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REGULAR RESEARCH ARTICLE

Zero-Burning Policy in Land Preparation: Social Changes and Its Impact on Communities and the Environment

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ABSTRACT

In Indonesia, forest and land fires have become an annual occurrence, with devastating effects. Following major fires in 2015, the government implemented policies restricting the use of fire in land preparation. This policy has affected the livelihoods of traditional farmers who still use fire for land clearing. The research aims to analyze the social changes that have occurred among traditional farmers as a result of the policy to ban burning in land preparation, and to assess its impact. The study was undertaken in Pulang Pisau Regency (Central Kalimantan) and Ogan Komering Ilir Regency (South Sumatera). Findings reveal two types of social transformation processes, namely, changes in agricultural commodities and changes in livelihoods. In general, fire policy restrictions in land preparation improved peatland ecosystems, but has had a detrimental impact on some rural communities living around peatlands. To anticipate these effects, the government promoted no-burn land preparation techniques and initiated a new paddy field construction scheme. However, both were less successful due to local resistance for their unsuitability in the local context.

KEYWORDS

Social change; Traditional farming; Zero-burning policy; Land preparation; Peatland; Community livelihood.

1. INTRODUCTION

Indonesia has the largest peatlands in Southeast Asia, with an area of 20.2 million hectares. This size is equivalent to 88% of Southeast Asia's entire peatland area (ASEAN Secretariat, 2021). Peat provides ecological services (such as biodiversity preservation, carbon storage, oxygen production, and water balance), economic functions, and socio-cultural functions (wood production, community livelihoods, ecotourism) (Harrison et al., 2020; Syahza et al., 2020; Turetsky et al., 2015). Agricultural cultivation in peatlands also plays an important socioeconomic function (Darani et al., 2017; Wildayana, 2017). Nevertheless, agricultural techniques, whether large scale industrial practices or those employed by local communities cause fire to potentially devastating impacts (Akbar, 2015; Gunawan et al., 2020).

Forest and land fires continue to occur in Indonesia every year. Catastrophic forest and land fires in 2015 caused ecological, social, and economic consequences, as well as affecting neighboring countries. Following several major fire disasters, the government issued Presidential Instruction (*Instruksi Presiden* /Inpres) No.11 of 2015 on Increasing Control of Forest and Land Fires. This measure prohibits burning activities in land preparation. The government encourages a No Burn Land Preparation Technique (*Pembakaran Lahan Tanpa Bakar*/PLTB) and food estate programs are directed to improve regional food security. The implementation of Presidential Instruction No. 11 of 2015 was carried out through various joint operations, including participation of police and uniformed military to farming sites and settlements. In the regulation, perpetrators are threatened with (maximum) 15 years imprisonment and a fine of Rp 5

billion.

The government's strict law enforcement against arsonists has had a deterrent effect, resulting in a reduction in the number of fires on peatlands. However, this policy also had the unintended consequence of suppressing traditional ways of cultivation, especially planting rice that has been a part of the local community's way of life for generations. As a result, farmer livelihoods have been compromised due to a lack of adequate subsistence resources and reserves. This policy of prohibiting land clearing by burning therefore has a high potential in influencing social change.

Social change is often referred to as social transformation. According to Brooks et al. (2009), social transformation is a radical change in social structure, while Butzer (2012) views social transformation as a result of social collapse and thus as something unfavorable. According to several perspectives, transformation is an essential attribute of long-term operating systems. Transformation is defined as a change that promotes ecological sustainability and social welfare (Beddoe et al., 2009; Folke et al., 2010; Jackson, 2009). In this paper, social change is described as the major changing of social structures (that is, patterns of social action and interaction), including the repercussions and manifestations of such structures embodied in norms (rules of conduct), values, cultural goods, and symbols (Laurer, 2011; Theophilus & Jack, 2017; Wagoner & Power, 2021).

According to Arthur (2021), social change is determined by three elements: 1) changes in social structure, 2) changes in culture, and 3) changes caused by external factors. Social changes that occur in society are caused by several aspects, including population increase, conflict, new discoveries, natural disasters, wars, education, contact with other cultures, community dissatisfaction in certain domains, as well as political and power changes (Anwar & Adang, 2013; Martono, 2021; Saebani, 2016; Suryono, 2020) and agricultural developments (Osterburg et al., 2010). Another factor is social and cultural change (Antrop, 2005; Mattison & Norris, 2005).

The social changes that occur will be analyzed using Wallerstein's theoretical approach. According to Wallerstein, the historical stages consist of: minisystems, world-empires, and world-economies. Societies in the Global South are simple entities practicing simple agriculture or hunting animals. Wallerstein calls them 'minisystems' because they have a single cultural framework with a complete division of labor. The strong and rich core of society will dominate the poor and weak peripheral to society, and this is called unequal exchange. Transfer from a subsistence system to a technology-intensive industrial system also takes place through Karl Marx's idea of social reproduction and the division between bourgeois-proletarian. In this sense, the core state is shaped by the upper class, the semi-periphery state is the middle class and the periphery class is the exploited working class (Goldfrank, 2000; Wallerstein, 1979).

