of economic growth, at the distance *0 - d.1*, can be used by industries, setlements, agriculture and forestry. But, the best choice is industries *(1)*, since it gives the maximum rents. If we expand industry to the land outside *d.1*, this choice do not give the maximum rent, since it is lower then the setlement. So, the setlement *(2)* is the best choice for the region with the distance range between *d.1 - d.2*. We can explain the similar things happen in the region with distance range *d.2 - d.3* and beyond *d.3*, which are the best for agriculture and forestry, respectively.

We can understand that sustainability is the continuity of the border *d.1*, *d.2*, *d.3* and so on, among the corresponding alternative landuses. If for example, the economic efficiency of setlement increases, relative to agriculture, then the border *d.2* will shift farther to *d.2'*, and the agricultural landuse will shrink between *d.2' - d.3*. It will be also a case if the agriculture getting higher efficiency, relative to forestry, then border *d.3* will shift to *d.3'*, and reduce land from forestry. The same case also could happen if the efficiency of forestry is decreasing, for example due to unappropriate technology and unproper management practices, the border will also shift farther and reduce the land for foresrty.



To sustain the border ***d.1***, ***d.2***, ***d.3***, and so on, needs not only maintaining but also increasing and balancing the existing level of each landuse efficiency, such is shown in the next figure.



So, for practical purpose, the sustainability of landuse must be interpreted as : "the simultaneous and balance development among landuse efficiencies, which can increase the regional welfare, through increasing the total rents of all land use while maintaining the border between landuse".

		Forestry	
		developed	***stagnant***
Agriculture	***Developed***	*Sustainable and developed landuses*	*Unsustainable forestry*
	Stagnant	*unsustainable agriculuture*	*Sustainable, but undeveloped landuses*

On other words, the sustainability of the regional landuse can be achieved by promoting the efficiency of both non-forestry (agriculture, etc) and the forestry simultaneously. Therefore, maintaining the border between non-forestry and forestry ***at d.3*** does not mean a stagnation in both landuses, since the rents of both landuses are simultaneously growing in harmony.

ALL PEOPLE'S CONCERN AND RESPONSIBILITY

We believe already that the existence of forest resource is beneficial to human life, not only through producing forest products, but also by producing a very broad spectrum of forest services, including environmental services (air, water, soil, scenery, etc.) and biodiversity or genetic resources. It is all the people's concern to develop and sustain the existence and utilization of forest resources.

For example, it was a case in the northeren part of West Java, namely the Ujung Karawang region. It was in 1979 the study concluded to convert the mangrove forest into brakish water fishery (tambak), in order to enhance the income and employment of the local people. At that time the fishery productivity was still low, but potentially could be doubled by using appropriate technology and management without any extension of fishery land. So, it should be no need to extend fishery land by converting the mangrove forest. Now in 1994, the mangrove at the region totally gone, while the fish production in the area is declining and the clean water is becoming a serious problem for the local people. So, it is our responsibility, not only the forester, to do our best efforts to sustain the forest resources.

We will fail to conserve forest if we do not see the forest as an economic resource for the welfare of the people. As it has mentioned earlier, the forest in Indonesia has been a very important economic resource for the country's development. The forest which covers 75 % of land has given the second largest contributions to Indonesia foreign earnings, after oil and gas. While, the market of forest products and services seems to be batter in the future.

It is rational and realistic that conservation must be defined as a socially optimum utilization. What we mean with social is concerning all interests and needs of the people, of the present as well as future generations. We could not preserve our forest without using it, which should be more rational rather than an emotional approach. We know that we could not avoid our need for finance to do conservation it self, even just to guard the forest.

As it was mentioned before, the problem of conservation is a problem of land resource allocation among land consuming economic sectors, such as : agriculture, fisheries, animal husbandry, mining, housing, etc. It is our hope to have the economic sectors with less using land, such as high-tech industries, at which the people have wide and perfect alternative sources of in come so that allow the forestry growing. In the meantime, land consuming economic activities could be lessened through applying better technology and human resources.

Based on above frame of thinking, it may be concluded that the sustainability of forest and forestry basically could be managed, if :

1. The forestry is competitively more profitable and beneficial to the people, so it is not rational for the people to convert forest land to non-forestry land uses.
2. The other non-forestry landuses become more and more efficient in using non-land input factors, or more successful in intensification program, so it can leave more part of the land to be covered by forest, and also to ease the pressure of income earnings to the forestry sectors, which would mean to reduce the rate of forest exploitation to the sustainable level.

We can see that the second way is not the direct forester's responsibility. It is the duty of non-forestry professionals, which is about how to increase the productivity of existing land to produce other non-forestry products and services. So it is clear that the sustainability of forest and forestry is all party's responsibility, not only the foresters, such as mentioned in above example of the Ujung Karawang case.

To be more clear, the forester's own responsibility could be focused on increasing forestry efficiency in serving the welfare of the people.

