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REHABILITATION OF DEGRADED PEAT SWAMP ECOSYSTEM SERVICES AND CONSTRUCTION OF IMPLEMENTATION SYSTEM ON REDD+ SAFEGUARD

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INTRODUCTION

The Ramseur treaty on wetland conservation was concluded in 1971. Wetland forests in the tropics have, however, been experiencing drastic land-use change for easy access and utilization, which, together with tropical forest decline, has also been a focal point of global environmental issues. Rehabilitation of degraded wetlands has, nevertheless, hardly been attempted. LULUCF (Land-Use, Land-Use Change and Forestry) has been discussed as an agenda of IPCC since 2001. It is, therefore, urgently necessary to conduct research on land resource management option and local society empowerment for global-warming prevention in Southeast Asian wetlands. COP15 of Copenhagen Agreement proposed REDD+（Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (2009) and COP16 of Cancun proposed REDD+ with Safeguard (2010). Southeast Asia has the widest area of wetlands consisting of mangrove, peat swamp and freshwater swamp forests, with a distribution of 28.3 million hectares compared with 3.5 million ha in Africa and 5.2 million ha in Latin America (Page *et al*. 2010). Indonesia is ranked as the fifth country for highest emission of GHG including peat fire according to President Yudoyono. Therefore, this paper will be discussing on the REDD+ safeguard related to PES (Payment for Ecosystem Services). The Cancun Agreement reached a resolution on December 11 in Cancun, Mexico, during the 2010 United Nations Climate Change Conference putting emphasis on the way forward towards greenhouse gas emissions reduction and to help developing nations in protecting themselves from climate impacts and build their own sustainable future. When undertaking activities with reference to paragraph 70 of this decision, safeguards should be promoted and supported. Action has to complement or are consistent with the objectives of national forest programs and relevant international conventions and agreements. Therefore, this paper will discuss on the safeguards as follows; (1) Transparent and effective national forest governance structure, taking into account national legislation and sovereignty. (2) Respect for the knowledge and rights of indigenous peoples and members of local communities, by taking into account relevant international obligations, national circumstances and laws, and noting that the United Nations General Assembly has adopted the United Nations Declaration on the Rights of Indigenous Peoples. (3) The full and effective participation of relevant stakeholders, in particular, indigenous peoples and local communities, in actions with reference to paragraph 70 and 72 of this decision. (4) Actions are consistent with the conservation of natural forests and biological diversity, ensuring that actions with reference to paragraph 70 of this decision are not used for the conversion of natural forests, but are instead used to incentivize the protection and conservation of natural forests and their ecosystem services, and enhance other social and environmental benefits (5) Actions to address the risks of reversals.

Actions to reduce displacement of emissions

Tropical peat swamp forest ecosystems are the most important target areas in these international arguments. Those areas are appropriate as subject of research for REDD+ particularly because they tend to disintegrate as tropical swamps, accumulate the largest amount of carbon in comparison with other forest ecosystems, and have been subject to recent rapid development. It is thus required to conduct research on REDD+ and safeguards on which little research has yet been made in particular. Therefore, there is a pressing need to conduct research on the assessment of REDD+ and PES for reducing warming in the Indonesian peat swamp forest ecosystem, safeguards as prevention measures against the negative impact of their implementation, and optimal options for peat resource management (Fig.1).

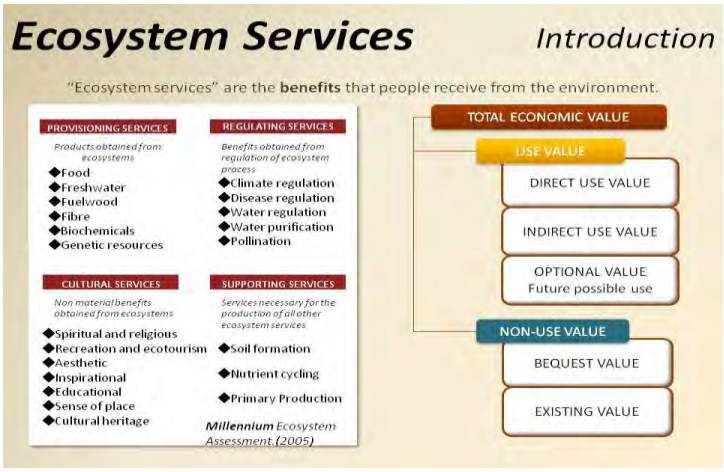


Fig.1 Forest Ecosystem Services (Millennium Ecosystem Assessment 2005)

CASE STUDIES AND RESULTS

Purpose

The local community incentives for the utilization of the forest ecological resources are essential for REDD+, which has been proposed during COP13. Therefore, clarification of these local community incentives to REDD+ by understanding the present utilization of forest ecological resources at logged-over forests, secondary forests, and fallows. It is also crucial to emphasize that NTFP will be planted during the processes of fallow, logged-over and secondary forests successions and evaluate the carbon credit by local community participation. The local community receives incentives from the semi-domestication of forest ecological resources that will allow REDD+ to function effectively and contribute to global environmental policy. In this case, we must pay attention to implementation of ―Safeguard System" for the local community.