Wallerstein explains that the failure of growth in developing nations in a broader context is part of the functioning mechanism of the capitalist world economic system, which is already well established. His criticism emphasizes capitalism and social class inequality. Wallerstein's theoretical framework is an extension of Karl Marx's idea of social class struggle (Burhanuddin, 2016). According to some of Marx's theoretical conceptualizations, social structure is closely intertwined with social reality and material aspects. Individuals adapt to survive and fulfill their lives. The economic structure of society serves as a bridge between individuals and their material environment (Ritzer, 2012).

Forest and land fires in 2015 prompted Indonesia to issue Presidential Instruction (Inpres) No.11 of 2015 on Increasing Control of Forest and Land Fires. As a result, traditional peat farming experienced livelihood dilemmas due to reconfigurations

required to meet subsistence needs and development priorities. This has an impact on the social changes that occur in society. Therefore, social change is relevant for being analyzed by Wallerstein's perspective. Wallerstein's world systems theory was chosen because it describes the process of social change due to pressure from wealthier countries to urge developing countries, such as Indonesia, to reduce emissions. Burning peatlands harms peatland ecosystems. In this context, damaged peatlands are a significant source of greenhouse gas emissions, accounting for over 5% of worldwide human CO2 emissions (IUCN, 2021).

This research aims to enhance theories related to social change by evaluating social changes induced by governmental policies. There is limited scientific information available on social change resulting from policy changes in peatlands. The purpose of this article is thus to investigate the process of social change among traditional peat farmers after the implementation of a policy restricting the use of fire in field preparation, as well as the impact of the policy.

2. METHODOLOGY

2.1 Research location

The study was conducted in Ogan Komering Ilir Regency in South Sumatra and Pulang Pisau Regency in Central Kalimantan. Research samples were taken as an example, the number of hotspots in Central Kalimantan in 2015-2017 reached 9,055 points (Aguswan, 2019). In the same period (2015-2017), the number of hotspots in South Sumatera reached 26,230 points (BPBD Provinsi Sumatera Selatan, 2021). In 2015, Pulang Pisau Regency in Central Kalimantan Province and Ogan Komering Ilir Regency in South Sumatra Province contributed the most haze and fire in the two provinces. Incidents covered a total of 220,202 hectares in Pulang Pisau Regency, and 377,333 hectares in Ogan Komering Ilir Regency (Ekawati et al., 2024).

Figure 1. Map of the research site

The sites were selected based on their high number of fire incidents and traditional farming practices. Research samples were taken from two villages in each district. The

research sites in Ogan Komering Ilir are Tanjung Serang village and Rambai village; while in Pulang Pisau Regency were carried out in Jabiren village and Mantaren I village (Figure 1).

2.2 Data collection

Data collection included literature review, field observations, in-depth interviews, and focus group discussions (FGDs) in the two provinces between June to August 2023. In this study, 40 key informants were interviewed at the village level, with 10 informants from each village. Additionally, in-depth interviews were conducted at the provincial and district government offices, including the Provincial Forestry Service, Provincial Environment Service, Provincial Food Security Service, and Provincial Food Crops, Horticulture and Livestock Service. Further interviews were conducted at the Agriculture, Forestry and Plantation, and Environment Office of the District, the Production Forest Management Unit (FMU), the Regional Disaster Management Agency, academics from Palangkaraya University and Sriwijaya University, local NGOs and Forestry Extension Workers. FGDs were conducted at the village and central levels, involving all relevant parties. FGDs at the village level were attended by traditional peat farmers, traditional leaders, and village officials, while FGDs at the central level were attended by the Ministry of Environment and Forestry (KLHK), the National Research and Innovation Agency (BRIN), the Peat and Mangrove Restoration Agency (BRGM).

2.3 Data analysis

The study data will be presented in a qualitative and descriptive manner using tables, graphs, simple statistics, brief descriptions, narratives, charts, correlations between categories, and flowcharts (Yin, 2011). The data is evaluated interactively in a sequence that begins with data collection and progresses through data reduction, data display, and conclusion (Corbin & Strauss, 2008). Immanuel Wallerstein's thoughts on the world system are used to provide contextual analysis of the data.

2.4 Logical framework of research

The policy has a major impact on rice farmers in peatlands and encourages rapid social change or social transformation. The regulation is a powerful government tool to discourage arson (Soemanto, 2018). Prior to Presidential Instruction No. 11/2015, farmers cultivated rice using traditional methods based on local wisdom to meet their subsistence needs. The Presidential Instruction promoted changes in agriculture, including intensification, the adoption of new techniques for land clearing without burning, new rice field planting programs and food estates. However, traditional farmers may have difficulty accepting these sudden changes in agriculture, resulting in implementation challenges. There are two types of social change that occur, namely change in plant type selection and livelihood change.

