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The interplay of community, corporate, and government interests: An analysis of forest and land fires (FLFS) in South Sumatera

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ABSTRACT

Background: Forest and Land Fires (FLFs) in Ogan Komering Ilir (OKI), South Sumatera, pose significant ecological challenges. Driven by government policies, plantation businesses, and community activities, these fires spread due to peatlands and dry conditions. Satellite data from CIFOR shows an increasing affected area, from 150 km^2 in 2020 to over 250 km^2 in 2023, highlighting the urgent need for intervention. **Methods:** This study examines the complex interplay between community and company involvement, government policies, and FFGFs in OKI using a descriptive analytic approach method to enriched by a literature review, this study delves into the historical context and current state of forest and land fires in OKI. **Findings:** Previous research has highlighted the adverse impacts of these fires on the environment, economy, and community well-being, to address this, our hypothesis posits that collaborative efforts involving local communities, plantation companies, and government agencies can yield effective fire prevention and management strategies. Forest and land fires in OKI District are a complex issue because they are related to the awareness of the local community, plantation company management, and local government policies. **Conclusions:** The necessary effort is to encourage private plantation companies to support community involvement in the form of village-level fire control institutions facilitated by the local government. **Novelty/Originality of this Study:** This study provides a novel approach by analyzing the role of community, plantation companies, and government policies in addressing forest and land fires (FLFs) in the Ogan Komering Ilir (OKI) District. It proposes a collaborative solution, emphasizing the involvement of local communities through village-level fire control institutions, facilitated by the local government, to improve fire prevention and management strategies.

KEYWORDS: community involvement; descriptive analysis; forest and land fires; government policies; plantation companies.

1. Introduction

In Indonesia, forest and land fires (FLFs) are a persistent concern that lead to issues with the environment, economy, and public health. Fires on plantation and village fields cut by slash-and-burn techniques have severely damaged the OKI district in the province of South Sumatra (Nurhayati et al., 2021). Every year, severe land fires in OKI are caused by human activities that convert forests into agricultural and settlement areas. During the 2021 period, approximately 726.4 km^2 (4.2%) of the area was at high fire risk, followed by 5,621.3 km^2 (32.7%) and 10,835.3 km^2 (63.1%) at moderate and low fire risk zones, respectively. According to projections made using NDMI, NDVI, and LST1 data from 2021,

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there will be a rise in high fire risk areas in roughly 14% of areas between 2021 and 2040 and 30% of areas between 2041 and 2060 (Rendana et al., 2023).

The community plays a crucial role in both causing and preventing forest and land fires, human activity is a significant factor in causing these fires, with nearly 100% of forest and land fires attributed to human actions. Community members have long used fire to clear land for crops, often losing control of fires and villagers feel dependent on slash-and-burn as it is inexpensive, saving money for necessities, while understanding associated issues, some participate in illegal logging out of poverty (Nurhayati et al., 2020). The community in OKI has a unique relationship with the land, which is reflected in their behaviors that trigger peat fires, these behaviors include sonor, land preparation for plantation, and fishing. Sonor is a regional swamp rice cultivation method, is practiced post a three-month dry period when swamp river vegetation becomes dry and susceptible to burning (late September - October). Following minimal clearing post-burning of a huge area, seeds are sown after the initial rain of the season (November), growing without care until harvest. Sonor was originally practiced by local marsh and now is adopted by the migrants in the lower Musi Delta, South Sumatera, initially supported by locals for crop harvesting (Hamzah et al., 2019). These activities are deeply rooted in the history and culture of the people, indicating a strong dependence on the land for their livelihoods and the perception of the community towards peat fires is also influenced by their cultural and historical context (Fajrini, 2022). It can be shown from the data that people in OKI Regency have a moderate knowledge and perception of forest and peatland fire control, ranging from 56.7% to 83.3%, so that their understanding and attitudes towards peat fires are shaped by the knowledge, experiences, and cultural practices (Nurhayati et al., 2020).

