

Community adaptation to the “zero burnings” policy on peatlands: cases in Rengas Merah-Riding and Senasih Mulya-Kayu Labu, Ogan Komering Ilir District, South Sumatra Province

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Abstract. The conversion of peat swamp forest and peatlands is generally caused by the use of fire in land preparation, which is at risk of triggering uncontrolled forest and land fires. Even though the Indonesian government has explicitly banned the use of fire in clearing peatland for agriculture since 2014, which was stated on government regulation number 71 of 2014 concerning the protection and management of peat ecosystems, people still use fire in land preparation because it is cheap. This research investigated how do the community of Rengas Merah-Riding and Senasih Mulya-Kayu Labu, Ogan Komering Ilir Regency, adapt to the “zero burnings” policy? In-depth interviews and Focus Group Discussion (FGD) were used to collect data. Data were analyzed using tabulation and a qualitative descriptive approach. The results of the study indicated that by the prohibition on the use of fire in land clearing, the community has tried to adapt it even though it cannot be fully implemented. The local communities of research site have alternative livelihoods without using fire, which is “bekarang” (fishing) (both site), developing edible bird nest (both site), and making “purun” mat crafts (only in Senasi Mulya-Kayu Labu). The results of the study are expected to be a valid promotion for local livelihoods without burning, as an element of community livelihoods revitalization within the framework of peat restoration programs.

1. Introduction

Farmers have long used the fire for land preparation because it is clean, easy to work on, free of pests and diseases and to get mineral ash, which is rich in certain soil nutrients. Increased use of fire for land clearing combined with peat drainage causes uncontrolled fires. Uncontrolled fires on peatlands pose severe risks to health, livelihoods and conservation efforts and contribute significantly to climate change. The area burned in Sumatra and Kalimantan in 2015 reached 1.34 million km² [1]. Economic losses due to fires in 2015 were reported by the World Bank of IDR 221 trillion [2]. The 2015 forest and land fires were recorded as the most fires season in Indonesia [3]. Also, [4] estimated forest fires in South Sumatra in July to December 2015 were 422,718 ha, of which 163,143 ha were on mineral soils and 260,575 ha on peatland.

In order to overcome the fire and smoke haze disasters that endanger human health and the environment, the Indonesian government issued Government Regulation number 71 of 2014



concerning the Protection and Management of Peat Ecosystems. The regulation explicitly prohibits the use of fire in clearing peatland for agriculture. Fire prevention is a fire control activity that is carried out before fire occurs in order to minimize the incidence of forest and land fires. One way of prevention is the Early Warning System, which is an integration of weather and fuel elements. Another way is zero burning and fuel management. However, the prohibition on burning for land clearing also limits the ability of farmers to increase soil fertility. Research shows that the minerals produced by the combustion increased soil fertility in some cases and conditions [4 - 6].

Farmers have difficulties to follow alternatives suggested by the government to clear land without burning practices. They have to clear land manually, using machetes or sickles, and let the grasses and tree biomass to decomposed. It takes longer than burning one to two months compared to just a few days with fire and is more expensive because of labor costs. This study examines how the zero burning policy affects the practice of farming and community livelihoods.

2. Methodology

This research was conducted at two villages (Rengas Merah Riding and Senasih Mulya Kayu Labu) in Ogan Komerling Ilir (OKI) Regency, South Sumatra Province. The method used is Participatory Rural Appraisal (PRA) by modifying the emphasis of role models and learning processes. The sampling technique used was purposive and snowball sampling [8]. Data are obtained through field observations, in-depth surveys and interviews. Data were analyzed using a qualitative descriptive approach and quantitative analysis.



Figure 1. Research site map.

3. Results and discussion

3.1. Land management before 2015

Land preparation by burning is an activity that has been carried out for a long time ago and has become a culture in the community. The results of the study showed that all respondents chose to clear land by burning because it was cheap, easy and fast. This was similar to the results of research conducted by [9], which pointed out that the form of land processing/cleaning by burning required a relatively faster time and costs less than manual land preparation. The local community burns out bushes because the land processing cycle is short. They cultivate land once only that is in the dry season with paddy rice. They cultivate paddy rice by the *sonor* system, which plants paddy rice by burning grass bushes on peatlands. The tradition of people preparing land by burning for paddy rice planting (*sonor* system) is difficult to remove, this is also influenced by economic aspects where the *sonor* system has an economic value that is profitable because it is cost-effective [10].