One of the relevant development theories as an analytical tool in this paper is world system's theory from Wallerstein. Wallerstein's analysis of global socio-economic and political changes has geographic and geopolitical dimensions (Maiwan, 2017). Wallerstein argues that the world is a unit of analysis in understanding issues of development and social change. The Paris Agreement is a monumental global agreement to deal with climate change. The Paris Agreement is supported by 195 countries, including Indonesia. The zero-burning policy in land preparation is one form of climate change mitigation that will have a global impact, not only in Indonesia but around the world given its emissions reduction possibilities. In addition to the zero-burn policy, the government also offers an inclusive policy with rice field cultivation program and the food estate program, both of which are modernization initiatives promoted by

the agricultural sector.

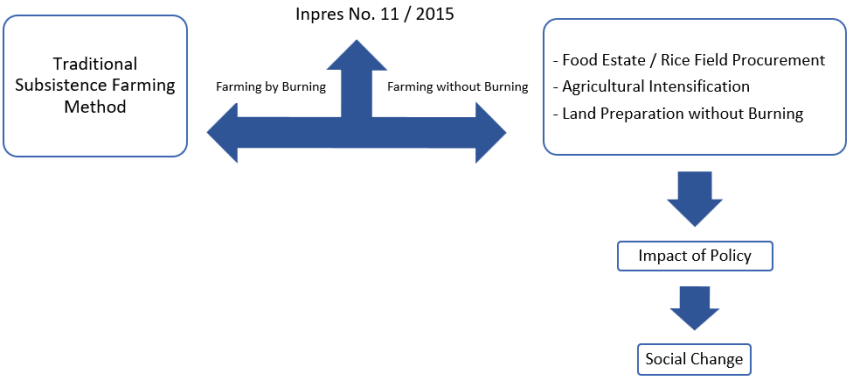

Figure 2. Presidential Instruction No. 11/2015 and social changes that occurred at the research location.

This paper will examine the phenomena of social change as a result of the existence of modernization as part of the development of world system's theories of capitalism developed following feudalism (Sundary, 2018). Following from Rostow (1960), who described the process of economic, social, political, and cultural transformation from traditional "backward" society to contemporary "industrial" society (Bohnet & Reichelt, 1972), they identify five economic development issues for further inquiry, one of which is about human dilemmas and mentalities.

In this study, the concept of Wallerstein's thought is contextualized to communities on peatlands that experience social changes due to the policy of prohibiting burning in land preparation. As a result of the product of bureaucratic structure that causes changes in the structure of society and affects other structures. Social changes that occur cause a transformation of the social system, impacting economies, socio-cultural dimensions, and ecological systems.

3. RESULTS

3.1 Impact of zero burning policy in land preparation

Domestic policies in developing countries are actually inseparable from globalization issues as they relate to the international discourse of forest regimes (Fisher et al., 2017), as well as policies prohibiting burning in land preparation. Policy implementation is the process of translating policy decisions into actions to achieve desired outcomes. Policies often fail or face implementation challenges due to various factors, such as complexity, uncertainty, ambiguity, conflict, and rejection (Hudson et al., 2019). Successful policy implementation is envisioned to advance sustainable development. Around the world, many policies fail to achieve their anticipated goals, however (Mugambwa et al., 2020).

As a result of these policies, impact on the social system in communities in Central Kalimantan and South Sumatera are variable. Some informants in Central Kalimantan and South Sumatera explained that the environment in their village becomes greener and the air is fresher as a result of the policy. The positive evidence they presented included improved public health because not a single villager was exposed to upper respiratory system infections due to haze and air pollution. Informants express that villagers no longer dare to burn land for agricultural activities. For example, when forest and land fires occurred in South Sumatra and Central Kalimantan from July to October

2015, the numbers who suffered from upper respiratory infections in the two provinces showed an increase compared to previous months (Ministry of Health of the Republic of Indonesia, 2016).

Negative impacts that occur include the loss of *handep* in Central Kalimantan and *gotong royong* in South Sumatera. Both of these are local wisdom and forms of local collaboration in agricultural activities. *Handep* for the Dayak Ngaju in Central Kalimantan philosophically at once means agreeing, taking a step, understanding, sharing the same fate, supporting each other, caring for each other, helping each other, working together, and overall a very close sense of kinship and togetherness (Dormauli et al., 2023; Hartati, 2018). Similar to *handep*, *gotong royong* is an activity carried out in South Sumatera in a particular community to work together and lighten the burden on persons in need. For example, in the agricultural sector, this takes place in the form of exerting energy together to do work in the fields (Sinaini & Iwe, 2020). Informants expressed that with the loss of the culture of mutual cooperation in socializing, the sense of togetherness is lost and what emerges is that community becomes more individualistic.