Plantation companies hold concessions for large areas of drained peatlands in OKI that are highly prone to fire. Companies have been associated with using fire for land clearing and failing to adequately block fire spread within concessions (Resosudarmo et al., 2023). In Ogan Komering Ilir (OKI) district in South Sumatra, notable entities, such as PT Sampoerna Agro and PT Tempirai Palm Resources, had their burning oil palm plantations, covering 586 and 648 Ha respectively. These companies, implicated in deliberate land-clearing fires for their concessions or negligently allowing them to, account for a total of 9,953 sealed Ha in South Sumatra by The Ministry of Environment and Forestry (KLHK) (Ferdinan, 2021). The repercussions of the fires extend beyond corporate activities also significantly impacting the local population in OKI, with peatlands constituting 98% of the burned land, the destruction of these ecosystems results in profound losses for the surrounding flora and fauna (Saharjo & Novita, 2022). Micro weather changes in the district have led to a surge in Acute Respiratory Infections (ARI) among residents, causing economic losses related to education and healthcare expenses (Risdiyanto et al., 2020). Furthermore, the complex dynamics involving local residents, transmigrants, and plantation companies, coupled with the influence of traditional farming practices, underscore the multifaceted nature of forest and land fires in the OKI district. The companies alleged practice of financially incentivizing locals to conduct land burning not only harmed the cultural heritage and livelihoods of the people, but also exacerbates environmental degradation and health risks associated with the ongoing fires (Fajrini, 2022).

One of the main causes of these fires is the conversion of forests and peatlands into agricultural land in OKI, often involving the illegal burning of forests, this not only leads to deforestation but also contributes to the annual fire season, which results in severe air pollution affecting millions of people (Hicks, 2021). A key facet enabling rampant burning is legal ambiguity in national and local statutes around what constitutes permitted clearing methods and liability rules governing fire prevention duties - allowing covert exploitation through slash-and-burn techniques that spark uncontrollable peat blazes. District agencies are further hampered by data access barriers and monitoring constraints over concessions located within remote forests or community zones - frustrating evidence gathering on origin points. Moreover, connections between politicians and corporations have likely enabled avoidance of stringent audits or infringements through licensing loopholes within weakly-enforced legal frameworks (Hakim et al., 2021).

Weaknesses have been revealed in the rules and regulations put in place to control these fires. For example, government policy in Indonesia established a number of supervisory bodies to prevent and eradicate corruption within the judicial process; however, corruption by judges, prosecutors, and court officials appears to be persistent, indicating that these measures are ineffective (Siregar, 2023). The relationship between the government and businesses is another important factor in this problem. Asia Pulp & Paper Group (APP) PT OKI Pulp & Paper Mills (OKI), one of Indonesia's largest paper mills, intends to greatly increase the amount of paper that it produces there (Suhardi et al., 2019). In order to grow the pulpwood trees required to achieve this capacity, activists fear that these plans may result in increasing deforestation of Indonesia's natural forests and peatlands, worsening the country's yearly fire season (Sitanggang et al., 2022). The Indonesian government's deregulation drive, which eliminates social and environmental safeguards for a variety of industries, including pulp and paper, is helping these projects.

Addressing this issue requires a comprehensive approach that not only strengthens the existing policies and laws but also ensures responsible business practices by companies involved in land use (Sommer, 2022). Furthermore, it is crucial to enhance the capacity of supervisory bodies and improve the effectiveness of the judicial process in dealing with corruption, which is a significant impediment to effective FLF management (Budiningsih et al., 2022).

2. Methods

The study was conducted in the Ogan Komering Ilir (OKI) District, located in southern Sumatra, Indonesia, covering 19,023 km2 area. OKI has a tropical climate with distinct wet (Oct-Mar) and dry (Apr-Sep) seasons. Annual rainfall is 2600-2900 mm with average temperature of 31°C. Majority of the land is peatland (50.6%, 639,122 Ha), making it prone to hard-to-extinguish underground fires. Land cover is a mix of forests, shrub, plantations and settlements. Forest clearance activities have increased fire risk (Afifuddin et al., 2019). Fires frequently occur in OKI, responsible for 51% of South Sumatra's burnt area in 2015, over 17,000 and 4,500 hotspots were detected in 2015 and 2019. Since the study area are forest and land, the phenomenon of repeated fires in OKI change primary and natural forest properties, degrade vegetation, affect endangered tigers and elephants, and cause transboundary haze, with extensive flammable peatlands (Rendana et al., 2023). OKI regency has 327 villages and 769,348 residents face annual fires, necessitating conservation and fire mitigation efforts in this ecologically sensitive region.