SITE, METHODS AND RESULTS

1. *Giam Siak Kecil Bukit Batu, Riau, Indonesia*

(1) Site: Logged-over forest, (2) Treatment: Gap planting, (3) NTFP's + 5 commercial species: especially *Dyera lowii* (Julton Paya), (4) Result in Indonesia (Haris, Kobayashi 2016)

Treatments to be taken for gap planting: Gap size will be 10 m x 10 m. Two gap densities (e.g. 9 gaps ha-1) will be tested and tree species suitable for the site condition will be selected. Wildings may be applied (Figure 2). The plantation results are still under continuous observation (Fig.3).

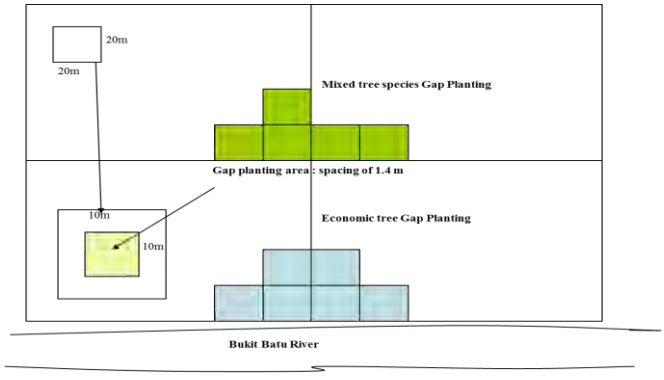
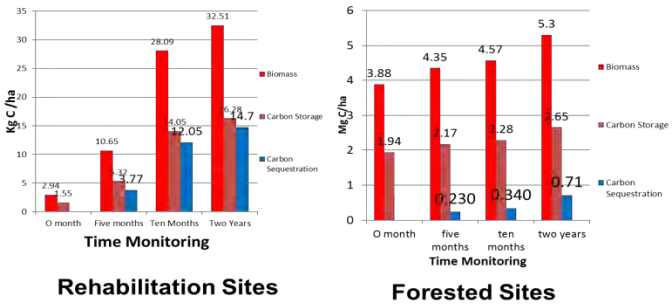


Figure 2. Trial design of land scale level



Total carbon sequestration: 0.72 Mg/ha
Ten months monitoring

Fig.3 Results of rehabilitation activities

2. Tha Se, Luang Nam Tha, Laos

(1) Site: Four years old fallow, (2) Treatment: Forest under plantation with understory clearing, (3) NTFP's: Cardamon (*Amomum spp*.), Alpinia (*Alpinia spp*.), Sapan (*Soehmeria malabarica*) using wildings, (4) Treatments: Size of experimental plots will be more than 200 m x 200 m. Two plots of 1 ha (100 m x 100 m) each will be treated to have two levels of light intensities (e.g. 15% and 30%) on the forest floor by removing the substorey and understorey vegetation;(a)Small quadrats (2 m x 2 m) will be set up to monitor seedling growth; and (b)Upperstorey will be harvested when the seedlings reach 3-4 m.
(5) Result
Evaluation of carbon storage (Kiyono *et al*., 2007)
Forest biomass = 4.71(BA) + 19.4 ------①
Litter = 0.2415 [In(Y)] + 2.6091 ------②
Dead tree = 0.6471(Y) + 2.3165 ------③
Carbon （①＋②＋③） = 15.378[In(Y)] + 11.815 (0.128Mg/ha/yr)-----④
Data： 2011.1.20: H(6.9m), GBH(23.1cm), Litter(1500g)
2011.6.15: H(6.9m), GBH(24.1cm), Litter(1500g)
Carbon storage at 5 years old fallow by NTFPs semi-domestication

The site gained carbon of 89.2/Mg/ha after 22 months. Then, an estimated 48.74/Mg/ha/yr of carbon which is affected by semi-domestication of NTFPRS. NTFPs will be continued to be planted under the fallow forest and the fallow forest will be maintained for 7 years instead of the current 4 years in Luang Namtha province. It will be an occurrence of carbon credit as 48.74/Mg/ha/yr X 3years= 146.2/Mg/ha /3yrs. In the case of Luang Namtha province (a secondary forest area assumed to be with a certain degree of disintegration), the estimated total carbon storage of about 136,000,000/Mg/3yrs (45,000,000/Mg/yr). If the area is to be expanded, the carbon credit of about 3,993,000,000/Mg/yr for the semi-domestication of NTFPS will be achieved. The approach is effective, however not much changes on the local community's livelihoods will be observed. Cost-Benefit by semi-domestication of non-timber forest products are as follows; (a)Price : Cardamon (10,000-15,000 kip/kg), Alpina (3,000 kip/kg), Sappan (800-1,000 kip/kg)(b) Seedling (wildings) cost = 100 kip X 2,500 : 250,000/kip (c) Labor cost: 10,000 kip/hr (d) Total working time: 25hr/ha(e) Planting cost = 10,000 X 25 :250,000 kip (f) Estimated income from Cardamon = 10,000 X 0.1 (estimated) X 2,500(2,500,000 kip/3yrs).