The ban on burning to prepare agricultural land also has an impact on the loss of cultural rituals associated with planting and harvesting rice. For the Dayak community, for example, before planting rice seeds, the tribal chief or field owner first places all the rice seeds and necessary items in the middle of his field before planting using the *tugal* method. They then pray to the creator for the rice to grow healthy and yield good harvests for the family. After that, *tugal* activities can be carried out together (Dormauli et al., 2023). When the harvest is abundant, the village community will hold an *'aruh ganal'* (thanksgiving) ceremony for the abundant harvest by inviting other village residents. Apart from that, before the burning is carried out, the Dayak community holds the '*mangirau*' ritual, namely giving offerings to the "guardian of the site" to ask for permission to clear the land; and also '*manjemburup*', which is a ritual to keep away or excuse spirits from the location that will be burned (Hadiwijoyo et al., 2017).

The area of farmers' arable control has also decreased, because land that is usually cultivated with rice fields, is now left empty and uncultivated. To meet their needs, some villagers migrated outside the area, such as to the Gunung Mas Regency for farmers in Pulang Pisau Regency, and Bangka-Belitung islands for farmers in Ogan Komering Ilir Regency. Farmers that cannot cultivate their lands due to the prohibition on burning have also sold lands to a palm oil company, thereafter becoming a worker paid by the owner of the palm oil company on the former land that had been sold. As a result, family food security becomes unstable, where once farmers harvested for food reserves for a year or more, now the culture of storing rice in rice granaries has quickly disappeared.

Another impact is the change in consumption patterns, from rice harvested by the farmers themselves on their own fields to rice subsidy programs delivered by the National Logistics Agency (*Badan Urusan Logistik/BULOG*). This change has resulted in a different social system, with women no longer involved in activities such as grazing and growing vegetables in the fields, which they used to do together. Informants also indicate links to mental health, particularly among mothers. The act of gathering to engage in mutually beneficial activities have impacts on family well-being.

Wallerstein's world systems theory argues that negative impacts resulting from policies indicate a failure of development. This is a common issue in the Global South, viewed as part of the working mechanism of the capitalist world economic system. The government hopes that its rice fields expansion programs, food estates, and providing assistance such as '*Bantuan Langsung Tunai* (BLT)' (direct cash assistance) or agricultural infrastructure will facilitate a shift in the community's social system from

traditional farming to more 'advanced' agriculture, and in turn improved development conditions. However, the program has not been successful, and changes in one structure have affected the structure of another (Dwiguna & Munandar, 2020; Husnain & Mulyani, 2021; Yeny et al., 2022).

Before the burning ban was imposed, the community met their food security needs from farming, both by *tugal* (Central Kalimantan) and *sonor* (South Sumatra). The results of farming an area of 1 hectare could meet the family's subsistence needs for a year until the next harvest. Farmers in Jabiren generally produce 2-4 tons of grain/ha/harvest. In addition to planting rice, farming activities also integrated vegetables, such as: cassava, corn, sour eggplant, tomatoes, chilis, etc. The crops are not sold but stored in rice barns at home.

In Jabiren Village, it was once known as the center of red rice with a very distinctive taste, while in Tanjung Serang was once a village famous as a producer of watermelons. The size of the watermelons were known to be quite large with a sweet taste. But the two commodities of pride from these two villages are now only memories. Farmers in Tanjung Serang Village no longer cultivate watermelons because their land has "sunk", due to changes in the nearby company's drainage system around the village. Farmers in Jabiren village do not plant red rice anymore because they have not farmed since the ban on burning was imposed.

Table 1. Positive and negative impacts of the implementation of the no-burn policy in land preparation.

No	Impact categories	Aspects		
		Social	Economical	Ecological
1.	Positive impact	Rarely develop upper respiratory tract infections	Crop losses due to fire reduced	- Reduced fire disasters - Reduced smog - Increased area of land cover from both planting (*sengon*, rubber, palm oil as well as natural regeneration (*belangeran)*
2.	Negative impact	- The loss of *handep* culture in farming - Loss of cultural rituals before planting and harvesting rice - Reduced area of farmers' arable control - Some villagers migrate outside the area to provide for their families - Become a palm oil worker on his own former land - The loss of the culture of storing rice in granaries	- Farmers' income is declining - Debt increases - Farming activities become expensive, (rent tools, fertilizers, medicine) - Farmers lose family food (rice) reserves - It used to be a rice buyer center - The loss of watermelon centers and brown rice centers - Frequent crop failure in tidal fields	- Tidal fields are submerged and overgrown with shrubs - Disappearance of some local varieties of rice (*sampoi, geragai, labata*)

No	Impact categories	Aspects		
		Social	Economical	Ecological
		- Loss of activities of mothers in grazing and growing vegetables in the fields	- It is difficult to get hired labor to work in the garden. - The wage system became dominant.	

3.2 Prohibition of burning land and social change

The context of time in the study of social change includes past, present and future contexts (Martono, 2021). Social changes in Pulang Pisau Regency, Central Kalimantan and Ogan Komring Ilir Regency, South Sumatera have similar characteristics, as shown in Table 2.