Recurrent wildfires pose substantial threats to ecology and public welfare in OKI district located in southern Sumatra. Hotspot detection systems have recorded extensive burning, with over 17,000 and 4,500 hotspots documented in 2015 and 2019 alone, these fires spread harmful air pollution transnationally, severely reducing regional air quality (Arjasakusuma et al., 2022). Peatlands, which dominate OKI's landscape, are a major contributor to this problem, as fires can smolder underground in peats for long durations before reigniting. Additionally, rampant deforestation activities have significantly raised fire susceptibility by replacing native forests with highly flammable agricultural crops. OKI bears most of Sumatra's fire burden, being responsible for over 50% of all burning in South Sumatra in 2015 (Purnomo et al., 2018). Mitigation measures focused on peats and shifting land use incentives show promise towards addressing this urgent issue plaguing OKI communities and wildlife.

The research design is qualitative methods with a descriptive analytical approach were used to develop fire mitigation strategies that balance development and ecological sustainability in OKI. Data on fire frequency, land cover changes, climate patterns, stakeholders, and socioeconomic conditions were gathered and analyzed to identify key issues, interests, and complex interrelations driving problematic fires in the context of FLF in OKI (Thompson et al., 2021). This research will develop effective strategies for FLF management that consider the interests, capacities of all stakeholders and highlights key issues and literature, analyzing community, corporate and governmental interests and

complex interrelation driving problematic land and forest fires in the OKI district. The data analyze the hotspost area in OKI regency and largest fire-affected village in OKI district, targeted cooperative intervention is presented as essential to balancing development and ecological sustainability in the region (Pais et al., 2023). Discussion centers on research gaps and potential coordinated interventions needed for responsible land use and fire mitigation per principles of ecological integrity, social welfare and climate change mitigation (Tomar et al., 2021). The conclusion of this reasearch aimed to analyze then synthesizes it into policy recommendations and a collaborative management effort as an action regarding problematic forest and land fires, especially in the OKI area.

3. Results and Discussion

3.1 Ogan Komering Ilir (OKI) forest and land fires

Indonesian forest and land fires have long been a source of worry for regional, governmental, and international organizations (Edwards & Heiduk, 2015). Every year, especially as the dry season approaches, forest and land fire disasters strike Indonesia. In 2015, smoke and fires resulted in half a million cases of acute respiratory tract infections, 19 fatalities, and economic difficulties (Adinugroho et al., 2005). Damage to water supplies, carbon emissions, vegetation damage, loss of biodiversity, health expenses, disruption of business travel, and ecosystem restoration costs are additional losses brought on by forest and land fires. The worldwide ramifications of these fires encompass increased temperatures, decreased light intensity, and possible effects on the El Niño Southern Oscillation, sometimes known as ENSO (Harrison et al., 2009). Of the 2.6 million Ha of land burned, 33% were peatlands, and the remaining area was mineral, according to LAPAN data from 2015. Seven Indonesian provinces—Rau, Jambi, West Kalimantan, East Kalimantan, Central Kalimantan, Papua, and South Sumatera—are frequently struck by the worst forest and land fires.

