

Research Paper

A project on the Restoration of Damaged Peat Swamp Forest at Biosphere Reserve, Riau Province through Community Empowerment

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Abstract

Designated as Biosphere Reserve by UNESCO in 2009, the area of Giam Siak Kecil-Bukit Batu (GSK-BB) is part of the largest Sumatran peat swamp forest ecosystem in Riau Province. Due to the damage of most of its area, serious effort has to be made in order to benefit from owning such a large area of tropical forest. The Biovillage concept of LIPI has been developed since 2012 at Temiang Village, located in the district of Bukit Batu. The objective of this activity is to empower the community by enhancing the quality of life of local human resource through wisely and sustainably managing natural resources. In the long run, these resources are expected to be used as primary capitals in driving the economy of the village in terms of environmental awareness. One of the community empowerment activity at Temiang Village is the development of ecotourism of tropical peat swamp areas. This ecotourism is an effort to raise the awareness of the importance of conserving the natural ecosystem of tropical peat swamp forest, which in the end can lead to real preserving actions. This effort is also expected to have short-term impact on the socioeconomic well-being and to promote the role/participation of Temiang villagers in preserving the peat swamp ecosystem. From the initiation of this ecotourism activity, an idea arose to introduce CAMPING (Came and Planting) PROGRAM, where more participants are expected to come to Temiang Village in the future to plant the saplings seeded by the local community.

Keywords: GSK-BB Biosphere Reserve, Biovillage concept of LIPI, Temiang Village, ecotourism, CAMPING PROGRAM.

Introduction

In Indonesia's Mid-Term Development Plan Phase Two (2010-2014), development in Indonesia was directed at strengthening the reform of Indonesia in all fields by emphasizing efforts to improve the quality of

human resources, including the development of science and technology and economic competitiveness. Among the areas highlighted in the Second Stage Development Plan are economic competitiveness and natural resource and environmental management. Attention is directed at efforts to (1) create a competitive nation, (2) achieve

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equitable development, and (3) build Indonesia up as an independent, advanced, strong and national interest-based archipelago; these are goals of National Long-Term Development Plan 2005-2025, with a vision towards an independent, advanced, fair and prosperous Indonesia.

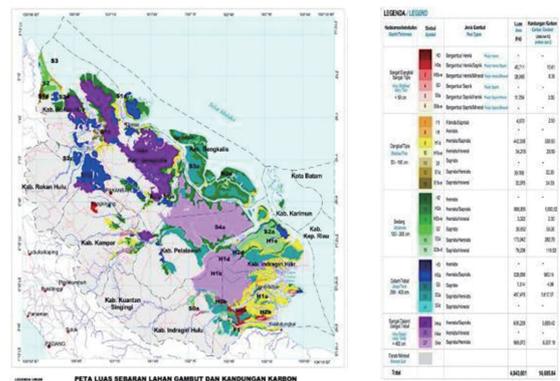
Indonesia has the largest peat swamp forest ecosystem in the tropics, at 27 million hectares, mostly spreads across the island of Sumatra (8.3 million ha) (Silvius 1989; Rieley *et al.* 1996; Sorensen 1993). The widest distribution of this ecosystem in Sumatra is located in Riau Province, which covers 4.04 million hectares (WWF 2008). Unfortunately, most of the area has been damaged, and even the forest cover has been completely altered. Currently, the remaining tropical peat swamp forest is only in the form of forest blocks with relatively pristine condition (Fig 1a). An area in this ecosystem whose status has been upgraded and has been designated as a Biosphere Reserve by UNESCO in 2009 is Giam Siak Kecil-Bukit Batu (GSK-BB) in Riau Province (Fig 1b).

Among the biggest contributors of carbon emissions in Indonesia are damaged by peat-swamp and peat fires, putting Indonesia in third place as one of the world largest carbon emitters. As it contains the largest area of tropical peat swamp forest in Sumatra, Riau certainly has an important bargaining position in regard to the global warming issue. Riau will have important role to play in reducing carbon emissions, not only in Indonesia but also in the world. To benefit from the wealth of tropical peat swamp forest, serious efforts have to be made to harness tropical peat swamp forest more wisely. Mistakes made in the past time in natural resource management, especially in the disappearing area of natural forest become an expensive lesson hopefully not to be repeated in the utilization of tropical peat swamp.

