Sustained Economic Revitalization of Peatlands to Support the Green Economy in Jambi

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Abstract . Peat land is a natural resource that has great potential to support the greening of the economy in Jambi. Revitalizing the peatland economy is an important strategy to achieve this, maintain environmental sustainability and, achieve sustainable economic growth. This research aims to examine efforts that can be made to support the sustainability of peatland economic revitalization around the Sungai Buluh HLG in the surrounding villages, namely, Merbau, Pematang Rahim and, Pandan Sejahtera, East Tanjung Jabung Regency, Jambi Province. The research method used is descriptive qualitative with field observation data collection techniques, secondary data analysis and, interviews with relevant stakeholders. Data analysis techniques, data reduction, data presentation and, drawing conclusions. The results show that the economic revitalization of peatlands in Jambi is very complex. good management and maintenance of blocking canals to maintain moisture and prevent fires resulting in land degradation, lack of verification of sources of income for communities around peatlands, such as through the development of sustainable agribusiness and utilization of non-timber forest products, not involving local communities in planning and implementing economic revitalization programs, the implementation of sustainable education and assistance to farmers has not been optimal and there is weak supervision and regulation to control peatland economic activities so that the problem of illegal logging still occurs in regional Peat Protected Forests.

Keywords: Peat Restoration; Socio-Economic Revitalization; Sustainable; Green Economy

1 INTRODUCTION

Paying close attention to climate change and socio-economic issues in communities in marginal peatland ecosystems often receives little attention (1). Peatlands in Indonesia cover an area of 13,430,517 ha, spread over four islands; Kalimantan, Sulawesi, Papuan and, Sumatra are the largest (2). Since the last 10 years peatland degradation has been estimated at 25.1% to 44.6% (3). Peatland degradation in Indonesia is caused by anthropogenic activities including plantation conversion and industrial agriculture, drainage, fires, and deforestation (4).

Apart from that, the vulnerability of degraded peatlands is flammable and creates new problems. So the continued degradation of peatlands that are still intact, not only

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affects carbon stocks but also downstream water quality, land subsidence, GHGs, biodiversity, and socio-economic communities (5). On the other hand, peatlands in their natural conditions absorb and store up to 30% of global soil carbon and are home to biodiversity and the livelihoods of local communities (6). So it is necessary to develop sustainable peatland management with an orientation and integration between environmental sustainability and supporting the socio-economic development of the community (7).

Policies throughout the world, including the Indonesian Government, are oriented toward restoring peat ecosystems through peat restoration policies (8). The tragedy began with forest and land fires that occurred in 2015 covering an area of 2.61 million ha, including peatland reaching 869,754 ha (9). This was a step in the birth of a peat restoration policy through Presidential Regulation No. 1 of 2016 concerning the Peat Restoration Agency. This non-ministerial institution is directly responsible to the president for restoring peatlands in seven priority provinces, namely; Papua, South Kalimantan, Central Kalimantan, West Kalimantan, South Sumatra, Riau, and Jambi. The approach used in peat restoration is 3R; Rewetting, Revegetation, and Revitalization.

The largest distribution of peatlands on the island of Sumatra is in the provinces of Riau, South Sumatra and Jambi, the third largest reaching 496,766 ha (10), but the area continues to decline due to land conversion for oil palm and pulpwood plantations (11). In addition, the 2015 fires burned 286,527.3 ha and caused losses of 19.064 trillion ha (12). the peat restoration policy was implemented in 2017 in Jambi Province through rewetting or wetting by building canal blocks and drilled wells, then replanting revegetation with adaptive and economically valuable endemic plants, then socio-economic revitalization of the community through village assistance and development. These three approaches are implemented in a self-managed manner to directly increase benefits for the surrounding community (13)

Economic revitalization is the utilization of economically valuable commodities in peatlands with sustainable management, so that they can improve the welfare of disadvantaged communities in peatland areas [14] , for example plants that can absorb carbon and store carbon, such as rice, jelutong sap pineapple, areca nut, coffee, sago, sago waste, bee honey and gelam wood. The potential of other peatlands can also be exploited through the cultivation of fish species, animal husbandry and the development of livestock feed potential (15)

