

## **Tropical Deforestation as an International Externality: The Property Right Issue**

**Endah Murniningtyas\***

*Negara berkembang sering disalahkan sebagai pihak yang melakukan deforestasi atau tindakan penembangan hutan-hutan. Negara maju kemudian mencoba untuk menghukum dengan memasukkan nilai-nilai lingkungan ke dalam nilai-nilai perdagangan. Hal ini telah menyebabkan sengketa yang berkelanjutan antara kedua pihak oleh karena negara berkembang sangat bergantung pada keuntungan yang berasal dari produksi komoditas utama, yang berasal dari hutan. Pada umumnya telah disetujui bahwa dalam penggunaan sumber daya alam sudah seharusnya juga diperhatikan dampaknya pada lingkungan baik dalam lingkungan domestik maupun lingkungan global. Peraturan lingkungan universal dan peraturan lingkungan yang disesuaikan dengan batas-batas di dalam perdagangan, di satu sisi, mungkin tidak bisa efisien dan efektif dalam menangani masalah lingkungan internasional, sehubungan dengan isu hak kekayaan intelektual yang berkaitan dengan keuntungan dari hutan tropis. Tulisan ini memberikan pandangan mengenai deforestasi dari sudut pandang Negara-negara berkembang serta menawarkan suatu nilai baru yang dapat diterapkan pada kebutuhan Negara-negara berkembang dan masyarakat global.*

*Kata-kata kunci: perdagangan dan lingkungan, (global) peraturan-peraturan lingkungan, serta hak-hak kekayaan intelektual*

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\* *Director for Food and Agriculture, National Development Planning Agency (Badan Perencanaan Pembangunan Nasional).*

## **1. Introduction**

Increasing tropical deforestation in developing country is a major concern of the global communities especially the developed countries. Deforestation contributes to global warming and also the loss of biodiversity. Developed countries claim that developing countries extract forest at the rate higher than their natural growth, and cause extinction of biodiversity and induce global warming. Meanwhile, the developing countries argue that they need their forest to finance their economic growth. The problem of deforestation, however, is not a new phenomenon. The issue is becoming more crucial today than decades ago because there is an imbalance between supply and demand. The increasing of population and people's income increase land clearing and forest harvest which reduce supply of pristine forest. Meanwhile, the forest use also increases and varies. The problem on forest was only on controlling the rate of cutting at the rate of forest growth (sustainable harvest). Today's problem is more complex i.e. to balance the forest use for variety purposes, such as: recreation, climatic function, biodiversity preservation and future uses.

Until today, there is no single agreed rule to set the right level of forest use and what method (rule) to control deforestation. The existing policy is to reduce deforestation rate by controlling timber trade through taxation, certification and labeling. These approaches, however, are considered as impediments, sanctions and discriminations toward developing countries. In addition, environmentalist thinks that those approaches did not succeed in reducing deforestation because there are other causes, such as: increasing of forest clearing for settlement and for industrial sites, which could not be controlled by trade policy alone. This paper attempts to discuss policy options to directly control forest use. This paper views that forest contains many components and each component needs different policy approach. Clear institutional setting on each component will help to find proper approach for possible universal rule on the use forest on each component and (in total) on forest use.

This paper consists of three parts. First part examines empirical

situation on deforestation to identify its causes behind the lack of agreed universal rule. Second part offers to view forest as a collection of components that have different characteristics. Third part discusses the proposed policy options.

## **2. Empirical Situations**

To control the rate of deforestation, we need to know the cause of deforestation. In understanding the cause of deforestation, we need to take a look at the deforestation pattern overtime. This pattern also helps to understand how one country has different "level of appreciation or valuation" on different component of forest. The later will help us to find the proper approach of forest use.

### **2. 1. Pattern of Deforestation**

Considerable attention has been focused on tropical forest, where deforestation most directly and imminently threatens the remaining reserve of biological diversity. While addressing deforestation remains critical, it is necessary to see the process from a global and historical perspective. Vast tracts of closed temperate and boreal forests were exploited and destroyed long before tropical forests were invaded. The peak of deforestation of temperate forest was before the 1950. Many original closed temperate forests of Western Europe and United States were depleted by the middle of the century (Environmental Defense Fund, 1998).