Table 2. Changes in farmer livelihoods before and after Presidential Instruction No. 11 of 2015 (Inpres)

No	Aspects	Before Inpres	After Inpres
1.	Changes in farming methods		
	Planting preparation	Burning (*tugal/sonor*)	Land preparation with a tractor
	Use of seeds	Local varieties	New varieties from the market
	Paddy planting	Mutual cooperation (*handep*) with traditional rituals	Self-employed workers with their families or hired workers
	Plant maintenance	Almost no plant maintenance	Fertilizing, pesticides, herbicide application
	Harvesting	Manually	With harvesting machines
2.	Changes in crop commodities	Dry land paddy	- Land left abandoned - Annual plants were replaced by trees named *sengon* (Paraserianthes falcataria) and fruit trees
3.	Shifting livelihoods	Most of them work as farmers	Villagers' livelihoods are more diverse

Along with the ban on clearing land by burning, farmers no longer carry out rice planting activities. Land preparation without burning cannot be done using simple equipment such as hoes and machete. but must use agricultural machinery such as four-wheeled and two-wheeled tractors, the Government has helped with these tools, but it costs money to rent and buy fuel oil. In addition, no-burn farming systems require regular maintenance, fertilization and pest/disease eradication.

When burning land was still allowed, the production costs incurred for farming are very small, it can even be said to be nil, because expenditure in the form of money was almost non-existent in past cultivation approaches. The seeds used are usually prepared by farmers from previous crops. Fertilization is not carried out because farmers use natural fertilizers in the form of ash left over from burning land. Land that is burned will destroy soil organic matter which has a positive effect on increasing nutrient availability (Beja et al., 2015; Firmansyah & Subowo, 2012). In addition, maintenance is not really needed because after rice seedlings are planted or spread, the land is then left for a long time until the rice grows large.

Farmers cannot carry out the techniques of paddy farming introduced by the government. In the first year of the new paddy expansion program, agricultural production facilities and infrastructure (tools, seeds, fertilizers, and pesticides) received assistance from the government. But the aid was not timely and targeted, resulting in crop failures. Farmers did not have enough money to buy agricultural facilities and infrastructure. The choice of farmers to switch agricultural commodities is a rational choice. Some farmers started planting *sengon* tree, fruit trees, and dabbling in planting oil palm. Palm oil and some fruits (such as crystal guava) require good drainage, which has a poor effect on peatlands. Peatlands that should have been kept wet were drained by creating canals which made peatlands vulnerable to fire.

In addition to changes in commodities, the impact of the ban on burning land also occurred on changes in livelihoods. Before there was a policy of prohibiting burning, family members gathered at home as farmers, only a few migrated to make a living in other areas. At that time the main food needs in the form of rice could still be obtained from their own land by burning to clear the land. After the policy of prohibiting burning, farmers could not produce rice from their land, so they had to find money to buy rice.

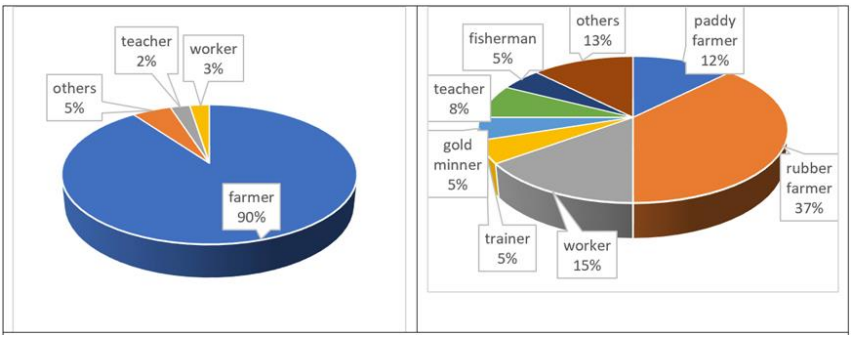

Figure 3. Changes in community livelihoods after the implementation of the policy of prohibiting burning in land preparation.

Prior to the implementation of the policy prohibiting burning in land preparation, this research revealed that 90% of respondents relied on farming as their livelihood, while the remaining worked as teachers or laborers in sawmill companies (Figure 2). Results show that livelihoods are relatively homogeneous, with a cultivation system rooted in social relations working together among families in the village. At that time, farmers cultivated their agricultural land by burning it before the rainy season arrived and planting it with rice (either with *tugal* or *sonor*) when the rainy season arrived. The *tugal* (paddy farming) is local wisdom in the Dayak community in Kalimantan in the agricultural sector, which is closely related to the system of burning land to clear fields (Djungan, 2021). Meanwhile, *sonor* is a process of preparing agricultural land which is preceded by burning the peat surface to obtain important nutrients from the burnt ash, after which rice seeds are spread on the burned peat land (Chokkalingam et al., 2004; Larastiti, 2018). *Sonor*, or *nyonor* as the community calls it, can also be defined as the activity of clearing land by burning for rice farming in swamp and peat areas, which is carried out by the community only when entering a prolonged dry season (Rozani et al., 2016). The differences between *tugal* and *sonor* are slight. With *tugal*, rice seeds are planted in small holes in the peatland, while *sonor* involves spreading rice seeds on the surface of the peatland.