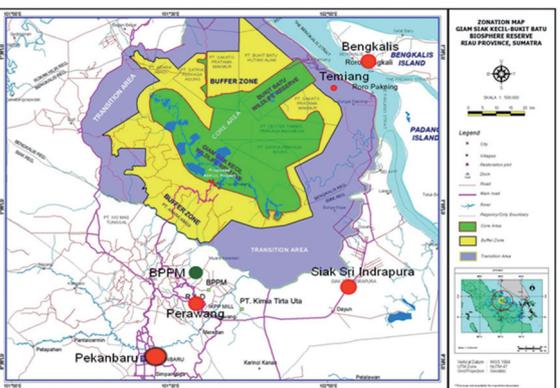
In the past, the local community had a very high dependence on the natural resources of peat swamp forest ecosystem. In addition to utilizing the wood, they also made use of other forest products such as rattan, seeds, leaves and fish. The Bukit Batu river that divides Bukit Batu's wildlife preserve block has become a very important source of livelihood for the people. The peat swamp river is used as a source of potable water and

provides a breeding ground for a great variety of fish. Most of the forest and environmental conditions of Bukit Batu's wildlife preserve block have changed over the past few decades. Some places have become forest grove, the river has developed areas of murky black water and forest cover has been cut down to make way for rubber plantations, especially along the river bank. This condition eventually will threaten the existence of Bukit Batu's wildlife preserve block with its unique ecosystem and environmental functions in the future. Therefore, systematic efforts are needed in order to save this ecosystem of tropical peat swamp forest (Gunawan 2011).

In the past, when the nature was still dominant, rivers, natural lakes, *bunto* (never-dry water basin in the forest) and the dense forest provided a guarantee for their survival. Nowadays, tens and even hundreds of thousands of hectares of natural tropical peat swamp forest have



(a)



(b)

Fig. 1. (a) Conditions of tropical peat swamp forests in Riau (Source: Adji 2012); (b) Giam Siak Kecil-Bukit Batu Biosphere Reserve (Source: Munoz, 2012).

been replaced by a vast number of homogenous plants (*Acacia crassicarpa*) and a vast expanse of oil palm plantation. The river is losing its fish, forest wood can no longer be cut and there is no land to farm, in turn make the lives of indigenous communities more difficult. It is an irony for most of the members of local community that the environment has changed but their lives never prospered. Nowadays, people use the river dikes for rice fields as they are not aware of the importance of keeping the embankments of the river. They were forced to this condition by the lack of alternative livelihood to survival (Gunawan 2011).

Bio-village concept is a good area development concept in order for accomplishing the vision-mission of Indonesia's Long-Term (2005-2025) and Mid-Term (2010-2014) Development Plan, which is expected to provide both short-term and long-term solutions to local and national problems through developing strategic knowledge. This concept puts human and natural resources as the capital of the area/region which can be used as primary capitals to help generate the economy of the area.

Since 2012, this Biovillage activity has been developed at Temiang Village, biosphere reserve of GSK-BB, Riau. The reasons behind the assignment of Temiang Village as the location to conduct the project of Biovillage of LIPI are (1) this village is located adjacent to wildlife preserve of Bukit Batu, (2) some of its people's livelihoods depend on fishing in local rivers and on planting rubber trees. In addition, through deciding GSK-BB as a biosphere reserve, many researchers will visit the wildlife preserve by passing Temiang Village as the entry point to the area.

The objective of this activity is the community empowerment in Temiang Village at biosphere reserve of GSK-BB. The objective suits the Biovillage concept of LIPI that is, to enhance the life quality of local human resources by managing natural resources wisely and sustainably. Managing natural resources can be used as primary capital to develop the economy of the village and surrounding area where there is environmental awareness. The targets to be achieved are the establishment of Temiang Village community in a way where they can increase their social and economic quality

of life while preserving the natural environment of tropical peat swamp forest.

Plan of the Project

For this community empowerment towards the LIPI concept of Bio-village a community group for forest conservation called KMPH (*Kelompok Masyarakat Peduli Hutan*) was formed in 2012.