Today planted groves in temperate zones provide timber and forest cover, and they may take pressure off old-growth forests, but they do not contain the biological diversity of old-growth and may not provide the same ecosystem benefit. The tropical forest destruction began later. The pattern of deforestation both zones, however, is similar but decades apart. Forest area declines as it is cleared for agriculture, fuel wood, industrial and residential construction, and trade. Unexploited forests became scarce, as did unallocated or inaccessible forest tracts (Table 1).

**Table 1. Pattern of Deforestation**

Period	Temperate zone forest	Tropical Forest
1850-1900	Deforestation is high North America lost 17 million hectares of forest in this period.	Deforestation is low
1900-1950	Lost 15 million hectares due to: agriculture, fuel wood, industrial, residential construction and trade.	Deforestation is low
1950-present	Deforestation declines. Less than 10% of forest area in the U.S. remains undisturbed. Increasing forest is in secondary and plantation forest. All forests do not contain the biological diversity of old growth and may not provide the same ecosystem benefit.	Deforestation is increasing due to agriculture, fuel wood, industrial, residential constructions and trade. Level 6-9% on all tropical forest per year. Indonesia is about 1-2% per year.

Source: Making the Label Stick (EDF, 1997)

This deforestation pattern shown that it is not only happened in the developing countries in this century, but also was done by the developed countries when they are at the stage of developing their economy. It means that for any country, forest is the source of development fund. Every country uses forest to finance their development and as income increases, other sources of fund emerged and forest use as source of fund became less and lower in the composition of their country's revenue. As income increases, appreciation on other goods, such as low pollutions, esthetics use of forest and future generation also raises. As a result, their appreciation and valuation on many aspects of forest use increases too. In other word, demand of other forest product, which use to be only on limber is widely developed to other forest uses, such as for recreation, environmental use, ecotourism, biodiversity and its prospect and also the use of forest for water sources and water

management.

This developed countries society's demand on other forest uses has increased total global demand on multi use of forest which now is only supplied by the pristine tropical forest. Meaning that forest conservations serving consumers needs beyond the country, owners of the tropical forest. This is public goods characteristic. In other word there is good externality produced by conservation of tropical forest. Therefore, when the developing country has to preserve their forest they need to be paid the services they provide. If such payment does not exist, then the developing countries provide subsidy to the developed countries for consuming the tropical forest use. What level of supply needs to be provided by the developing countries and what price should they charge to the consumers?

According to Kindleberger (1986), to produce an international public good: a. we "need a positive leadership backed by resources and readiness to make some sacrifice in international interest"; b. System should run by rules not people. Using this, it is difficult to imagine that developing countries which are poorer than the developed countries has to sacrifice their needs for accommodating the developed countries interest. This will be subsidy from the poor to the rich. More over, global society is divided by country's boundary and different rules. Therefore, a global rule or a global market has to be established to enable transactions of these international goods. Application of global rule or market however faces at least two challenges. First, tropical forest lies in certain countries and there is a political boundary. Second, different country, applied different regulations, which may not compatible. Third, how to determine the right level and price of forest use?

## **2. 2. The Existing Instruments and Policy**

There are several existing measures applied to reduce deforestation and logging. These instruments are trade ban and boycott, certification, tariff and labeling (Table 2). Following the above descriptions, these instruments are clear, for several reasons: (i). Definition is too broad especially as we know that forest has many components. Application of this instrument will not result in

the right component and level supply; (ii). The instruments are not clear whether to control or regulate forest component, trade on forest product or forest management; (iii). The instrument needs specific information and data which may not available in every country, not to mention its availability uniformly. Therefore, the instrument will not be fair and adequate to control the utilization (or supply) for each forest component. Implementation of providing loan, grant, and debt swap from developed country to tropical country to preserve forest is also seen as influence/intervention of the developed country to the domestic matters in the developing country.