However, land preparation by burning has a very damaging effect. First, fires on peatlands are challenging to extinguish, considering the fire is below the soil surface. Fire can spread everywhere and are difficult to predict. This makes the fire is not easy to control. Second, it is difficult to rehabilitate burned peat forests, and the costs are more expensive than those of dryland forests. Third, if the peat burns out and a layer of sand underneath exposed, it will be difficult to restore. Fourth, native plants are challenging to grow on heavily degraded peatland [11].

All respondents thought that burning at the first land preparation was carried out because of the high density of bushes due to the long fallow period in each shifting cultivation cycle. Preparing the land with a high density of shrubs is difficult for them. Land clearing by burning is the fastest choice for them because besides being cheap and easy to do, it can also reduce the risk of paddy rice pests, namely rats.

Usually, people who do farming on peatlands make land preparation by burning. The land cultivated into agricultural land was initially in the form of shrubs with several trees or secondary peat swamp forests. Land clearing is done by using tools such as machetes and chainsaws. The remnants of tree trunks and twigs are then raised to be burned. Combustion facilitates cleaning, and the results of combustion are considered to increase the fertility of agricultural land. Besides, the combustion of the remaining stems and twigs (wood) that are not destroyed will become a nest of rat pests. Stages of land preparation by burning are presented in Figure 1.

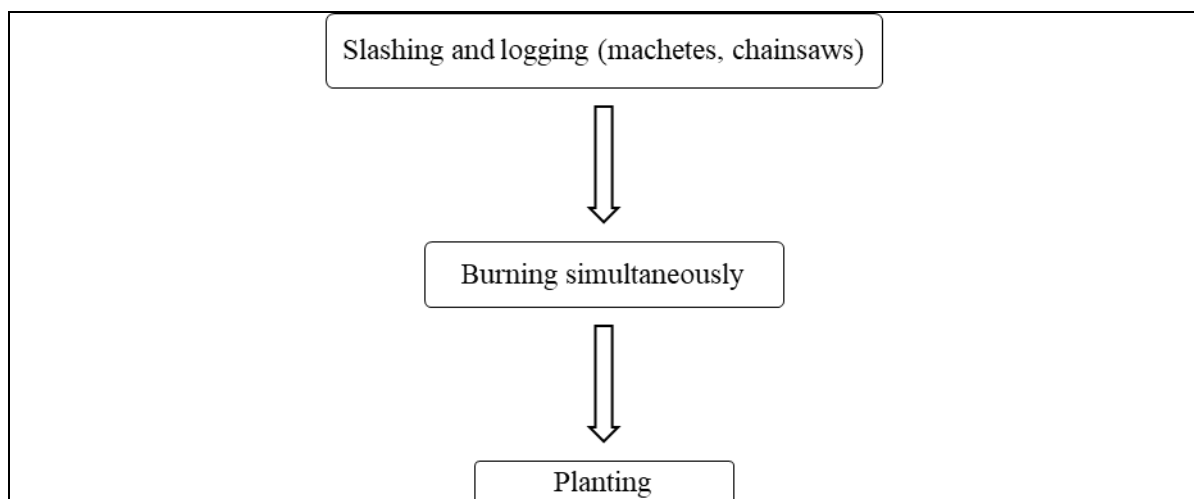


Figure 2. Land preparation by burning.

3.2. Land management after 2015

Government policy on the prohibition of land management by burning mainly on peatland has actually been done for a long time. Even based on Government Regulation No. 71 of 2014 concerning Protection and Management of Peatland Ecosystems expressly stated that every person is prohibited from burning peatlands and/or carrying out other activities that result in damage to the peat ecosystem [12]. However, the implementation was strictly carried out after the disaster of forest and land fires that occurred in 2015, which affected various socio-economic and cultural aspects of Indonesia. After 2015, the community was forced to change the culture of managing land by burning into land management without burning.

Implementation of a no-burn policy has encouraged farmers to seek alternative ways of managing land without burning. However, the government does not just give up its policies. Counseling and assistance with tools such as tractors for processing land and plant seed assistance were carried out for the success of this policy. It is quite successful in changing the current pattern of community land management.