After the Indonesian burning ban, people's livelihoods at the research site became more varied (Figure 2). This also has consequences in that some men left their family

and the village to work in other areas. Farmers in Pulang Pisau Regency migrated to Gunung Mas Regency to become artisanal/informal gold mining workers, working odd jobs as builders or construction porters, or on palm oil company laborers such as at PT. Kahayan Berseri and PT. Antang Sawit Perkasa. Farmers who remained at the sites were those who have tidal rice fields or or own oil palm and rubber groves.

Meanwhile, farmers living in Ogan Komering Ilir Regency migrated to Bangka Belitung Island to become informal tin miners. Farmers who choose to live in their villages grow rice in tidal land (*lebak*) or on mineral soils. Some of them work odd jobs as rubber tappers or on palm oil company operations (PT. Klanten Sakti, PT. Gading Cempaka Graha, and PT. Rambang Agro Jaya) around their villages as wage laborer. This change in livelihood is a transformation of the subsistence economic system into an economic system that is fully oriented towards meeting market needs (Purwana, 2013).

There are stories from farmers like Mr. Wancik (59 years old), a farmer in Tanjung Serang Village in South Sumatera, and Mr. Yoseph (49 years old), a farmer in Jabiren Village in Central Kalimantan, who have both radically shifted since "tunu" or burning prohibitions were enforced on their land. The two farmers are representative of the situations faced by farmers in the four research villages. Mr. Wancik added that before the burning ban, he went to the rice fields every day to farm. However, with the burning restriction, he must substitute activities, making it difficult to meet basic needs of his family. He occasionally worked as a wood scrapper (cutting wood), and he also worked for a daily wage on sugarcane and oil palm plantations. This circumstance left his income unpredictable, limiting his family's capacity to purchase rice and vegetables at the market. As a daily wage worker, he had to leave for work at dawn and return home in the evening. He performs this activity for 20 days each month. Prior to the burning restriction he only worked in the rice fields for half a day and then rested early at home.

Furthermore, abandoned rice fields are frequently flooded because of oil palm plantation canals that flow onto locals' rice fields. The extent of open land is now covered in shrubs that reach a human height, making it difficult to labor with only human strength. Similar to these conditions are the experiences of Mr. Yoseph. His family owns approximately 2 hectares of land, which was formerly entirely cultivated with rice after burning the land. However, the burning ban meant that only the one hectare of rubber plants could be cultivated. Another plot of farmland was abandoned due to a lack of means to prepare the land. Abandoned land became commonplace in the four research villages after the burning prohibition was imposed.

The communities in both research sites consist of traditional farmers who rely on natural conditions to manage their land. They understood these processes intimately, and fire was a key component of their cultivation practices. The farming techniques use simple tools materials available in surrounding areas. Burning to prepare land improves the acidity level of the soil, fertilizes the land, and prevents against pest outbreaks. Although the production inputs released are low, the results obtained can guarantee family food security for one year or more. The government issued several community empowerment programs, such as community outreach on land preparation without burning, expanding new rice fields, social forestry, and food estate programs. The paddy and food estate expansion programs use 'modern' farming techniques that local communities were previously unfamiliar with. The community at the research location were forced to follow external guidance on 'modernizing' their practice. For Wallerstein, modernization discourses are like a sharp double-edged knife. On the one hand, modernization theory suggests that interventions will lead to welfare and order, but on the other hand, modernization produces inequality. Farmers faced these dilemmas

about development and differentiation. Forms of proposed 'modernization' initiatives may not necessarily apply at these research locations because of historical factors, cultural relations, ecological adaptations, and overall habits that have been rooted in place for generations.

Wallerstein's concept also addresses the issue of exploitation of natural resources, practices which are carried out by the GoI. By carrying out a policy of prohibiting burning, the government seeks to make these areas centers of rice production, so that these areas also benefit from 'progress.' The policy of expanding new rice fields and food estates is an effort to also achieve food security more broadly, but the target of the program in this case were traditional farmers with a history of extensive practices, not rice farmers accustomed to fertilizer inputs, pecsticides, and mechanization.

Across the Global South, global donor initiatives and national governments are committing to support climate change adaptation and mitigation efforts. Global negotiations aim to support governments like Indonesia to work hard to reduce their emissions. Presidential Instruction No. 11/2015 is one of the government's efforts to reduce emissions from peatland fires. Unfortunately, the funding has not yet reached the communities described in this research in the most beneficial and targeted ways.