**Table 2. Existing Global Policies**

<i>Existing Policies</i>	<i>Objectives</i>	<i>Problems*</i>
Trade ban and boycott	To reduce wood trade and in turn deforestation.	Criminal approach. Objective is too broad and deforestation is not only associated with wood productions.
Certification	To address public concern on the management of forest resources by means of program that could simultaneously maintain the productivity and economic value of forest ecosystem, and address socio-economic concerns of parties interested in or affected by forest management. Examples: label seal licenses to producers or manufacturers and may appear on or accompany a product derived from certified forest.	Too many markets involved because definition is not clear, whether to control timber/wood, forest management, or to protect wildlife habitat and biodiversity.
Tariff on wood trade	Tax on traded wood and timber or tax on importers	It's good but tariff still carries burden of deforestation in general. Other non-wood productions do create external effects.
Labeling:		

a. Country of origin	Last substantial transformations carried out are known.	Environmentally no adequate information. Produce in A country, the origin is at B is not known.
b. Origin & species	Last substantial transformations carried out and species is known.	Environmentalists can check what species come from. It is viewed as new non-tariff barriers.

Source: Making the Label Stick (EDF, 1997). \*Emphasize and personal opinions are added.

### **2.3. Divergence on Existing Forest Use Policy**

Institutional set up on forest use is completely different between developed and developing countries. For some illustration, the following is a brief comparison on forest use policy applied in the United States and Indonesia.

In the United States, federal, state, local government and individual (person) own forest. The rule on forest property is the same as rules on any other properties. The use on forest, however, is bound by other regulations such as Soil Conservation, Water Conservation, Protection and Conservation of Wildlife etc. For the purpose of Conservation (Title 16), the uses of land and water for different purposes are ruled under this Title.

In Indonesia the federal government owns all forest. No forest use is allowed unless there is a right to use this forestry, which is given through licenses. This licensing practice is quite new in Indonesia. Before 1970, wood is harvested by state enterprises. In 1970, licenses were given to private enterprises to extract forest woods. The central and provincial (state) government determines which part of forest is used for what purposes and to whom licenses are given. Allocation of forest (national forests) for non-timber use such as protection of marginal forest (risk of erosion, natural fire), watershed protections, and wildlife (flora & fauna) protection is determined first and the rest of forests are used for productive purposes. The problem is that this allocation may be enough to meet domestic consumption but not enough to meet global demand.

## **2. 4. Political Boundary**

Political boundary actually is not a major problem in establishing an international rule, because several developed countries had made agreement on how to control emissions. One factor that makes emission control different from forest use is the attachment to land. For emission control, it is obvious that free air (atmosphere) has no boundary. To limit pollution on this clean air, every country has to reduce pollution into this air. For land (forest) use, the land itself belongs to the country where land lies, and land (forest) use has monetary values. International claim on this land creates obstruction to country's sovereignty and reduce country's opportunity to benefit from this forest land. This factor made that the single policy on international public goods produce by forest land is different from international policy to control global emission.

## **3. The Proposed Approach**

From the above explanation we can see that there is a divergence of regulations between developed and developing country. The problem is how to make them in harmony so that a universal regulation can be applied. Two fundamental factors/problems need to be established before formulating a universal regulation on deforestation:

- a. Forest is viewed as one good market.
- b. Segmentation into different local (country) market.

### **3. 1. Components of Forest, its property rights and market**

Existing international policy try to internalize externalities from deforestation through timber trade policy and banning trade on endangered species, which also implemented smoothly (agreed universally). These two approaches were not successful in assuring forest use for clean air, recreation and preserving biodiversity and future use. To make sure that production of these components satisfy domestic and global community's demand; forest use can be



decomposed into each use (output). By decomposing forest into different component and measures how each component is needed (demanded), then we can apply different policy on each component individually. If each component has different elasticity of demand, uniform policy (e.g. tax) will not lead to optimal solution, i.e. not cost efficient and do not induce the optimal level of production on each component. After decomposing the forest component, property right on each component needs to be established, not just on forests property right as a whole. By establishing property right for each component, supplier/producer can be identified and transactions can be established. This will induce market creation for each component and in turns stimulates/provides incentive on provision for optimal level of productions.

To decompose the forest use, we can see that forest produces at least two types of benefits (goods) to the community:

- a. *Tangible benefits*, e.g. wood, non-wood products, and recreation values;
- b. *Intangible benefits*: climatic function, wildlife habitat and biodiversity. In the short run these functions seem conflicting to each other. An increase in forest extraction reduces the use of forest for recreations, availability of biodiversity and reduces climatic function of forest (increase global warming). In the long run, however, they are complementary, for example better climate will support forest regeneration, when market for each component already established and functions.