However, researchers reveal that peat restoration policies are still oriented towards environmental restoration "projects" without considering the socio-economic problems of the community as the main key to the success of the policy [5], [16]–[19] . Apart from that, many socio-economic revitalization programs have been developed only to fulfill program aspects without considering sustainability and economic growth or the community's mindset towards peat ecosystems [18], [20]–[22] . Therefore, this research aims to explore the sustainability of the economic revitalization program from the peat restoration policy and supporting the green economy around the Sungai Buluh Protected Peat Forest (HLG) which has three villages, namely; Pematang Rahim, Merbau and Pandan Sejahtera. The three are peat care villages and one of the peat restoration priorities in East Tanjung Jabung Regency which has been under the guidance of the

Regional Peat Restoration Team in Assistance Tasks since 2018. However, the community's socio-economic activities still depend on forest products such as logging, clearing land by burning and not paying attention to drainage construction [23], [24] . Therefore, it is necessary for this research to look at the sustainability of the Peat Restoration Policy for Economic Revitalization and Supporting the Green Economy in East Tanjung Jabung Regency.

Furthermore, the problem solving approach in this research uses exploratory qualitative research methods with primary data obtained through interviews, observation and documentation. Meanwhile secondary data was obtained through various literature and social media to support and strengthen research findings. Meanwhile, as a basis for highlighting this issue, researchers use the concept of peat restoration with the R3 approach (Rewetting, Revegetation and Revitalization) which is generally stated in Presidential Regulation no. 1 of 2016 which was changed to Presidential Regulation no. 120 of 2020 concerning the Peat and Mangrove Restoration Agency. To describe this research, the following framework is presented.

The Sustainability Approach consists of Ecological, Economic and Social Aspects, adopted in this research to measure community involvement through self-management schemes as a people's economy. Meanwhile, economic revitalization looks at sustainable livelihoods/development of a "green economy", opening minds to current opportunities, encouraging innovation. encourage the development of necessary local markets, policies, infrastructure and capacities. Furthermore, this research will identify relevant solutions that need to be implemented in efforts to revitalize the economy of communities around peat, both in the use and utilization and management of peat land.

Several scholars in research related to peat restoration have studied financing for restoring peatlands starting from technical activities as well as funding sources and alternative funding for peat restoration [25]–[27] . Meanwhile, other researchers have revealed the causes of peatland degradation and factors and obstacles in peat restoration efforts, so this research looks at initial events or in the process of implementing peat restoration [16], [21], [28], [29] . All scholars highlight and recommend peat restoration policies for future research focusing on socio-economic problems that still tend to receive less attention. Therefore, the research offers novelty regarding the sustainability of peat restoration policies that focus on socio-economic revitalization of the community and supporting the green economy.

2 Research methods

To achieve the research objectives, the research method used was exploratory qualitative to understand and explore the problem and research object in depth, map the problem, directly review the field or observe [30] . This research data is in the form of primary data that researchers collected from interviews with stakeholders, community groups, communities and local village governments, then core and supporting sources will be traced to facilitate and validate the data. Apart from that, researchers also made direct observations related to peat restoration activities, especially activities related to economic revitalization that promotes a green economy. Apart from that, it is related

to social activities and community insight into sustainable management and economic activities on peatlands. Apart from that, researchers collect data by means of documentation to strengthen and enrich findings that can become evidence. Then, as a reference and data validation, researchers also used secondary data obtained from various documents such as legal foundations, modules, books, social media and journal articles related to peat restoration and economic revitalization.

3 DISCUSSION

Peat stores the world's carbon reserves, prevents drought, and prevents saltwater from mixing with agricultural water. Peat is also home to many types of flora and fauna, so its presence helps maintain biodiversity throughout the world.

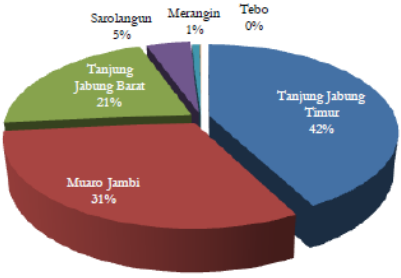
Peatlands are spread across various regions in Indonesia, especially in Kalimantan, Sumatra, Papua and several other islands. Indonesia is one of the countries with the largest peatland area in Southeast Asia.