In Rengas Merah Riding Village, the respondents have already tried to adapt to the prohibition on burning land in land clearing. Nowadays, the types of plants that are widely developed by community are paddy rice and corn with a 2 - 1 planting system, which is twice planting corn and 1-time planting paddy rice (IR 64, Ciherang) or vice versa. With this crop-planting system, farmers have to manage the farm and cannot leave the land for too long. Hence the condition of the bush is not too high and can still be treated using a tractor. The types of land management applied are in Table 1.

Table 1. The planting crops patterns applied by the community in Rengas Merah.

Cultivation pattern		Crops	Cultivation time	Harvesting time
Pattern 1	-	Paddy rice	October	January
	-	Corn	February	May
	-	Corn	June	September
Pattern 2	-	Paddy rice	October	January
	-	Paddy rice	February	May
	-	Corn	June	September

Source: Primary data (2018)

Some respondents have already implemented mixed garden systems on their land. Various types of fruits are planted to enrich the production of the farm. The species of plants planted include mango, banana, orange, water guava, guava and jackfruit. They use the *surjan* system, which is one of the mixed cropping systems where the planting is done on mounds so that during the tidal season, the plants will not be inundated. Besides, some people do land preparation without burning to plant paddy rice like in hamlet 5 in Senasi Mulya Kayu Labu village in Pedamaran Timur sub-district.

3.3. How did the community utilize peat without burning?

The prohibition on the use of fire in land preparation encourages farmers to adapt to agricultural cultivation. The results of in-depth interviews with farmers provided information that the community is still carrying out controlled burning practices in land preparation. Burning is done by collecting wood that cannot be destroyed with the equipment used. Controlled combustion is carried out in stages, on a small scale, in the afternoon when the wind is not strong, made firebreaks and monitored jointly by the community. In addition to the limitations of equipment, the burning of remaining logs and twigs is done because the remnants of stems and twigs will become the nest of rats, which are the main pest for agriculture. Two types of land preparation, which are usually done by the community, are presented in the figure below (Figure 2 and Figure 3).