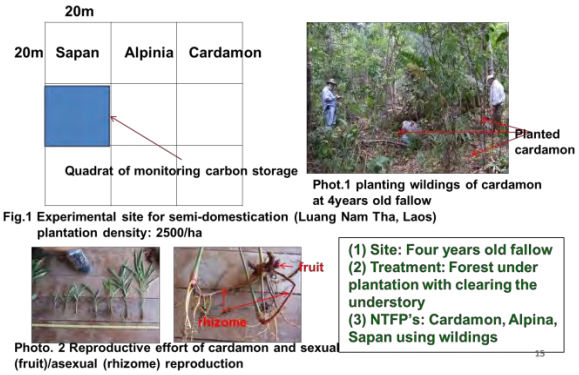


Fig.4 Semi-domestication in Ta Se, Luang Nam Tha, Lao

DISCUSSION

1. *Land Utilization related to REDD+*

Local community engages in Para rubber plantation instead of paddy. Local community is given the incentive of capital intensive land use instead of laborer intensive paddy agriculture. Finally, it is concluded that the local community takes into account the two main factors, economically stable land use and human resources in implementation of any government program for mitigation of global warming.

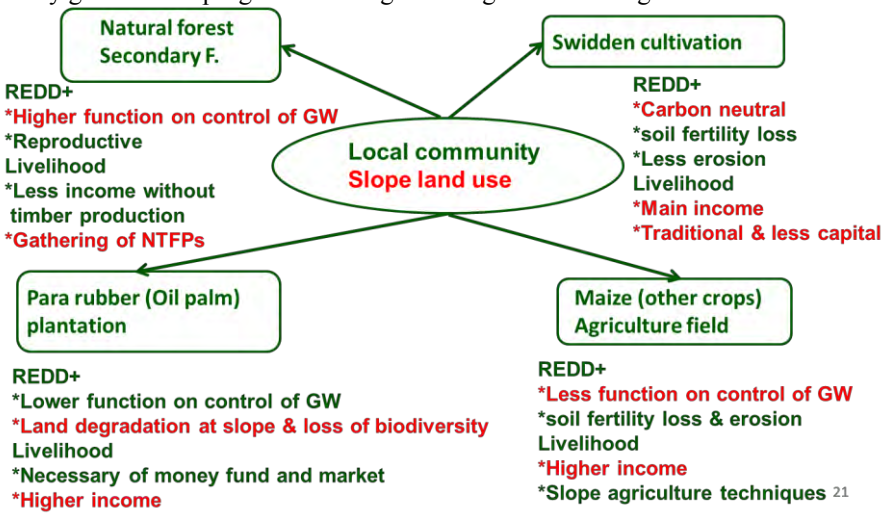


Fig.5 Land use pattern

2. *How to implement the REDD+safeguard?*

The current agriculture practices of the indigenous (Village A) and the migrant (Village B) communities in Tesso Nirro, Sumatra. Households in the Village A has derived only a small part of their income (13%) from agriculture practices related to shifting cultivation. Households in Village B has derived the most of their income (75%) from smallholder oil palm plantations set up by the Nucleus Estate and Smallholder (NES) program (Fig5).