### **3.2. What rights is associated with each component?**

*Tangible benefit.* Owning forest and use it to produce wood is associated with the (forest use) right to extract. The same case if forest is used to produce recreations, then owner has the right to use forest for recreations. These type of forest use (goods) are rivalry and excludable. These characteristics make markets for these two products are easily defined. Demand for wood is a derived demand from plywood industries, home constructions, furniture etc. Recreation demand is obtained from people willingness to pay (WTP) to visit the recreation sites.

Since both products have private good characteristic, the right associated with these goods is more obvious. Externality associated with these two activities/goods can also be identified and internalized relatively easy. Therefore, as long as forest use for these two goods do not produce any external effect, transactions on these two goods do not need to be taxed. Forest extraction should not be taxed unless it creates externality (e.g. produce smoke, hazardous material or any other pollution substance that will cause global pollution) and so timber trade. The same rule applies for transaction on recreations. In relations to inter-generations concern, as long as forest extraction is on industrial forest, there is no intangible benefit destroyed, and then internalization related with future generation right does not exist. By separating wood and recreations components from other intangible component, we can also distinguish the type of externality generated by each component.

*Intangible benefits: climatic functions, wildlife habitat and biodiversity.* These benefits (output) have international public good character for present generations and carry an inter-generations issue. Once the forest exists, it gives climatic function, provide wildlife habitat and biodiversity to everybody with no boundary; and also help maintaining forest existence for future generations. When we relate forest use with this type of benefits, what right is associated with them? The country where the forest lies politically owns the forestland. Its content, however, has an international public goods character. The right associated with these types of good then is the right not to extract forest, because extraction of forest means creating (bad) externalities to the whole world. This situation seems very simple when forest is owned and consumed by people in the same political boundary, for example federal and state government in the United State. It gets more complicated when they are divided by many political boundaries (countries). Producing countries claim that they preserve forest for these benefits at the amount enough for their people. The global community say is not enough. Any interference from global community on production of these benefits means interference on domestic affairs.

This problem could be reduced if we view these intangible

benefits as any other goods. Using simple economic logic, good is under-provided when there is not enough incentives (price is not high enough) for producer to provide the goods. The under provision of these intangible benefit then can be viewed as the problem of segmented markets i.e. because market is segmented (divided) in many (countries) locations that prohibit universal market rule.

### **3. 3. Segmented Markets**

Segmented market is not a problem for private good such as timber, because transaction on these goods will connect several segmented markets and brings an equilibrium price on every market. It becomes a problem when the transacted good is not a private good. The problem of segmented markets on these intangible benefits (as public goods) relates with at least three problems:

- a. The property right cannot be established across these political (market) boundaries;
- b. External effect is difficult to be internalized;
- c. Production based on WTP of people in one market does not reflect the community WTP.

We start from the problem of segmented market on WTP. If we view a country as an individual, individual preference may not reflect social (global) preference. WTP based on individual (country) does not reflect the community (global) demand for public goods. As a result, supply of this public good based on individual WTP is not enough to response to the community WTP.

Another problem is when there is an external effects, it is difficult to internalize the effect without any higher level of institutional set up, i.e. global market. Establishment of a global market will face two things: a. Need to established property right of forest component; b. Establish market for each component; c. Harmonization of a country regulation.

#### **4. Proposed Policy**

As described in the previous section, the basic problem of deforestation is that the forest area devoted to multi-functions of the forest use is not enough to serve global and inter-temporal demands. Since forest contains many components, first, disaggregation of forest component needs to be done. Second, for each component, property rights for each component need to be set up, so that we can determine who are the suppliers and consumers. Third, we should measure local and global WTP for each component, so that we can measure the proper level of supply and demand.

**Forest Component.** As describe before, forest components can be divided into: extraction and recreation; and climatic functions, biodiversity, wildlife habitat, extractions, and recreations. Forest extractions usually mean extractions for woods. This is the shortest and quick yielding activity, which lead to deforestations. The amount of trees to be cut should be at the rate of their growth. This is known as sustainable harvesting. Cutting at any rate above its growth is considered as deforestation and will not sustain the industry, both the forest and the lumber industry. This type of forest then is called as industrial forest. Recreation use of this forest is complementary goods when trees is still young and is a competitive good when trees are ready to cut.