Researchers are interested in developing activities that will be conducted in a way to empower the people of Temiang Village at GSK-BB. These actions are expected to influence their socioeconomic life as far as maintaining natural ecosystem of tropical peat swamp forest and will be achieved through the following:

1. Short term efforts:
 - a. Local fish breeding.
 - b. Utilization of Bintangur seed as biodiesel feedstock.
 - c. Development of peatland ecology tourism (ecotourism), such as through building and maintaining the infrastructure and facilities of river transportation (Pompong).
2. Long term efforts:
 - a. Seedling of Meranti Bakau (as a potential bio-ethanol feedstock) and rare species that make up peat swamp forest ecosystem, such as Ramin (*Gonystylus bancanus*), Punak (*Tetrameristra glabra*), Balam (*Palaquium spp*), Suntain(*Palaquium spp*), Bintangur (*Callophylum spp*), Resak Rawa (*Vatica rassak*), Durian Hutan (*Durio carinatus*), and Jangkang (*Xylophia havilandii*). These actions will be carried out through stocking and collecting seeds using various methods, and the development of infrastructure and facilities for seedling and cultivation, for example, building a research shelter.
 - b. Re-plantation of some rare hardwood species back into their habitat (reintroduction) in order to accelerate the restoration of abandoned illegal ogging areas of peat swamp forest and enhance the natural condition of the tropical peat swamp forest ecosystem through careful preparation and planning.

The mechanism in order to empower the people of Temiang Village of GSK-BB will be accomplished

through internal and external coordination that will be carried out by conducting monthly meeting with research members from LIPI, consisting of Research and Development Units for Biomaterials (RDUB), Research Center for Biology, and a Research Center for Biotechnology. External coordination will be conducted by holding a Kick-off Seminar on 2 April 2012 that will be attended by research members from other institutions: University of Riau and Lancang Kuning University and other parties are expected to support this activity: Man and Biosfer (MAB) - UNESCO Indonesia, Natural Resources Conservation Agency (BKSDA), local government, House of Representatives of Riau, tropical peat swamp forest ecosystem rescuer community that unite in Center for Tropical Peat Swamp Restoration and Conservation (CTPRC Indonesia) and some keynote speakers.

Programs of the Project

1. Potential of Temiang Village

Temiang village is a village that has existed since hundreds of years ago. The village is located in the district of Bukit Batu, Bengkalis, Riau Province and directly adjacent to Bukit Batu's wildlife preserve. This village is located 5 hours land-travel from Pekanbaru and 2 hours land-travel from Dumai.

The population of Temiang Village in 2010 was 1328 people (305 households), consists of 691 men and 637 women. This number has increased by 53 people compared to the previous year with 1275 people (297 households), consisting of 653 men and 622 women. The

increase of the population is quite alarming because the village land area is limited. Without education on the importance of the existence of conservation surrounding the village, the increasing population will lead to a shift or expansion to wildlife preserve of Bukit Batu. In addition to the ever-increasing population, the education sector also needs to be taken into consideration. In this village, most of the people have a limited education. This also affects the creation of employment in the village. Therefore, it is necessary to improve the skills and knowledge of the community.

The composition of the community at the moment consists of 50% Malays and 50% Javanese with main occupations are as fishermen, rice farmers, oil-palm farmers and stock breeders. This village also has potential traditional handcraft such as mats, baskets and trays made of pandanus plant whose market is still local. Unfortunately, the cooperation society at the village is not working well enough to accelerate local trade.

The community empowerment activity at Temiang Village at biosphere reserve of GSK-BB will be conducted by carrying out appropriate activities that have a short-term positive impact on villagers' social and economic wellbeing, i.e. (1) seedling and reintroduction of endangered wood species (2) breeding of local river fish, and (3) development of ecotourism of tropical peat swamp. This seedling activity was supported by BBKSDA Riau which provided support launching the program of conservation village model beginning on 2011 (Fig 2).