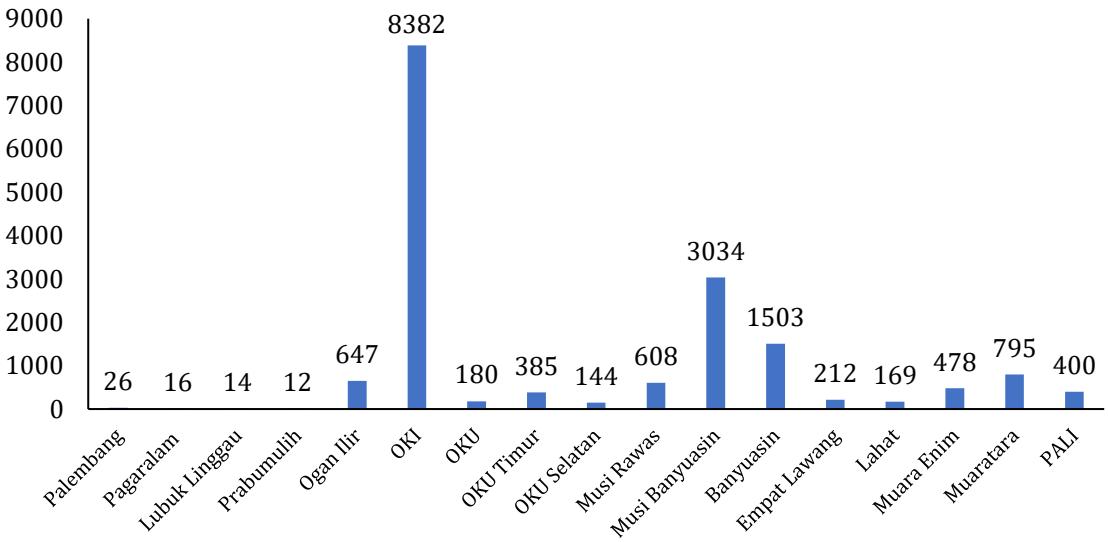

Fig. 1. Recapitulation of hotspot's data in South Sumatera Province, Indonesia in 2019

The province of South Sumatra has a significant danger of forest and land fires because to its large peatlands, which total 1,270,421 hectares (BPBD, 2021). With 638,379 hectares, Ogan Komering Ilir (OKI) Regency has the most peatland in South Sumatra, followed by Banyuasin Regency with 303,350 hectares and Musi Banyuasin Regency with 254,050 hectares. Since peatlands are made of organic material that has broken down, their degradation will result in a considerable amount of greenhouse gas emissions, particularly while the land is burning. Because of the drier peat surface conditions brought on by the decline in groundwater level (GWL) in peatlands, sensitivity to fires would rise (Saharjo &

Novita, 2022). As a result, draining peatlands may intensify already-existing fires or start new ones (Taufik et al., 2019), exacerbate recurring fires (Konecny et al., 2016).

Human activity is typically the source of forest and land fires, including burning marsh vegetation and clearing land for agriculture (Thoha et al., 2019). This can happen both singly and collectively, without authorization or in violation of rules. Extreme weather conditions, such as an extended dry season, can also raise the chance of fires, which are sometimes indicated by a rise in hotspots. Thus far, hotspots have been employed as a fire event predictor; however, not all hotspots found in satellite imagery are indicative of a fire. On the other hand, in terms of quality, the quantity of hotspots that are grouped together, accompanied by smoke, and that are seen to happen frequently, usually signals a fire occurrence in a region. Consequently, hotspot data remains the most efficient means of promptly (almost real-time) monitoring fires over wide areas.