Peat Protected Forest (HLG) is a forest area that is used as agricultural land, a hydrological buffer such as a water catchment area, an oxygen provider, a carbon storage area, and a guardian of biodiversity and environmental balance. Due to their acidic pH, low nutrients, and thick organic matter, peat forests are constantly under water [31] .

The implementation of Peat Restoration by BRG is based on Presidential Regulation No. 1 of 2016 concerning Peat Restoration (Presidential Decree 1/2016) . Then it changed to Presidential Regulation Number 120 of 2020 concerning the Peat and Mangrove Restoration Agency (BRGM).

The peat forest area in Jambi Province reaches 736,227.20 ha, with Protected Forest status, and is spread across six districts. East Tanjung Jabung Regency has the largest peat forest area with 311,992.10 ha. 42% of East Tanjung Jabung Regency's peat area in Jambi Province is spread across 6 districts.

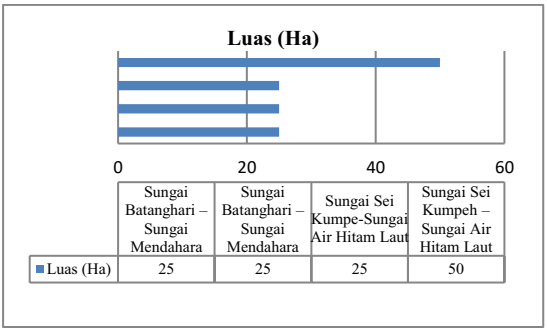
Diagram 1. Percentage distribution of peat areas in Jambi Province



The Sungai Buluh Protected Peat Forest (HLG) covering an area of 17,721 ha is in East Tanjung Jabung Regency, with 12,476 ha in Mendahara Ulu District and 5,245 ha in Geragai District, according to Jambi Governor Decree Number SK No. 108 of 1999 dated 7 April 1999 and Minister of Forestry Decree No. 421/Kpts-II/1999 dated 15 June 1999.

Ecological Aspects "Efforts to restore land cover in peat ecosystems through planting native plant species in protected functions or with other types of plants that are adaptive to wetlands and have economic value in cultivation functions." This shows that revegetation can be carried out in both cultivated and protected peat ecosystem functions. Carrying out Revegetation activities in KHG Mendahara River, Batang River, East Tanjung Jabung Regency for Seedlings distributed 30,250 sticks. Consist of Areca nut: 6,250 stems, Arem: 200 stalks, Durian: 2000 sticks, Avocado: 2,500 stems, Rambutan: 1,000 stem, Kaliandra: 1,000 stems, Jelutung Swamp: 11,500 sticks, Bayur: 2,525 sticks, Guava: 1,000 stems, Rengas Klakok: 375 stem, Sand": 1,500 stem Klireside: 400 Meranti stems Rawa: 250 Pete bars: 1,000 bars and Pulai: 1,000 cigarettes .

Graph 1. Area of revitalized forest



Source: Jambi Province Forest Service Report

Chart 1 shows that the revegetation efforts carried out by the BRG Team focused on Muaro Jambi Regency, this was the main fire spot in 2015. Meanwhile, other areas were still far behind. This is the main priority revegetation challenge after the fire. Furthermore, efforts to maintain forest areas, protect rare species, The results of research in the field are limitations that village forest patrol teams often face, such as encroachment and having created a 1,300 meter long canal to be used to transport wood resulting from illegal logging. In addition, they have cleared approximately 38 hectares of land.

One of the protected peat forests in Jambi Province, the Sungai Buluh Protected Peat Forest, experienced major damage due to fire in 2019. An area of 207.9 ha of the Sungai Buluh HLG experienced high levels of fire in 2019 [32] . The efforts made by BRGM to prevent fires in Pandan Sejahtera Village installed a Water Level Monitoring Equipment (APTMA), the aim of which is to report humidity, groundwater level and rainfall automatically in peatlands which are integrated with the SIPALAGA system. This data is usually used to monitor the results of peat restoration in the area and to anticipate peatland fires. Based on community recognition, the efforts made by members of the Pematang Rahim LPHD are to protect the forest by actively patrolling to prevent fires and other actions that damage the forest. In each of these villages, there is also a Village Forest Management Institution (LPHD) and a Fire Care Community (MPA) which were established to protect peat forests in the Suangai Buluh HLG area. Apart from that,

economic movements were carried out in three villages to prevent the community from destroying the Sungai Buluh HLG.

