A NOTE ON ECONOMIC DIVERSIFICATION OF AFORESTATION AND REFORESTATION IN INDONESIA[2)]

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Introduction

Indonesia commitment on climate change is ratified in Law No. 6/1994, which confirmed Indonesia commitment to United Nation Framework Convention on Climate Change, UNFCCC. Following this, several studies and committee national on climate change have been established to seek the mitigation potential and participate in Clean Development Mechanism, CDM and non Kyoto Mechanism. However, most of these studies refer specifically to energy sector, consequently, source of information and knowledge about mitigation strategies for LULUCF is still very limited and general.

Considering the large forest area need to be reforested and afforested, Indonesia need to promote climate change mitigation mechanism including CDM and others mechanisms.

In addition to reducing costs, economic diversification through product diversification is one of strategy for forest carbon project as benefit gain from carbon trading would not covered costs for establishing aforestation and reforestation projects.

Indonesian Land Use

The total territory of the Indonesia archipelago is about 780 million ha, of which about 191 million ha or about 57 per cent devoted to forests (Table 1), which form about 45 per cent of the tropical forest in Southeast Asia. Detail land use cover in Indonesia is shown in Table 1. The figure gives information on the apparent potential of land use for greenhouse gas mitigation activities for global carbon market.

The term forest in Indonesia' definition refers to an area dominated by a group of trees having height usually more than 5 meters, with canopy larger than 10 per cent (MoF, 1999). This definition is met forest definitions set by UNFCCC. Land uses including forest cover is a very dynamic issue.

Table 1. Land use cover in Indonesia, 2000

No	Type	Area (Ha)	% of total
1	Forest	10,8571,713	56.7
2	Wood land/agroforestry	8,905,200	4.7
3	Agriculture/paddy field	8,106,356	4.2
4	Plantation	16,543,663	8.6
5	Fallow land	10,260,492	5.4
6	Grassland	2,424,469	1.3
7	Shifting cultivation/wasteland/garden	12,768,711	6.7
8	Housing	5,131,727	2.7
9	Dyke/ponds	642,905	0.3
10	Mixed vegetation cover & others	17,922,705	9.4
	Total	191,277,938	100

Source: Central Bureau of Statistic, 2001

In addition to forest conversion for human activities, permanent and shifting agriculture, and development purposes, illegal logging and forest fire are two major causes of deforestation in Indonesia. The latter activities caused critical land. According to official data, critical land in Indonesia in 1990 was about 6.8 million ha with annual increment of about 1.7 million ha during 1990-2000 (MoF, 2001). This data increased significantly up to 23.7 million ha. Between 1990-2000 Indonesia has successfully rehabilitated 2.9 million ha through aforestation and reforestation activities. However, compared to the need for rehabilitating all critical land area, the number is far from sufficient. Furthermore, domestic funding currently available for land and forest rehabilitation was only about US $ 0.75 billion (MoF, 2001). This highlights the need and importance of implementing CDM and non-Kyoto projects in Indonesia.

Forest Carbon Projects

Forest carbon project in Indonesia can be group into three categories. First, conservation and forest management, including protection forest, enhanced natural regeneration or enrichment planting, and reduced impact logging. Second, sinks enhancement including reforestation, aforestation, timber estate, and agroforestry. Third, substitution of fossil fuel-based energy with biomass energy.

It is recommended that tree-based farming systems such as reforestation, aforestation, timber estate and agroforestry offer a sustainable alternative based on several aspects: (i) incentives to rehabilitate critical area, (ii) source of additional income for community, (iii) meet the need of household income for short, medium, and long term.

Incorporating Barriers for Designing Project Strategy

Barriers are unavoidable risks in any forest development project, which may discourage project proponents for forest carbon project due to unexpected changes. There are three kinds of barriers, i.e., technical, institutional and economics. Economic barrier involved access to credits and financial supports, low of benefits, market size, etc.

For example, an arbitrary measure of the cost of carbon sequestration was obtained by dividing establishment costs (at social prices) by the average carbon sequestered by each system. Although this may not be the true cost of providing an incentive for tree planting, it could be argued that a program that covers establishment costs would be attractive to smallholders. By this measure, the damar systems provide the lowest-cost per tonne of carbon sequestered (US$5.62/tC and US$7.45/tC for the traditional and semi-intensive systems respectively). Most estimates of the market price of carbon range between US$5 and US$25, and five of the six systems evaluated in Table 2 fall within this range, hence they could be attractive investments for carbon sequestration. However. These barrier will remain exists. Therefore strategy is needed to cope with.

Table 2. Carbon sequestration, costs and return to labour for selected systems.

System	Average C sequestered t C/ha	Carbon cost $US/tC	Return to labour Rp/pd
Rubber, traditional	19.8	11.76	6,481
Rubber clone	42.4	8.92	7,953
Cinnamon/potato	22.7	72.23	9,180
Damar traditional	102.7	5.62	11,706
Damar intensive	102.7	7.45	15,042
Oil palm	27.0	8.64	12,941

Note: an exchange rate of Rp10,000 per US$ was used.

Economic diversification is one of strategy to cope with risk and uncertainty. This could be done through multiple cropping involving short, medium and long-term species for different purposes, e.g., food, cash, and carbon.

Conclusion

Sinks activity through timber based planting is a means to rehabilitate large critical area in Indonesia. Economic diversification is an important strategy to cope with risk and uncertainty embody within forest carbon projects.