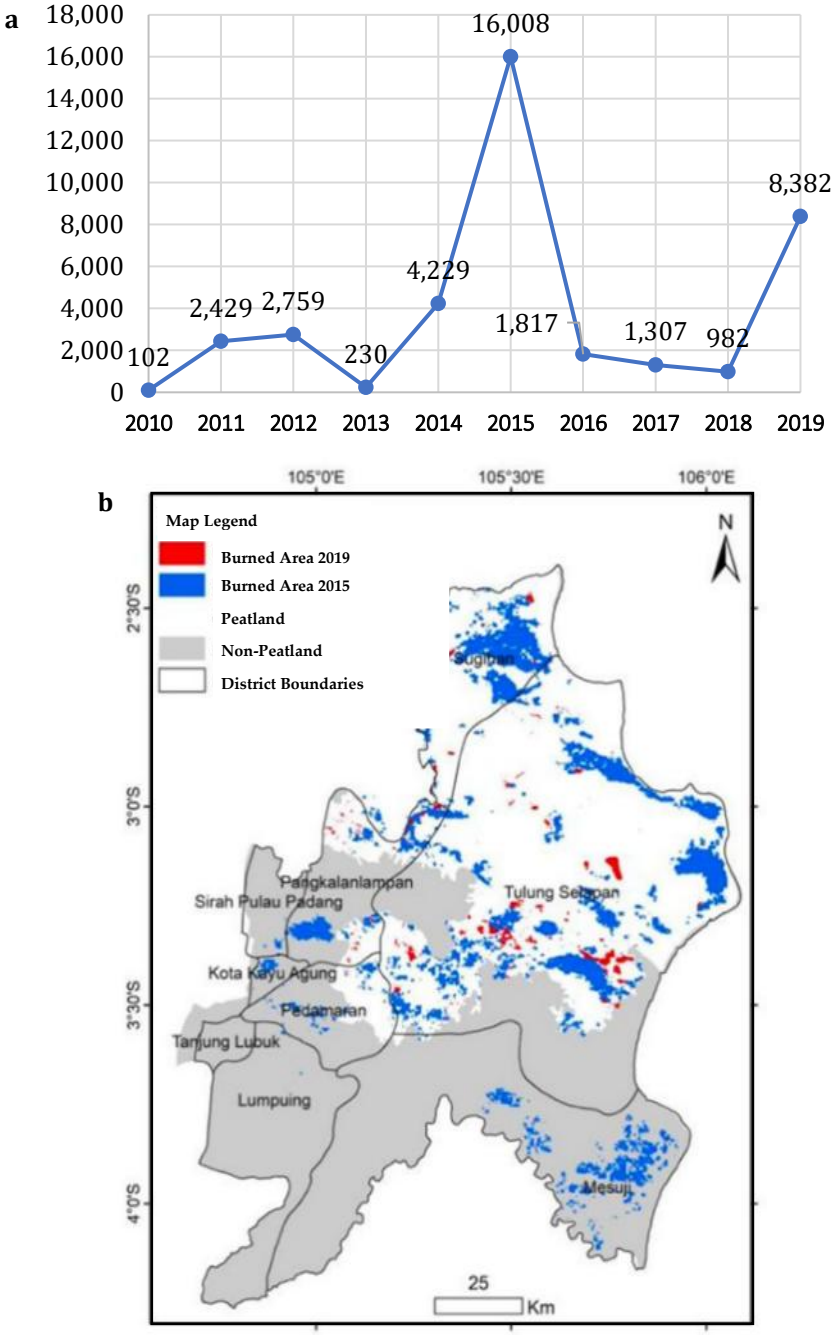

Fig. 2. (a) Data on Hotspot's Fluctuations in South Sumatra Province around 2010-2019; (b) Burned Area on Peatland in OKI District 2015-2019 (Nurhayati et al., 2020)

One of the fire centers in South Sumatra Province is located in Ogan Komering Ilir (OKI) Regency. Based on the data in (Fig. 2), it shows that OKI Regency is the regency that experienced the worst fire in South Sumatra Province in 2019. This can be seen from the data on the number of hotspots in 2019 from January to November with a total of 8,383 hotspots (BPBD, 2021). The high level of fires in OKI Regency is related to the characteristics of the land which is mostly peatland. Based on data from the South Sumatra Forest Fire Management Project (SFFMP)-Europe Union (2008) in BKSDA South Sumatra (2015), peatlands in South Sumatra reach 1,476,335 Ha with 653,726 Ha of peat dome and 822,609 Ha of non-peat dome, predominantly located in OKI and Muba Regencies. According to research by Yunardy et al. (2018), OKI Regency has an area of 1,704,244.54 Ha, with 65% of this area being Peat Forest Area (KHG), and only 35% is land.

According to Fig. 2, there were two notable land fire and forest fire incidents in OKI Regency between 2010 and 2019—specifically, in 2015 and 2019 (Fig. 2). In 2015, there was the biggest land and forest fire in OKI Regency, with 18,262 hotspots from July to November (Yuningsih et al., 2019). According to research data from Yunardy et al. (2018), the OKI Regency's peatlands and forest sustained the highest damage from fires in 1997, 2006, and 2015. Anthropogenic factors are the main source of fires in Indonesia and many other tropical locations (Bowen et al., 2002). This leads to both accidental and purposeful fires.

3.2 Community involvement in forest and land fires (KARHUTLA) in OKI

The community in Ogan Komering Ilir (OKI) consists of the native Ogan Komering tribe and immigrant tribes. The presence of immigrants in the peatland area of OKI began in 1970 with the Wetland Transmigration Program. However, their presence is still concentrated in the Air Sugihan District. Plantation company investors began to enter OKI in the 2000s to open palm oil plantation businesses (Martin & Winarno, 2010). Agriculture, forestry, and fisheries remain the basic and superior sectors relied upon in OKI Regency (Andikaputra, 2022), one of which is oil palm plantations and forest plantations. According to Basuki & Gayatri (2009), the agricultural sector contributes greatly to the formation of GRDP and development in OKI Regency. The existence of high land processing activities by the community and companies has the potential to cause fires. The triggers for natural forest fires used to be natural factors such as lightning, but now fires occur more often due to human factors related to anthropogenic land use changes (Baker & Bunyavejchewin, 2009). Based on Purnasari (2011) research in Pangkalan Lampan District, OKI Regency, it was stated that the cause of the fire in that location was sonor activities, nglebung, looking for sunken wood and negligence.