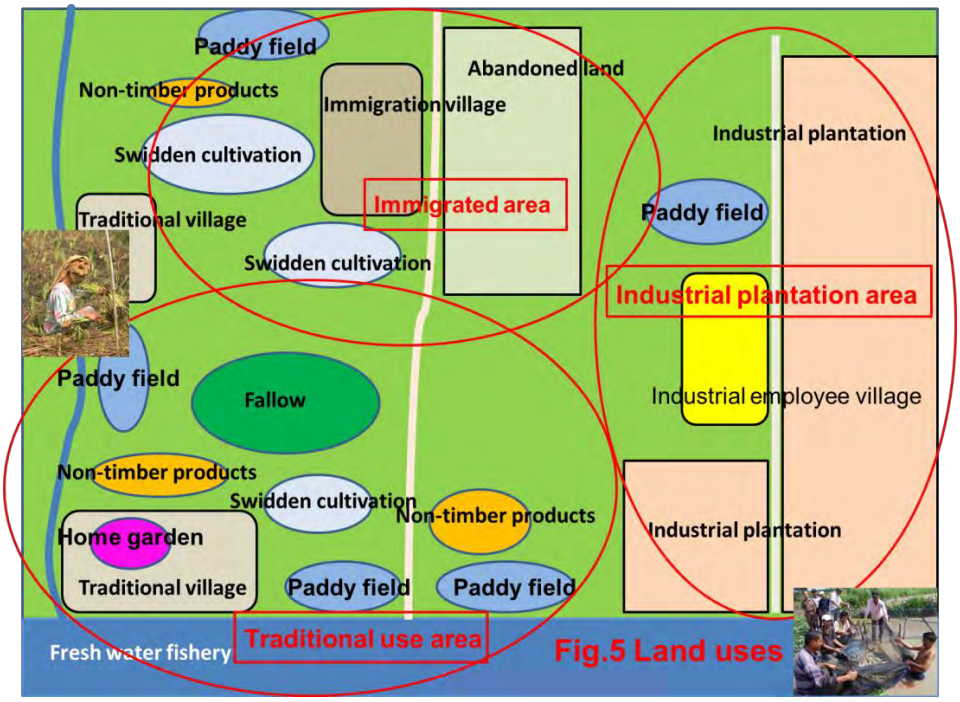


Fig.6 The villages have different the history and livelihoods.

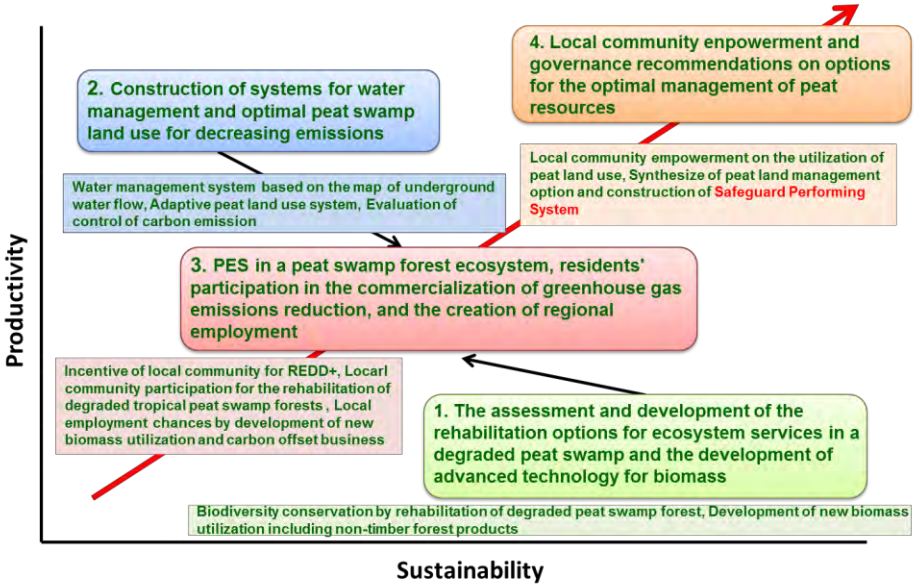


Fig. 6 Safeguard Performing System on REDD+ at Peat Swamp Forest Ecosystem

CONCLUSION

As preventive measures against the negative impact of REDD+ implementation, these safeguards reinforces the purpose of national forest programs and complement or are consistent with relevant conventions and agreements. It is also to construct transparent and effective national forest governance structures, to take into account the semi-domestication of NTFPs andto respect the knowledge and rights of indigenous peoples and membersof local communities. They promote the full and effective local community participation of relevant stakeholders. Semi-domestication has been carried out by local community based on their traditional knowledge to avoid the conversion of land use in natural forests and promote the conservation of ecosystem services, local community keeps their sweddin cultivation area without expanding, to contribute to the conservation of natural forests and biological diversity, that incentivize enhancing other social and environmental benefits to members, of local communities, they avoid over-gathering of NTFPs and conserve biological diversity to take into account actions to address the risks of reversals and incorporate actions to reduce displacement of emissions.

REFERENCES

1. J.O. Rieley & Page, S.E. Eds. 1997. Biodiversity and Sustainability of Tropical Peatlands. Pp.369. SamaraPubliching. UK.
2. M.Osaki & N. Tsuji, Eds. 2016. Tropical Peatland Ecosystems. Pp.651, Springer, Tokyo.
3. K. Mizuno, M. Fujita, S. Kawai Eds. 2016. Catastrophe & Regeneration in Indonesian‘s Peatland: Ecology, Economy & Society. Kyoto CSEAS Series on Asian Studies 15, NUS PRESS, Singapore.
4. Kiyono et al. Predicting chronosequential changes in carbon stocks of pachymorph bamboo communities in slash-and-burn agricultural fallow, northern Lao People‘s Democratic Republic. J. For. Res. 2007, 12, 171-183