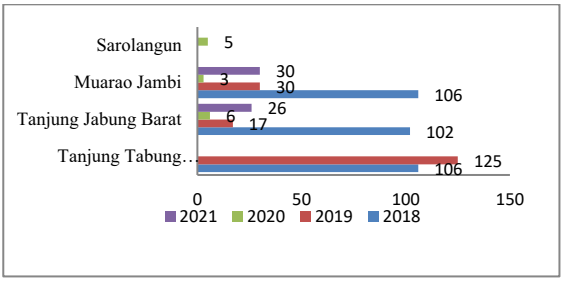
Fig. 1. HLG Suangai Buluh

LPHD Pematang Rahim is carrying out active limited patrols, they are also reminding the public to prevent forest destruction and report to the authorities in order to maintain sustainable forests to maintain them for the next generation.

Furthermore, according to the chairman of the LPHD, the obstacles faced in maintaining village-managed social forests are the lack of fire extinguishing facilities and weak support for forest protection efforts by the village government because they are not considered a priority sector. The lack of commitment from the Village Government in developing conservation-based ecotourism will not have a positive impact on Pematang Rahim Village. Both from the community and village development.

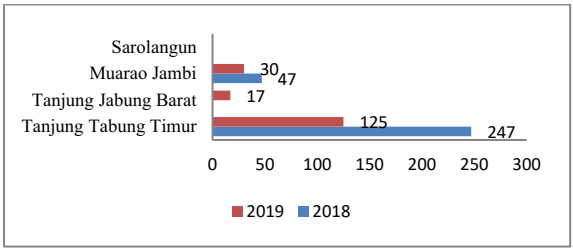
The infrastructure used for peat wetting is based on Government Regulation no . 71 of 2014 and Government Regulation 57 of 2016, Article 23, Paragraph (2), the construction of canal blocks in cultivation areas aims to prevent pyrite and/or quartz sediment from being exposed beneath the peat layer. Therefore, the water level threshold that must be maintained (especially at compliance points) does not exceed 0.4 meters below the peat surface [33] . In its implementation carried out by TRGD. Peat restoration through peat rewetting (Rewetting) is a type of infrastructure built in the form of canal bocking and bore wells. The following types of infrastructure are being built.

Graphic 2 Bulkhead (*Canal Bocking)*



Source: Jambi Province Forest Service Report, 2022

Graph 3. Boor Well



Source: Jambi Province Forest Service Report, 2022

Table 1. Blocking (*Canal Bocking)* and Boor Well

Village	Block the canal	Boor Well	Th
Pandan	128	50	2016-2020
Prosperous	64	25	2023
Pamatang Rahim	6	-	2018
Merbau	19	-	2018

Source: Report from the Jambi Provincial Forestry Department

The peat wetting (rewetting) infrastructure was built from 2018 to 2021. A total of 466 drilled wells and 481 canal blocks were built. In areas of cultivation and other forest production that are not permitted, local communities create canal blocks independently [23]. The author saw several canal barriers made of wood that were unkempt and rotting, even in the grass. In addition, several canal blocks at placement points on water and land transportation routes are vulnerable to mobilization damage and some canal blocks trigger flooding, especially during the rainy season and high tides. According to the village government and community, location transfers and changes to channel partitions are not permitted. However, it refers to the technical rules for canal blocking on the route. Then, based on community reports and our direct observations, several wells that were drilled did not function when they were to be used. This was also confirmed by the chairman of the Jambi Province DPRD, Mr. Edi Purwanto, as many as 500 wells in the peatlands of Jambi Province did not function when they were to be used for fire control. (34)

Economic Aspects In implementing community economic improvement activities in Pandan Sejahtera Village , Pamatang Rahim Village , and Merbau Village . BRG, through the DPG and Social Forestry programs, villages that participate in the DPG program also have a Social Forestry program. These two programs can complement or integrate each other. The following explains the economic aspect.