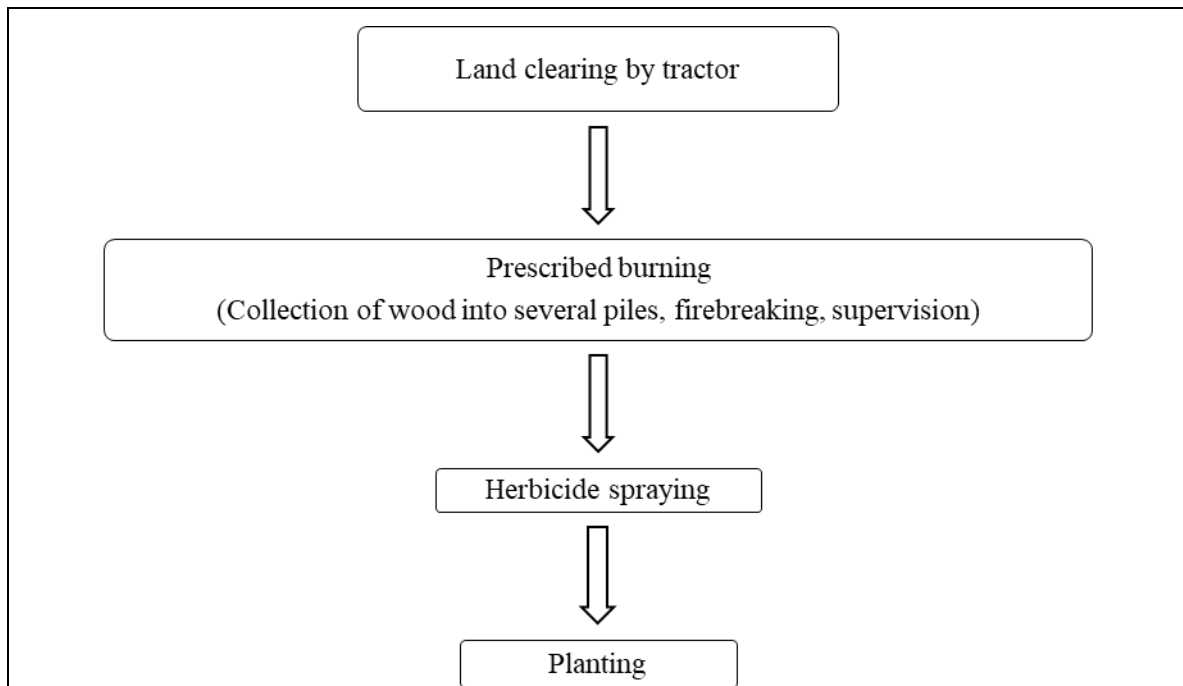


Figure 3. Land preparation type 1

Fire is still used in peatlands preparation that has never been used for cultivation or dense shrubs or vegetation previously. However, the use of fire can be carried out under the supervision of fire care organizations, such as community fire care (Masyarakat Peduli Api, (MPA) and prosperous village fire care (Desa Makmur Peduli Api, DMPA). The use of fire also can only be carried out at night after 7 PM with a maximum area of one hectare and bordered by firebreaks. Often people continue to burn land with an area of more than one hectare assuming that in the morning, the fires will go out. However, it potentially leads to more massive fire; hence this has to be a matter of concern. The reasons for using controlled are costless, short time, increasing soil fertility, and reducing rat pests. As a result of rat pests in 2017, most farmers experienced crop failure. Rat pest occurred because the community fully controlled the technology of land processing without burning. The role of the government, such as agriculture agency is essential to overcome the problems that may occur. For example, by increasing training to the community such as training in making compost using bio-decomposers to deal with haystacks quickly and at low cost and other training, it can increase farmers' knowledge so it would help to minimize the occurrence of crop failure.