To determine biodiversity function and wildlife habitat, we should identify the biodiversity content and wildlife in tropical forest. After these identifications, we can determine the forest area for these forest contents. This forest area then is ban for extraction. This forest content area is also can be use for recreations, so that it can provide direct financial value. The benefit forgone from forest extraction is compensated by the financial value from recreations use both from the tress and the biodiversity and wildlife reside in the forest.

*Property rights and physical area to be provided.* From the above forest component determination, the forest use for extraction is private property of the country. The area needed for industrial

forest is determined as L4 (Table 3). This area however is the amount of area to supply the domestic industry. To supply the global industry, wider area (G4) needs to provide and the forest area for this industrial use should be outside the forest which has intangible functions. Since the use of this forest for extractions do not creates any externalities to other countries. Country can not be charged for any use of these woods/logs traded in the domestic and global markets. This industrial forest also produces other revenue from its recreational use, both for domestic (L5) and global forest (G5). The use of industrial forest for recreational use can be used for revenue diversification, so that forest owner can determine the optimal age of trees for the most profitable cutting time. When price of logs is less than the cost, forest can be use for recreations, and when price of logs high, cutting can be done optimally. Since this use is private property and private rights of a country, trade on log and wood product can not be charged of any tax related with intangible use and benefits of this forest.

Measuring the forest area for intangible use is more complicated. We need to measure for domestic and global use and also for future generations. Sustainable use has intergeneration perspectives. First we should identify the biodiversity and wildlife lives in the forest. Data base for this can use the National Biodiversity Information Network (NBIN) developed by The Indonesian Science Institute (LIPI). The forest area identified as location of these biodiversity and wildlife should be preserve and left to be un-cut. What can be charged for this forest preservation? Some opinions say that it is priceless, means that that the value can not be measured because it has no substitute. When it comes to competitive use however, quantitative measures have to be done so that the appropriate policy to secure or not to secure can be applied rationally.

Table 3. Local and Global WTP

Proposed Solutions	Local	Global
1. Willingness to Pay/demand in US\$		
Climatic function	<i>A1</i>	<i>A2</i>
Biodiversity	<i>B1</i>	<i>B2</i>

Wildlife habitat	<i>C1</i>	<i>C2</i>
Extractions	<i>D1</i>	<i>D2</i>
Recreations	<i>E1</i>	<i>E2</i>
<b>II. Area required (hectares)</b>		
Climatic function	<i>L1</i>	<i>G1</i>
Biodiversity	<i>L2</i>	<i>G2</i>
Wildlife habitat	<i>L3</i>	<i>G3</i>
Extractions	<i>L4</i>	<i>G4</i>
Recreations	<i>L5</i>	<i>G5</i>

Assume that using current technology and based on the biodiversity data the location of biodiversity and other wildlife are known. The physical area of forest for these two uses then can be measured and determined. Suppose that total area is  $(L1 + L2 + L3) + (G1 + G2 + G3)$ . These two areas is the total area to supply both domestic and global consumptions, since the forest content or the intangible use of forest belongs to both domestic and global society. The right level of supply for the intangible use then is equal to the domestic and global willingness to pay. Any supply lower than the total WTP then considered as under supply.

This total area however has an opportunity cost for the country where this forest lies. If the country uses this forest area at the level of supply enough to fulfill the domestic willingness to pay, they are considered endangered the biodiversity and wildlife that belongs to the global society and the future generations. If the country do not use this and the global society did not pay their price (global willingness to pay), then the country owned the tropical forest can be considered subsidized the global society and the future generation in consuming biodiversity and wildlife. How can we put the right supply and demand so that we can be sure that the right and fair equilibrium is achieved?

Since we know the physical area from the technical data, then it will be fair if supplier provide the amount at the level of willingness to pay. If the willingness to pay is only paid by the domestic consumers, then the level fair to be provided is also at this level, that is  $(L1+L2+L3)$ . If the willingness to pay is paid in real term by both domestic and global society so that it match the total willingness to pay then the fair level of intangible use of forest is

also at  $(L1+L2+L3) + (G1+G2+G3)$ . Without any fair payment, then there is no base to say that a country consume more or provide less biodiversity, wildlife and climatic forest than what they should do. Without any real compensation or payment, a country will be considered subsidized the global society for providing good externality. When most tropical countries are developing countries, and most of them are poorer than the developed countries, is it fair that they subsidized the rich for consuming the intangible use of forest? Certainly, it will no be fair. How to determine the fair rate, and in what way the payment should be made?