RESEARCH AND EDUCATION TO INCREASE THE EFFICIENCY OF FORESTRY

Since the facts show that there has been a significant progress in non-forestry landuse efficiency relative to forestry, especially in using marginal lands, then it is very important and urgent for forester to increase the efficiency of forestry, or to increase the benefits could be captured from forest landuse. So that the optimum the optimum landuse would be at an equilibrium, which the forestry sustainably exists. On the figure 2 before, it can be shown by the optimum border at the former, or at least at the current one *(d.3)*. Such increase in forestry efficiency can be achieved through some kinds of effort, which should be supported by respective research and education, as follow.

1. To increase forest production efficiency, through applying appropriate technology and management scheme, which are not only in planting, tending and exploitation, but also in the processing of forest product. For example : the existing growth rate of Dipterocarpaceae, which is 1 – 2 m^3/ha/year could be improved by silvicultural technology to about 8 – 15 m^3/ha/year. While the survival rate of plantation could be increased about 1.5 times. Current exploitation wastes of about 50 % could be reduced to about 25 %, industrial waste can be reduced from 40 % to about 10 %, and so on. Research on the current level of production efficiency of forestry conducted by Darusman (1987) shows that the total efficiency was very low and could be increased about 6 to 8 times. Agroforestry is also one among appropriate technologies in forestry to produce better income for the people.
2. Rearrange the policy and institutional setting of forest resource utilization, which can allow more parties and more alternatives of use to participate in the forest utilization, and also can allow more competitive market of forest products to stimulate forestry efficiency.
3. Explore and find new forest products (good and services), such as medicinal plants, ornamental plants, ornamental fish, experimental animals, new breed of domesticated animal, recreational use, bioactive chemicals, and so on, in order to increase benefits captured from the same forest land.
4. Develop wide range of small scale forestry and forest product industry, especially in the region with marginal land condition, and traditional (close to nature) sosio-economic and cultural condition, which generally happen in the Outer Island of Java.
5. Realize and recognize the value of unidentified or unmarketed forest products (good and services), such as water yield, fresh and healthy air, traditionally and locally used forest products (fire wood, fish, fruits, leafs, birds, honey, animal skin, etc.) and so on.

   It is true that the benefit of forest resource for human life is quite much. The problem is the most people do not realize it and therefore do not calculate the so much forest benefit into their landuse optimization. For example, the case of Gunung Gede-Pangrango forest, which is gradually encroached and coverted into agricultural land.

   The 15,000 Ha forest area of the Gunung Gede-Pangrango National Park does not produce any wood product, since it is a concervation area, but serves recreation, water yield and traditional and local forest products, for the people surrounding the National Park, as well as for the regional people, such as the people from Jakarta.

According to researches conducted by Darusman from the Laboratory of Sosio-Economics, Faculty of Forestry in the years of 1991, 1992, and 1993, every hectar land of the National Park has given benefits about Rp. 270 million per year to the people in term of water yield (which is the most), recreation, traditional and local forest products, which is generally higher than the agricultural uses.

Realizing the higher rents compare to other alternative landuses of the National Park, it will be irrational for the people and decision markers to convert any part of the National Park into other landuses.

6. Change the attitude of people and decision makers toward modernization. Modernization shall not mean defeating the nature, but more clever in getting benefit from nature. It should not disturbing the nature ecosystem, but to reap more fruits from the ecosystem. Through such atittude, the people should not tend to convert forest land to other homogenous cultivations to get more and more homogenous output, but to get more but differentiated output from the existing but well managed forest land, including food, clothes, shelter, recreation, etc.

All above efforts in increasing the efficiency of forest landuse in Indonesia need a large number of qualified and commited human resources, and to increase such qualification and commitment needs research, educations and trainings, which must be given by the highly qualified and committed research and education institutions.

Basically, the new orientation of research and education should be focused on the improvement of forestry efficiency as it was mentioned before. The benefit of biodiversity of forest resource should be broadened and enhanced. This would mean that the people, especially the foresters, have to have multipurpose and sharp "sword" to combat their profesional challenges. To have such a good "sword", the foresters have to have good and strong understanding in basic sciences. It should be noticed that it is not rational to depend the importance of biodiversity without any basic understanding and efforts to make the biodiversity itself useful to human life.

The need strengthened basic sciences for forestry could be, firstly, in relation with exploring and exploiting new products and services from the forest and also to increase the forest productivity, such as : physics, chemistry, biology, and mathematics; and secondly, in relation with rearrangement of institutional setting in forest resource utilization, such as : micro and macro-economics, sociology, humanity and anthropology.

It was clearly mentioned in the Bangkok Meeting on Forestry Education, organized by the FAO Regional Office in 26 – 29 June 1990, about the need to enriched the forestry curricula by adding social sciences in order to make forestry closer to the people. But, it seems to be enough, we need to add also other basic and exact science in order to have broader and sharper look at the benefits that the forest can give to the people.

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