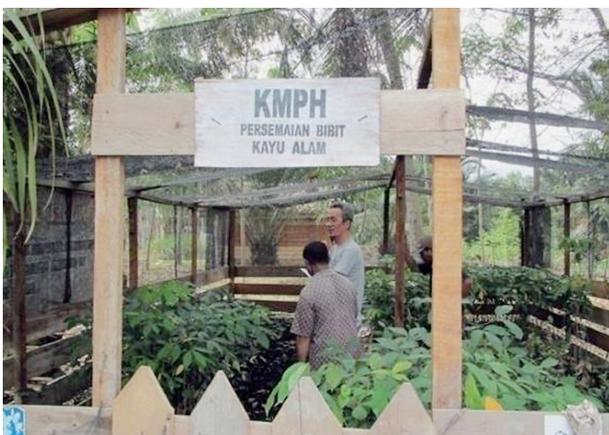


Fig. 2. Seedling of endangered wood species at Temiang Village.

2. Ecotourism of Tropical Peat Swamp and Malay Culture

In terms of biodiversity, Indonesia is the second largest country in the world, and has long been known for the richness of natural resources, flora and fauna. The uniqueness of wet tropical forest throughout the Indonesian archipelago marks it as a potential ecotourism destination. This destination can be exploited as ecotourism that can give maximum ecological, social, cultural and economic benefits to the local community, managers and government.

Ecotourism has been increasing recently. This tourism activity is not only that related to bird watching, horse riding and forest hiking but also has been associated with the concept of forest conservation in connection with local residents. Ecotourism is a combination of different interests that grow out of concern for the environment, and the economic and social sphere. Thus, ecotourism is very precise and efficient in maintaining the integrity and authenticity of the ecosystem in the pristine areas. By developing ecotourism further, the quality of nature sustainability can be improved.

Conservation area as the objects of interest to ecotourism can be in the form of national parks, forest parks, reserve areas, wildlife preserves, tourism-parks and hunting-parks. Other forest areas such as protected and production forest can also be used for tourism development if they have natural objects of interest for ecotourism. Natural areas of river ecosystems, lakes, swamp, peat and headwaters of a river or estuary can also be used for ecotourism. The approach that should be implemented is that of keeping the areas preserved in their natural condition.

Implementation of this topical peat swamp ecotourism is an effort to raise the awareness of local and national communities of the importance of conserving the natural ecosystem of tropical peat swamp forest in Riau so that actions taken will have a long-term impact on preserving the natural ecosystem. In addition, it is also expected to have short-term impacts on the social-economic wellbeing and promote the role/participation of Temiang villagers at GSK-BB in the effort of saving this ecosystem.

This ecotourism package will be a kind of

promotion that combines:

1. Cultural and culinary tourism (Siak Regency Palace, Laksamana Raja di Laut Cultural Conservation at Bukit Batu Laut Village and various Malay cuisine),
2. Education tourism (introducing tropical peat swamp ecosystem and restoration efforts at the location of wildlife preserves at Bukit Batu and Tanjung Leban Village),
3. Adventure tourism (coastal, river and lakes),
4. Village tourism (Biovillage of LIPI and Conservation Village Model of BBKSDA at Temiang Village).

A brief introduction of ecotourism was conducted at Riau University on November 2, 2012 while sounding out of this ecotourism project took place on November 3-4, 2012 (2 days and 1 night). Participants that attended the ecotourism expose and the sounding out included a member parliament from Jakarta, 1 person; the staffs of Riau Natural Resource Conservation Agency, 4 persons; the staffs of Riau Forest Education and Training Agency, 2 persons; the staffs of Tourism Board of Riau Province, Siak and Bengkalis Districts, 5 persons; the staffs of Regional Research and Development Agency of Riau Province, 2 persons; lectures and students of Riau University, 9 persons; lectures of Lancang Kuning University, 2 persons; students of Muhammadiyah University, 2 persons; lectures of Padang State University, 2 persons; Riau Pos Dially, 1 person; Tribun Dially, 1 person; Riau Terkini Dially, 1 person; Antara News Office, 1 person; researcher of Research Center for Biology LIPI, 1 person; researchers of Research and Development Unit for Biomaterials LIPI, 3 persons; and accompanied by Members of Forest Care Community Group (KMPH) Temiang Village.

Budget of the ecotourism was supported by Indonesian Institute of Sciences (IDR 3 millions), Riau University (IDR 5 millions), the Tourism Board of Riau Province (IDR 1 millions), and other participants (IDR 7.5 millions). Therefore, total budget was IDR 16.5 million.