4. DISCUSSION

4.1 Implications of changing land management practices and commodities

Farmers at both research sites have for generations grown rice in the fields and planted rubber and fruits in their gardens. Their customary practices are passed down from their ancestors and practiced from generation to generation. When a farmer's livelihoods are threatened, the most difficult decision to make is to abandon land rather than plant it. According to Najiyati et al. (2005), most people on peatlands live far from the benefits of state resources or can access benefits from development projects. Indeed, they are often considered frontier regions and targeted for exploitation and enclosure. This causes some farmers to change their agricultural commodities. According to Suhardjito (2011) and Salampessy et al. (2017), tree cultivation is an established practice in the daily lives of local people, passed down from generation to generation, and serves as a source of socioeconomic stability for families. Farmers' choice of perennials to cultivate is influenced by various factors, including biophysical conditions, price, ease of sale, harvesting intensity, knowledge and skills, availability of labor (especially family labor), availability of capital, ease of maintenance and harvesting, inheritance, and yield diversity.

The changes in commodities and livelihoods have broad implications on the lives and livelihoods of local communities. The burning ban has led to the discontinuation of cultivation of local rice varieties, which have deeply rooted philosophical values among these communities. Not only are the varieties lost, but so are the traditional practices with which they are grown. In this research, we described the tugal or sonor and the ways these local cultivation practices have changed. It not only results in the loss of local varieties that are known to be more resistant to various diseases, but also suggests the loss of a way of life (Rohaeni et al., 2018). The loss of local rice varieties affects not only the production but also the consumption patterns of rice among farmers. When farmers can still produce local rice, they consume the same type of rice they produce. However, after they stop producing local rice, they switch to cheaper rice varieties that are widely available in the market and that they can afford to buy. The ban on burning has resulted in the destruction of local food systems and reduced people's ability to be self-sufficient in terms of food (Savitri et al., 2022).

Social cohesion varies depending on factors such as the importance of mutual aid, which may decrease as each member of the society becomes preoccupied with other livelihood pursuits. In farming, certain tasks cannot be completed alone, necessitating exchange or wage relations with other farmers or laborers. As a result, social reproduction and relations have also changed. Joint activities and mutual assistance in rice farming activities have declined significantly or have been altogether lost. Family structures have also changed as many able-bodied men (husbands and fathers) seek out work elsewhere along migratory networks. For instance, farmers in Pulang Pisau Regency migrated to work as gold miners, while farmers in Ogan Komering Ilir Regency migrated to work as tin miners in Bangka Belitung Province. This migration of men to other areas has even led to an increase in divorce cases in Tanjung Serang Village.

Due to the condition of abandoned land, Mr. Wancik in South Sumatera is only able to meet his and his wife's daily food needs. His children and daughter-in-law live separately and work as wage laborers to earn a living. Occasionally, he makes fruit baskets to sell to *duku* fruit merchants during the season. Unfortunately, Mr. Wancik will be unable to pass on his farming knowledge and skills to his children and grandchildren. The presence of large-scale palm oil companies and sugarcane plantations does not guarantee paths to prosperity for Mr. Wancik and his family, who now rely on daily wage labor.

Mr. Yoseph in Central Kalimantan was unable to cultivate his land without burning. Cultivating such a large area of land manually is difficult. Using heavy equipment results in large operational costs such renting heavy equipment, procuring fuel, and purchasing fertilizer to replace the fertilizing ash left behind by land burning. Therefore, the burning ban reduces family income because they have to buy rice instead of producing it themselves. Additionally, the price of rubber latex commodities at the farmer level is currently low, around Rp 6,000-7,000/kg.

These two stories demonstrate that the implementation of a national-scale policy, although relevant, does not always result in the mitigation of alternative solutions. It is important to consider adaptive approaches, rather than solely relying on technology or technical solutions. Assistance has been provided for agricultural infrastructure and water management in Tanjung Serang and other surrounding villages. However, many development projects have failed to restore agricultural functions for local livelihoods.

The transformation from a livelihood pattern of farming, built over hundreds of years, to an industrial society takes place in uneven ways in different locations. The people of Tanjung Serang may not necessarily seek modernization as a solution, especially in the ways that the government envisions for them. Linnert and Wibeck (2021) describes ways that social transformation takes place when policymakers acknowledge the various drivers including socio-cultural and political diversity. Therefore, it is crucial to comprehensively understand the roots of socio-cultural problems before implementing a policy.

Fire is an important component of community wetland management (Chokkalingam et al., 2004). Burning has long been a way of life that embedded into local culture. There is an economic calculation behind every rationalization of those who live from managing large tracts of land, or what Bohnet and Reichelt (1972) call the condition of human mental attitudes in building their economies. Being a farmer is a profession of pride and a legacy of practice for the peoples in these areas. Until now, there has been no cost-effective and efficient technology for land clearing without burning. By taking away bruning as a lang management option, the government has severely reshaped and impacted local communities.

4.2 Pursuing ecological interests at the expense of local livelihoods?

This research has shown that the issuance of Presidential Instruction No. 11/2015 on Improving Forest and Land Fire Control caused significant social and cultural changes in farmers. The government issued the ban on clearing land by burning due to the huge losses suffered by the Indonesian people as a result of land fires that occurred and continued to recur from year to year, and in 2015, the amount of losses from economic accumulation reached Rp 221 trillion (World Bank, 2015). Protests from neighboring countries also ensued from Malaysia, Singapore, Thailand, and the Philippines due to the haze affecting them from forest and land burning originating from Indonesia. The purpose of the regulation was to protect forests and land from massive damages caused by burning and its consequences, and also change farming patterns of farmers from burning habits to no longer burning when clearing land.