*The Fair Price and Payment Vehicle.* The biggest challenge would be how the country owner is willing to let go part of forest for such purposes that reduce their opportunity to make money that is badly needed for the measurement, we put aside the competition between current and future generations.

The fair price or payment can be seen through two instruments, first is the willingness to pay (WTP) as the asked price from the domestic and global society as consumers, and second is offer price from the producers. These two prices have to come to an equilibrium rate for an optimal level quantity supplied.

WTP can be measured from through various techniques such as travel costs, hedonic prices both from domestic ( $WTP_d$ ) and global consumers ( $WTP_g$ ). Offer price from the producers can be measured from two components: a. Opportunity cost (OC) or benefit forgone from the forest use for intangible benefit; and b. Maintenance cost (MC) to provide such the intangible benefit.

Compensation for benefit forgone (OC) is the flow of income that this country may have if the forest is use for tangible benefit. Therefore  $OC = f1 * [G1 + G2 + G3]$ , where  $f1$  is income on per hectare of forest use for tangible benefits. Maintenance cost (MC) is annual cost to maintain the production of the component, for example is equal to US\$  $f2$  per hectare per year. The equilibrium quantity then should be at the level when asked price ( $f1+f2$ ) equal to offer price ( $WTP_d+WTP_g$ ).

*Payment mechanism.* Mechanism of this payment or transaction can be done directly or indirectly. Direct payment is the cash payment as transactions on any other goods. This transaction however cannot ensure that the intangible use of forest is provided continuously. There is always suspicious from both parties about certainty and continuity of their commitment. Therefore, a cost sharing from every country as member of global consumers should be charged. The level of cost sharing ( $C$ ) from each of  $n$  countries then is:

$$C = 1/n (OC+MC)$$

This cost sharing is paid to a general account, agreed by all countries. Each country pays  $C$  to a "general account" and the general account pays  $[(n-1)*(1/n)*OC]$  to the forest owner each year for compensation, and  $[(n-1)*(1/n)*MC]$  to the maintaining country strictly provided for maintaining productions of component  $(L1+L2+L3) + (G1+G2+G3)$  for the (domestic and) global community.

To incorporate a fair distribution of cost sharing, a weight ( $s$ ) to reflect the economic condition for each country could be attached. For example: use 10 scale index for income range of  $n$  countries. The index then is using a weight to get the cost sharing  $C$ . Adjusted  $C$  then is:

$$C = 1/n*s*(OC+MC)$$

Where  $s$ =scale is a fraction of a country income to the total world income or the level of percentile of income.

We can view  $OC$  as the minimum cost that owner is willing to give up the resources for global use, and  $MC$  is the variable cost of providing the "required" resources. Compensation payment can be given annually or (total) one payment. Annual payment gives: a. Possibility to adjust the value of forgone opportunity; b. Assurance that payment is used at the time when intangible use of forest is



delivered or conducted. The disadvantages is the possibility that producing country put new terms on the agreement, and maybe costly to conduct negotiations. One time payment (cash payment as mentioned above) will make current decision-makers agree to a huge payment. The disadvantages are: a. Can not guarantee that future expenses will be realized; b. Difficult to adjust if new situations occurred. *The Role of International Law.* Law is very important tools and based to realize the described policy. The form of legal rule/laws, both domestic and global which are in harmony is important to establish an agreed universal rule in formulating property rights, setting the agreed prices and also rules on payment mechanism. The existence of a single body to manage the global fund which plays objectively and transparently is also a key.

The above price instrument and its calculation are still need to be analyzed and determined accurately and fairly. The proposed mechanism and appointment or existence of a single body for managing this proposed global policy are also still need to be studied. The above proposed policy however can be used as starting point to separate the global trade rule on intangible use (goods) of forest transaction from the transaction of the tangible use, the timber trade. By using the proper policy the right level of forest for both uses can be determined rightly and fairly.

End