3. Camping Program

The implementation of ecotourism was accompanied by planting saplings of endangered species of hardwood. This sapling planting was an activity where participants were expected to purchase as many saplings as they

wanted which had been seeded by Members of Forest Care Community Group of Temiang Village for IDR 30,000/sapling and then planted them at the provided area by the ecotourism participants. The polybag used in plant seeding was replaced by *pandanus* woven basket created by the housewives of the village.

Other positive impacts of ecotourism activity were as follow (1) participants could stay at the house of the locals (*homestay*), so that the locals could get money from room rental while the housewives could provides Malay cuisine, and (2) the locals could also benefit from boat rent paid by the participants to go to the Core Zone of biosphere reserve.

From the initiation of this ecotourism activity, an idea arose to introduce CAMPING (Came and Planting) PROGRAM, where more participants were expected to come to Temiang Village in the future and plant the saplings seeded by the local community. The advantage for the village women is that they can offer woven handi craft showing their expertise as well as provide Malay cuisine for visitors.

Conclusions

To make Biosphere Reserve of Giam Siak, particularly that of Bukit Batu block at Temiang Village as the location for the improvement of Camping Program and of a unique ecotourism development, support from various parties is still needed. Therefore, it is necessary to increase the role of stakeholders in the empowerment programs that have been created, are ongoing or will be developed as part of CSR (Corporate Social Responsibility). Funding support from other institutions/ agencies is also needed, including potential funding from abroad such as that from Norwegian Embassy.

Facilities that should receive attention are the following: (1) Improvement of pathway towards homestay and forest care community group (KMPH) post at Temiang Village, (2) Improvement of street lighting and other facilities, (3) Improvement in sanitation in some of the homestays, (4) Improvement of Sundak Research Shelter, (5) Construction of water purification installations, (6) Procurement of river transportation facilities, (7) Capacity enhancement of village institution

and local human resources, (8) Enhancement of natural sapling nursery.

References

- Adji, B.D. 2012. Conservation Village Model by Natural Resources Conservation Agency. In: "LIPI Biovillage Model in Order to Community Empowerment at Giam Siak Kecil-Bukit Batu Biosfer Reserve Riau Province". Proceedings of Biovillage Kick-off Seminar, April 2. Cibinong, Bogor, Indonesia. pp. 116-158.
- Gunawan, H. 2011. Close observation in the Giam Siak Kecil - Bukit Batu Biosphere Reserve. In: "Special Edition Bulletin of Research and Development Board of Riau Province, Indonesia". Proceedings of the Second International Workshop on South-South Cooperation, October 4-8. Pekanbaru, Indonesia. pp.5-7.
- Munoz, C.P. 2012. Community Empowerment Program by Sinar Mas Forestry. In: "LIPI Biovillage Model in Order to Community Empowerment at Giam Siak Kecil-Bukit Batu Biosfer Reserve Riau Province". Proceedings of Biovillage Kick-off Seminar, April 2. Cibinong, Bogor, Indonesia. pp. 159-177.
- Rieley, J.O., Ahmad-Shah, A.A. and Brady, M.A. 1996. The extent and nature of tropical peat swamps. Tropical lowland peatlands of Southeast Asia. In: Maltby, E., Immirzi, C.P. and Safford, R.J. (eds) "Tropical lowland peatlands of Southeast Asia". Proceedings of a Workshop on Integrated Planning and Management of Tropical Lowland Peatlands, Cisarua, Indonesia, July 3-8. IUCN, Gland, Switzerland. pp. 55-73.
- Silvius, M.J. 1989. Indonesia. In: Scott, D.A. (compiler). IUCN, Gland, Switzerland. pp. 981-1109.
- Sorensen, K.W. 1993. Indonesian peat swamp forests and their role as a carbon sink. *Chemosphere*, 27(6): 1065-1082.
- WWF. 2008. Deforestation, forest degradation, biodiversity loss and CO₂ emission in Riau, Sumatra, Indonesia: one Indonesian province's forest and peat soil carbon loss over a quarter century and its plans for the future. WWF Indonesia Technical Report. Jakarta, Indonesia. pp. 7-11.



(a)



(b)



(c)



(d)

Fig. 3. (a) Polybag replacement wicker baskets; (b) Ecotourism participants buying saplings; (c) Planting site; (d) Participants of Camping Program doing planting.