Looking at historical data on forest and land fires in Indonesia, the largest fires occurred in 2015 and 2019, which burned between 2.6 million and 1.6 million hectares, respectively, of forests and land in Indonesia. Of this area, around 29% occursed on peatlands (Putra et al., 2022). Based on emission data released by the Ministry of Environment and Forestry (MoEF) of the Republic of Indonesia, the forestry sector became the largest contributor to emissions in 2015 and 2019. Total emissions emitted from the forestry sector in 2015 reached 1.5 million Gg CO2 and in 2019 amounted to 923 thousand Gg CO2 which value was also contributed from forest and peatland fires (Dihni, 2022).

To overcome the impact of peatland burning in Indonesia, the Peatland Restoration Agency (BRG) was created through Presidential Decree No. 1 of 2016. BRG is tasked with accelerating the restoration of the hydrological function of peat damaged by fires and drainage of around 2.4 million hectares until 2020 (Siregar et al., 2021). Furthermore, the agency changed its name to the Peatland and Mangrove Restoration Agency (BRGM) through Presidential Regulation Number 120 of 2020. BRGM is a non-structural institution under the President tasked with facilitating the acceleration of peatland restoration and improving community welfare in peat restoration areas as well as carrying out mangrove rehabilitation in target provinces. The government also issued Government Regulation (PP) No. 71 of 2014 junto PP No. 57 of 2016 concerning Protection and Management of Peatland Ecosystems.

The establishment of BRGM and the issuance of several regulations related to peat show that the Government of Indonesia is very serious in maintaining peatland ecosystems and very concerned about reducing emissions. The MoEF noted that carbon emissions from forest and land fires produced from 2016 to 2021 in the country reached 980.5 million tons of CO_2e. The highest emissions were produced in the 2019 forest and land fires with a magnitude of 624 million tons of carbon dioxide equivalent or CO_2e (Dihni, 2022). To tackle CO_2e, MoEF has rolled out a mitigation policy to reduce greenhouse gas (GHG) emissions, especially from the forestry and land sectors through Indonesia's FOLU Net Sink 2030, which is a policy mandated in Presidential Regulation Number 98 of 2021 concerning Implementation of Carbon Economic Value to Achieve Contribution Targets Nationally Determined and Controlling Greenhouse Gas Emissions in National Development. This program uses four main strategies: avoiding deforestation, conservation and sustainable forest management, peatland protection and restoration, as well as increasing carbon uptake (MoEF, 2023).

Through ecological politics, human relations with the environment are reshaped by political and economic contexts influenced from near and far (Muharram et al., 2021). The ecological political views embedded into the regulation were not supported by a desire to determine the impacts on farmers who utilize burning in their land practices,

especially since they are not the biggest culprits of burning. This burning ban has significantly affected the livelihoods of farmers, undermining subsistence systems that have been carried out for generations. Communities believe burning improves the soil, and without, burning the land will not be as productive (Siregar et al., 2021). In addition, the impact of land and forest fires has only expanded after several large companies set fires in land clearing activities, especially to establish oil palm plantations (Hadiwijoyo et al., 2017). While the ban has decreased burning for land preparation on large company activities, the much less intensive burning by local traditional farmers have been much more significant. Farmers accept the government's policy, even though according to Saharjo and Munoz (2005), smallholders carry out controlled burning according to their local wisdom. The government thus needs to find the right balance to restore local welfare and food security for local families that have deeply rooted histories and cultivation practices in these landscapes. Thus far, however, peatland mitigation actions have failed to integrate important justice components (Merten et al., 2021).

The Indonesian government has issued a number of policies and regulations to better manage vast tropical peatlands, but peatland degradation and conversion in Indonesia continues (Carmenta et al., 2021; Herawati & Santoso, 2011; Uda et al., 2020). Although the policy of prohibiting burning in land preparation has a positive impact on peatland ecosystems, it has a negative impact on the social and economic life of farmers on peatlands.

5. CONCLUSION

One the one hand, the policy of prohibiting burning in land preparation has had some positive impacts on improving peatland ecosystems. On the other hand, the policy forces farmers to abandon longstanding livelihoods and important means of subsistence, especially among traditional rice farmers. Several government programs were introduced to support local food security after the issuance of the burning ban, especially new rice cultivation practices. However, these programs were unsuccessful due to their imcompatbility with local socioeconomic and ecological characteristics. It is important to note that agriculture 'modernization' programs instituted from external actors may not always be acceptable to traditional farmers, especially in areas with sub-optimal natural conditions such as peat. Significant social changes have taken place among farmers targeted by burning bans in potentially irreversible ways.

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