Sonor is a rice cultivation technique that is inherited and practiced by local communities living in marsh areas and along the coast of South Sumatra (Tampubolon et al., 2019), but has been adopted and associated with the culture of transmigrants who settled in the lower Musi delta. The sonor technique begins with land preparation which is done by burning the land, with or without efforts to control the burning. Then the rice is planted by scattering, there are also those who do the tugal system, does not require maintenance/fertilization activities. In South Sumatra, sonor is mostly performed in four regencies: OKI, MUBA, and to a lesser degree, OKU and Muara Enim. In the central and eastern regions of OKI, particularly along the Sugihan River, the sonor rice farming technique is highly significant (Bompard & Guizol, 2000). Small farmers and indigenous people now burn land as a custom, and there is evidence that small farmers have historically used fire in a reasonably controlled and small-scale manner.

If land processing involves burning, it may act as a catalyst for more serious forest and land fires. According to research by Hamzah et al. (2019), there were land fires and forest fires in South Sumatra, however the majority of the fire sources originated from land that the locals used to produce plants using the sonor technique. Shifting agriculture, forest concessions, plantations, and logging associated with changes in land use are the main causes of forest and peatland fires. According to Watts et al. (2019), industrial land uses

such as forestry operations, timber plantations, and agricultural plantations, as well as small-scale farmers' land preparation and opening, are the primary causes of large-scale fires.

Since the 1990s, scholars and the government have been concerned about land and forest fires in OKI brought on by the sonor culture (Bompard & Guizol, 2000). The subject of land and forest fires in Oklahoma is complicated since it includes numerous parties, including local communities, businesses operating at the local or regional level, and the government. Thus, efforts are required to address the issue of land and forest fires in OKI, necessitating a comprehensive response from the community, businesses, and government. Because sonor cultivation has shaped community perceptions and been ingrained in OKI culture, it has emerged as one of the main obstacles to finding solutions to the land and forest fire problem. The majority of the population in OKI Regency still employs fire for land opening (sonor), according to research by Tampubolon et al. (2019), and they believe it is difficult to prepare land without burning. The community is aware, meanwhile, that sonorous activities can interfere with health and start fires.

Efforts to resolve the problem of forest and land fires in OKI need to be done starting from prevention and mitigation. Prevention is not just a matter of socializing to the community about the prohibition of burning. But prevention is more aimed at how to prevent the fire from being ignited or a small fire can be extinguished before the fire spreads so it is difficult to control. The community in OKI generally already knows about the prohibition of burning land for land opening, therefore they hope for assistance from the government to cultivate the land (Tampubolon et al., 2019). For this reason, there needs to be a land and forest fire control agency in the field (site) consisting of several elements including the local community. This land and forest fire control agency at the site level will play a role so that the fire is not ignited or a small fire can be handled earlier (Budiningsih, 2017). One of the institutions formed to overcome the problem of land and forest fires at the site level is *Desa Makmur Peduli Api* (DMPA).

3.3 Government involvement in forest and land fires in OKI

The Indonesian government has long been concerned about land and forest fires. A Forest Fire Prevention and Control Project (FFPCP) was implemented in South Sumatra Province in 1997. It was funded by the European Union and the Indonesian Department of Forestry, and it lasted for six years, from 1995 to 2001. This project might indicate that Indonesia's land fire and forest fire problems are getting worse and that explicit policy is needed. FFPCP develops technical suggestions for managing forest and land fires and focuses on institutional elements that can affect the risk, causes, and extent of damage due to forest and land fires in South Sumatra, one of which is in OKI District (Bompard & Guizol, 2000). Nonetheless, Purnomo et al. (2017) state that the Indonesian government's attempts to combat land and forest fires are still deemed inadequate. Through the establishment of the Peat Restoration Agency (BRG) in January 2016, the October 23, 2015, moratorium on peatland conversion, and plans for a moratorium on the growth of oil palm plantations and mining, Indonesian President Mr. Joko Widodo has committed to reducing the amount of smoke haze produced by forest and land fires. However, a current issue in the community is a lack of trust in government institutions as a result of openness (Tacconi, 2016).

