Peatland Management Based on Education for Sustainable Development (ESD)

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Abstract. Most people in Indonesia utilize and cultivate peatlands based on their unwise habits. They clear the peatlands by burning to be planted. If this condition is left alone, it certainly will threaten the existence and sustainability of peatland ecosystems in the future. Therefore, a breakthrough is needed to solve this problem by actively involving all interested parties. In the context of peatland maintenance specifically and environmental preservation efforts in general, the development of peat forests into peat arboretum is very important. Especially if the existence of this peat arboretum can be used as an educational facility managed by the community by applying the concept of education for sustainable development (ESD). Peatland management through the ESD-based Peat Arboretum can be a model in an effort to encourage people to be constructive and creative in facing the challenges of global warming. Moreover, this effort is also expected to create a resilient community in the sustainable management of peatlands.

1. Introduction
During the last few decades in Indonesia many areas of peatland have been cleared for various purposes [1]. The problem is that not a few opening activities are motivated by short-term economic interests by defeating long-term environmental aspects. What was then produced was a number of failures and losses experienced by the community itself, especially in the fields of ecology, economics, and health [2]. The haze that often arises during the dry season is one of the inevitable impacts due to unwise management of peatlands.

In Riau Province, as one of the provinces that has quite extensive peatlands in Indonesia, more peatland management has failed, both by the government and private companies [3]. One of the reasons for this is because the program focused only on returning the peatland ecology function and ignoring aspects of community empowerment. In fact, by involving the community, the community's needs will be known so that they share responsibility for the preservation of peatlands in their area.

To realize peat as a model of land management and a sustainable development approach requires the support of all parties [4]. Therefore it is important to make efforts to harmonize policies and strengthen community institutions as regional users. At present the field facts in Riau Province show that peatlands are in fact threatened with extinction by illegal encroachment of the area and excessive use of resources [5]. The encroachment not only took place in various areas, including protected areas which should not be touched by company and community activities. The government as the manager responsible for protecting the preservation of the area is as helpless to face it.

Realizing the importance of peatland management based on community interests, PT. Pertamina UR II Sungai Pakning, Bengkalis, created the Bestari Peat Village Program. The Berdikari Peat
Village Program is an environmental preservation effort in the context of peatland maintenance. The form is the development of peat forests into peat arboretum as a community-managed educational facility. The establishment of the peat arboretum is the first in Sumatra and is a peatland conservation and education area. Aimed at educational and tourism facilities especially for the younger generation to introduce the function of peatlands as the main buffer of ecosystems in Riau Province in general and Bengkalis Regency in particular.

Education and learning for sustainable development at all levels and in the community structure of peatlands is essential for the sustainability of this ecosystem. One of the needs to prevent peatland damage is quality education. The education topics needed by the community around the peatland area are in the form of environmental education, the application of environmentally friendly technologies, and the socialization of regulations relating to the protection of ecosystems [6]. Therefore it is necessary to carry out capacity building activities for the peat arboretum manager so that this object runs according to its function. The application of the concept of education for sustainable development (ESD) in the management of peat arboretum is an important effort for peatland maintenance in the future.

2. Methodology
This research was conducted using qualitative methods which are research procedures to produce descriptive data from the observed research objects. This method looks at the experience of individuals / organizations as a whole, so it does not limit the statement of individuals / organizations into a particular hypothesis. While the approach taken is a case study with a casuistic look at the implementation of the Forest and Land Fire Mitigation Program in Riau Province by CSR PT Pertamina (Persero) Sungai Pakning Refinery Unit II during the period of 2017-2019. Data collection was carried out through participant observation and Focus Group Discussion (FGD). The research informants were selected based on purposive sampling with the intention that the informants selected already knew the problem deeply so that they could provide complete information. The research informants were the management of the Tunas Makmur Farmers Cooperative whose business units were the Peat Arboretum, the Bukit Batu District Government, and PT. Pertamina RU II Pakning River.

3. Results and Discussion
Peatland productivity is very dependent on management and human actions. Some researchers report that peatland productivity decreases due to degradation of soil fertility, physical and biological properties of the soil [7]. There is a difference in soil fertility between the peatlands utilized and abandoned peatlands. Non-degraded peatlands have higher levels of N, available P, alkaline elements, and higher ash content than degraded peatlands. In addition, degraded peatlands have a lower ability to hold water, so that in the rainy season it is easy to experience flooding and in the dry season it is easy to dry and burn and the efficiency and effectiveness of fertilization is low. Even the decline in peatland productivity has caused some land to be abandoned or abandoned.

The above situation shows that peatland management policies have not yet achieved the desired goals and objectives in their efforts to protect them from damage and extinction [8]. Peatland management has not been followed by changes in the behavior of the community and other stakeholders to conserve biodiversity and carry out sustainable development in the region. This is suspected because there are still differences in vision, interests and perceptions among stakeholders regarding the existence of the peatlands. In addition, the existing institutional capacity is also still weak to adopt the correct concepts in the use of peatlands.