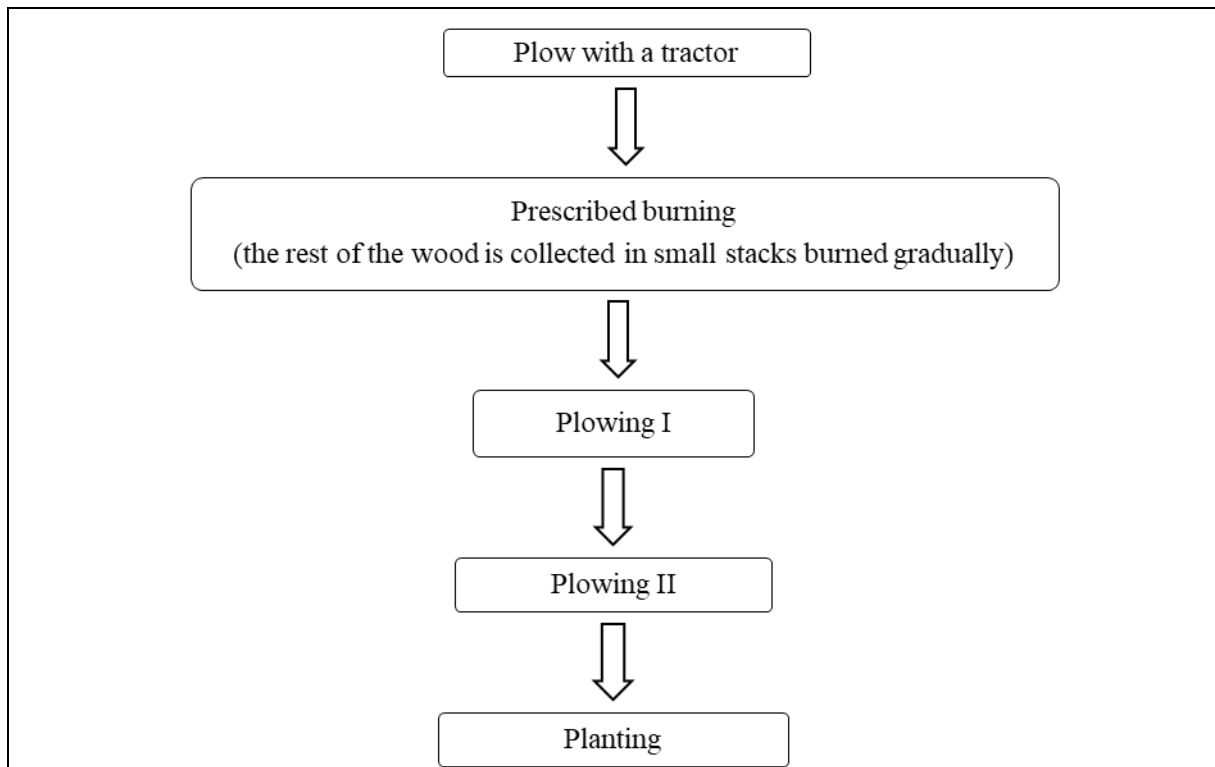


Figure 4. Land preparation type 2

This study also revealed that not all land could be processed without burning. Burning for land preparation is preferred by the community because it is fast and cheap. The cost comparison of land preparation is presented in Table 2.

Table 2. Cost of three types of land preparation.

No.	Description	Cost (Rp /ha)
A.	Land preparation by burning	
1.	Slashing	2,385,000
2.	Burning	300,000
	Amount	2,685,000
B.	Land preparation type 1	
1.	Plowing by tractor	1,200,000
2.	Prescribed burning	400,000
3.	Herbicide spraying	915,000
	Amount	2,515,000
C.	Land preparation type 2	
1.	Land clearing by tractor	1,200,000
2.	Prescribed burning	400,000
3.	Plowing 1	950,000
4.	Plowing 2	950,000
	Amount	3,500,000

Source: Primary data (2018)

Land preparation without burning can generally be carried out on land that has been intensively cultivated because the shrubs are not too dense. The land preparation without burning is presented in Figure 4. [13] suggested that land clearing without combustion can be carried out by fostering

communities from wild combustion methods to controlled burning, from controlled combustion to being nurtured again without burning land. The purpose is to achieve sustainable management of peatlands. In order to reduce fire risks, it needs a comprehensive and integrated policy package that covers the social dimension for preventing and controlling forest and land fires [14].

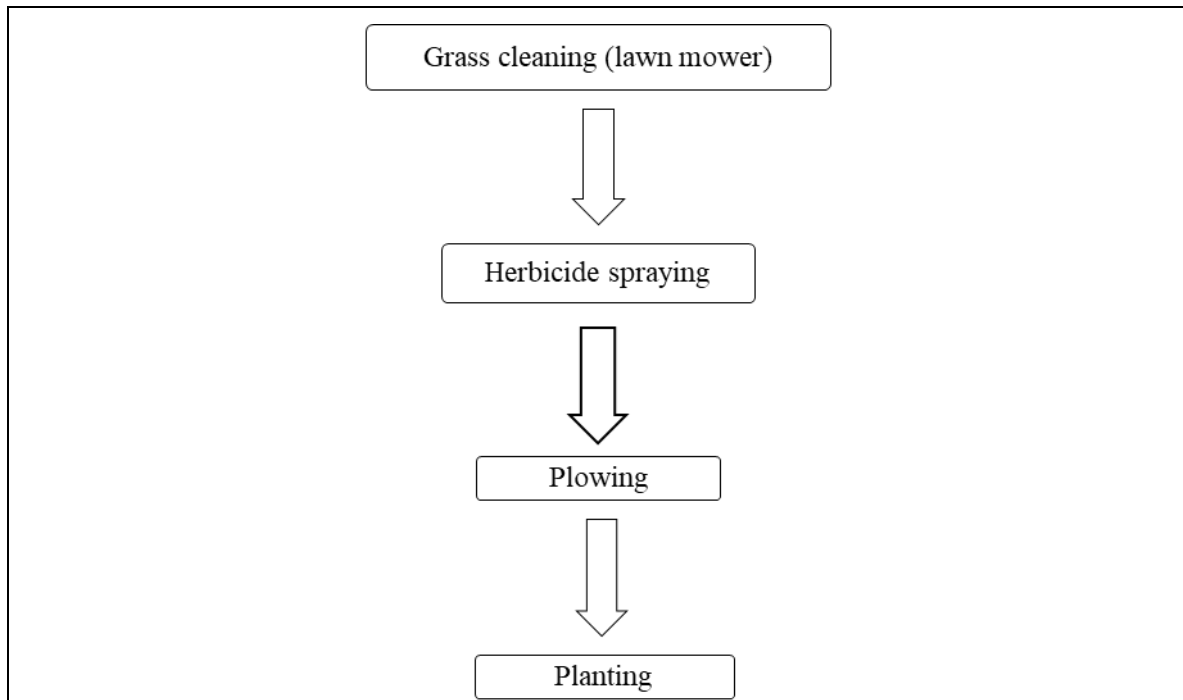


Figure 5. Land preparation type 3 (without burning)