Table 2. Economic Aspects at HLG Suangai Buluh

Village	DPG	Perhutsos
Pandan Prosperous Village	- 1 Cattle Breeding and Fattening Package – Breeding 7 Bali Cows and Planting Gaja Grass 0.5 Ha - (2018-2020 - 10 head of cattle fattening (2023)	-
Pamatang Rahim Village	Pineapple Cultivation 1.5 Ha, Red Ginger 05 Ha Pineapple Derivative Products, And Compost House 05 Ha (2021)	Pamatang Rahim Eco Tourism
Merbau Village	Farming 34 Goats Cultivating 3000 Catfish and 3000 Tilapia (2021)	-

Source: Report from the Jambi Provincial Forestry Department

Furthermore, based on the results of interviews with Pokmas Perintis Jaya, a community group in Pandan Sejahtera Village, they admitted that the revitalization package assistance provided by BRGM in 2018 had increased rapidly. From 1 aid package for 10 cows, now the number has increased 5 times to 50 cows. Then in 2019 the assistance of 10 cows increased in 2023 to 72 thanks to BRG assistance to increase the cattle population. It is hoped that in the future livestock community groups can be more independent in increasing their livestock population.

Fig. 2. Development of Cattle Livestock in Pandan Sejahtera Village

Source: Documentation of Watannas RI Visit, 2022

Meanwhile, the economic potential in Pematang Rahim Village that can be developed is Pamatang Rahim Eco Tourism . Permission to manage village forests was issued by the Ministry of Environment and Forestry on 26 October 2017, with number SK-5694/MENLHK-PSKL/PKPSPSL.0/102017, which was handed over directly by the President on 17 December 2018 Creation of LPHD, Village Regulation on Management and Peat Ecosystem Protection, numbers 8, 17. The peat forest ecotourism renovation project is underway. Currently we are building a trekking path, gate and ecotourism

gazebo to be repaired. During the COVID-19 pandemic, there was a decline in visits to tourist attractions, which resulted in reduced management enthusiasm. So that tourist attractions are decaying because they are not used. Now the spirit of the Meranti Rawa Tourism Awareness Group is starting to recover. One source of motivation is financial support from various parties to improve tourist locations, namely support from the BRGM government and KKI Warsi to build damaged ecotourism facilities.

Fig. 3. Pematang Rahim Ecocity

Source, Field Documentation, 2023

Apart from providing aid packages through the DPG and Social Forestry programs, the concept of self-management through Pokmas which is used to build canal blocks is also able to stimulate the community economy in these 3 villages, the results of which will be received back by the community, recovery and revitalization activities are a good example of how BRGM intervention can prevent forest and land fires and improve community welfare.

Table 3. Development Bulkhead Channel Through Community Group

Village	Community Group	Person
Pandan Prosperous	Agreed Jaya	15
Pandan Prosperous	Fork Save	15
Pandan Prosperous	Garuda Young	15
Merbau	Matturue	15
Pamatang Womb	Work proceed	15

To support the restoration and sustainability of peat ecosystems, economic assistance aims to increase the independence and welfare of communities in peatlands and their surroundings. This is closely related to the community practice of clearing land by burning because it is cheaper, reduces peat acid, and increases fertility. The level of success and economic sustainability of revitalization assistance is still low, according to the findings of interviews with the community and government. One of the reasons is the fact that socio-economic analysis relating to community needs is not carried out comprehensively. Apart from that, village assistants do not care about the social conditions of the people they accompany because they are not from their village.

Social Aspect , we found that the village has unstable economic conditions and livelihoods. Assistance for economic revitalization has not been fully absorbed because local institutions can politicize this assistance. For example, community groups

(Pokmas) consist of family members of the village government, so they cannot be accessed by communities who need or are able to manage revitalization assistance. So, economic revitalization cannot last long. Apart from that, revitalization increases community capacity through paladiculture training, peatland management without burning, and the creative economy through food processing factories such as pineapple, sago, and purun which are hampered by limited product marketing, the community is actually not interested. Apart from that, it is important to increase the role of village governments and district governments in peat restoration because they really understand the situation, environment and socio-economic conditions of their communities.

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