To make a sustainable peatland management policy, data on current characteristics of peatlands and community characteristics will be used as a basis for preparing future management plans [9]. Because it is well known that one of the weaknesses in peatland resource management is the lack of empowerment of all parties directly related to the use of peatlands. Various parties related to peat include the community and entrepreneurs. This is reflected in their low role in planning, as well as in the planned maintenance process.
Several studies on the existence of peatlands in relation to land conversion and fires have been carried out. The results of the study revealed the same conclusion, which states that the sustainability of peatland ecosystems should be a general understanding that is accepted by all circles. Therefore, the sustainability of this ecosystem must be realized in every practice of sustainable management of peatlands and should be considered as one of the remaining ecosystems. To that end, a number of problems that exist and develop in this region, in particular encroachment and peat fires require integrated and sustainable management solutions and efforts.

The solution of these problems can be done by involving all stakeholders in peatland management. In the context of sustainable development, it is important to consider including education elements in the management of peatlands in the future. Educational topics that are needed include environmental education, the application of environmentally friendly technologies, and media promotion [10]. Quality education and learning for sustainable development (ESD) in the management of peatlands is urgently needed. This application is an effort to encourage peatland management to be constructive and creative in facing global challenges and to create resilient and sustainable communities.

Why the ESD? Because ESD in theory can be interpreted as a learning process that aims to inform and involve the population to be creative. The goal is to have problem solving skills, scientific, and social literacy, then commit to be bound to personal and group responsibilities. This action will guarantee a prosperous environment socially and economically in the future. This concept has the potential to connect separate distances between the business world and classes in schools, as well as between classes in schools and the community. So that with a close relationship, the environment which is the place where humans live is expected to be maintained and able to support human needs in the future.

ESD allows every human being to obtain the knowledge, skills, attitudes and values needed to shape a sustainable future. ESD contains key issues of sustainable development into teaching and learning; for example, climate change, disaster risk reduction, biodiversity, poverty reduction and sustainable consumption. Companies that are business institutions must support ESD with CSR programs that can be utilized by schools and community groups.

This is the basis for making the Bestari Peatland Village Program a CSR mainstay of PT. Pertamina RU II Pakning River. Specifically the aim is to integrate environmental recovery and community empowerment. The form is in the form of environmental improvement, the community is more empowered, and the economy is more advanced. This program has become an example and inspiration for further development in other places because it can inspire existing stakeholders, especially those related to peatland management. In carrying out this program, the community is indeed involved as a whole in the management of peatlands, starting with the addition of extinction equipment, the establishment of the Fire Concern Community Communication Forum (Forkompa) to fire fighting training.

In addition, this program utilizes burned peatlands through pineapple cultivation and processing of pineapple products such as chips, dodol, sweets, and jam. Even the company also fostered nine elementary schools by instilling the values of the Berdikari Peat Village from an early age. The implementation is that the school has an environment-based curriculum that raises issues of preventing land and forest fires and utilizing the potential of peat areas. By involving the community in restoration and restoration programs, and preservation of peatlands such as the Berdikari Peat Village, community awareness will emerge. And from there, the community will participate in the conservation and maintenance of peat, along with improving their welfare.

Among the environmental preservation programs in the Berdikari Peatland Village Program which is the center of attention for environmentalists is the development of peat forests into peat arboretum. This program was the first in Sumatra and made it a community-managed educational facility. The peat arboretum is intended for educational and tourism facilities especially for the younger generation to introduce the function of peatlands as the main buffer of ecosystems in Riau Province in general. The point is that this program is expected to trigger and encourage other regions to develop the same program, namely by involving the community's participation in peatland conservation.

The program is expected to trigger and encourage other regions in developing programs, namely by involving the community's participation in peatland conservation. But the existence of this peat
arboretum is still managed traditionally and is impressed as it is. Its existence is not widely known by the public. It seems that the management still does not have plans to develop these objects in the short, medium and long term. The elements of technology have not yet touched on the development efforts that actually have the potential to become alternative livelihoods for their daily needs. The main potential is to become a place of education, which combines education and tourism.

Basically, peatland management requires support and commitment from all parties. This is because the participation of stakeholders or stakeholders is closely related to the capacity of stakeholders as one of the capital in its management. This capacity in particular is the capacity of developing a network of peat arboretum managers that is absolutely needed in multisectoral education management. The current management capacity has only the ability to identify resources and run educational management programs. To reach a network that is well established and able to be a resource for the program, it still has weaknesses, namely the absence of formal procedures to run the program and a sense of shared ownership of the stakeholders.

4. Conclusion
ESD-based peatland management is a breakthrough in preserving the environment in the future. The existence of peat arboretum can be used as a real example in the efforts of sustainable land management. Because besides having a restoration function, the peat arboretum also has an educational function by being a learning facility for school students and researchers from nearby universities as field learning laboratories. Economically, the peat arboretum also provides a separate income for the management group from the sale of tickets, food, and cultivated plants that can be brought home by visitors.

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