3.4. Livelihood models of local initiatives based on the use of non-combustion peat swamps

3.4.1. Bekarang. Fishing (*bekarang*) is an activity commonly carried out by people who live in a wetland ecosystem. Communities in research locations conducted fishing activities for daily consumption. However, the community in Kayu Labu village, East Pedamaran Sub-district, also sold fish from *bekarang* to meet their daily family needs. However, they complained about the decline in their fish catches, both from the large rivers (*Batanghari*) and small rivers (*tulung*). According to them, the decline in fish catches has occurred since the establishment of oil palm plantations around Kayu Labu village, which caused the river body to be shed and the discharge reduced. Besides, the water flowing from the oil palm plantation area is suspected by the community to contain fertilizer residues (poison), which is poisonous to the fish.

In general, fishing in OKI Regency is managed by the *Lebak Lebung* auction system. *Lebak Lebung* is the open water district which consists of river area and land that forms marshes (*lebak*) and waterlogged lowland (*lebung*) [15]. In this system, people are allowed to catch fish for consumption without paying some money to the auction winners. If fishing is carried out for commercial purposes, fishers must pay a sum of money to get a fishing permit from the auction winners.

3.4.2. Edible bird nest (EBN). Some members of the community at the research site began to carry out edible bird nest development. In the beginning, they developed it on a small scale. They started to learn how to do this business from villages in Tulung Selapan and Sungai Lumpur Subdistricts that have similarities in environmental conditions and a success story from this business. The potential for EBN development is outstanding, so it requires involvement with industry so that the EBN becomes the source of wealth [16]. The cost of development of EBN in the research site is presented in Table 3.

Table 3. The cost of development edible bird nest.

No.	Description	Cost (IDR)
A.	The building of 'the house' edible bird nest	50,000,000
B.	Maintenance	1,225,000
C.	Harvesting	24,375

Source: Primary data (2018)

3.4.3. *Making purun mats.* *Purun* (*Lepironia articulate*) is a kind of grass that grows wild around water or swamps. It is found mostly around peat swamps and oil palm plantations. Respondents, especially women, use *purun* as raw material for making mats. This activity is one of the livelihoods of women in Kayu Labu Village. They make mats to help the family's economy. There are two types of *purun* used by the community, namely *purun sabal* (rough) and smooth *purun*. *Purun sabal* has a larger diameter size but has lower durability than smooth *purun*, hence mats made from it have a lower price. On the contrary, smooth *purun* mats have a higher price due to their longer weaving process. Also, smooth *purun* mats are softer so that the mat can be folded into small folds.

The marketing of those mats is only done at the local level. Buyers are other communities who do not have time to make it. In addition to being sold directly, it can also be used as a medium of exchange for everyday goods, where people can buy their goods and pay in installments with *purun* mat that they make. The price of *purun* mats is shown in Table 4.

Table 4. The price of *purun* mats at Kayu Labu village.

No	Type	Quality	Price (IDR)
1.	White Mats	Rough	8,000
		Smooth	10,000 – 15,000
2.	Colorful Mats	Rough	30,000 – 35,000
		Smooth	50,000
3.	Colorful Mats with edge sewing	Rough	none
		Smooth	70,000

Source: Primary data (2018)

4. Conclusion

The communities living on peatlands in two villages Rengas Merah-Riding and Senasih Mulya-Kayu Labu, tried to adapt with zero burning policy in land preparation, even though it has not been fully implemented. People are still burning in minimal intensity and under supervision from local community organizations that care about the fire (such as Masyarakat Peduli Api (MPA) and Desa Makmur Peduli Api (DMPA)). Control burning is carried out at night after 7 PM with a maximum area of one hectare; the land bordered by firebreaks. There are three options of alternative livelihoods without using fire, which is carried out by the community, including *bekarang* (fishing), making *purun* mat crafts and edible bird nest business. Implementation of zero burning policy on land preparation needs to be followed by advising service from the agriculture and forestry extension workers.

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