In an effort to lessen land and forest fires, the Indonesian government has released a variety of rules. The Forest Fire Control Center was founded in 1995 by the Minister of Forestry by Decree No. 188/Kepts-II/1995 in order to manage fires in forested areas. The National Land Fire Coordination Team was established by the Environment Minister in 1996 with the purpose of coordinating fires outside of forested regions. Moreover, the National Coordination Team for Forest and Land Fire Control was established by the Environment Minister's Decree No. Kep. 40/MenLH/09/97 to address fires that happen both inside and outside of forest regions (Herawati & Santoso, 2011). Significant and frequent fire incidents, however, suggest that the efficacy of these laws is restricted. Presidential Instruction No. 11/2015 was issued by the Indonesian President following a

sizable fire occurrence in 2015. In addition to stepping up law enforcement, this directive calls for more forest and land fire control, which serves as the foundation for a complete prohibition on burning.

The government realizes that forest and land fires are a multidimensional problem, so it requires cross-sector coordination to handle it. The government's efforts in dealing with fire problems by designing and implementing policies to reduce fire incidents in Indonesia. However, several studies show problems in handling forest and land fires. Based on Budiningsih's (2017) research, it states that the approach to handling or extinguishing fires is unable to provide good fire control performance in the case of forest and land fires in 2015 in South Sumatra, including OKI District. Another problem encountered is the difficulty of coordination between related institutions, the absence of an appropriate division of authority and responsibility among related institutions, and the institutional nature is still ad hoc (Simorangkir & Sumantri, 2002). The implementation of the design of forest and land fire control is divided into two types based on its situation, namely normal and alert/emergency situations. In normal status, prevention or fire control activities are carried out by each related institution in the region. In an emergency situation, government agencies related to fires join together to handle or extinguish fires in the form of a Task Force (Satgas) for Forest and Land Fire Control.

Presidential Instruction Number 11 of 2015 is used as a reference for the formation of a task force for forest and land fire control in the region, but it does not resemble the whole. Regional leaders usually form this Task Force when the fire condition has occurred and is declared as an emergency condition. This Task Force is formed to tend to control fires that have occurred. The involvement of multiple agencies is in one container, namely the Task Force (Satgas) for Forest and Land Fire Control formed by regional leaders. Based on the Contigency Plan document of the South Sumatra (BPBD, 2021), the emergency task force for forest and land fires is formed from the provincial level, city/district, sub-district, to the village.

The district Task Force is established by the regent, whereas the task force at the provincial level is established by the governor. This task force is ad hoc in nature and has a time constraint, often one year, to complete its tasks. It is not a permanent institution. Typically, the Task Force for Forest and Land Fire Control begins operations upon determination of the alert status and concludes upon revocation of the emergency status. The Regional Disaster Management Agency usually serves as this task force's coordinator or home base (BPBD). Since Law Number 23 of 2014 about Regional Government came into effect, forestry matters have been transferred to the province, with the exception of districts with Tahura. As a result, the governor is crucial to the region's leadership in containing forest and land fires, but in actuality, the regent or head of the subdistrict also plays a significant role in coordination (Budiningsih, 2017).

The Task Force for Forest and Land Fire Control in the District in South Sumatra Province consists of four sub-task force operations that serve in ground operations, law enforcement operations (Gakum), socialization, and public health. Prevention of Forest and Land Fires is carried out by the socialization sub-task force that disseminates information about the prohibition of burning in police circulars. The action of controlling Forest and Land Fires is carried out by the ground operations sub-task force (BPBD, 2021). Post-fire actions are carried out by the law enforcement operations sub-task force (Gakum) and the public health sub-task force. This multi-agency government coordination is usually realized in weekly meetings. During the meeting, it usually starts with the presentation of weather conditions and hot spots then determining the area to be extinguished or determining the point for water bombing treatment. Coordination of Forest and Land Fire Control between districts and provinces occurs if the district cannot extinguish the fire with its brigade then it will ask for help from the province.

The Head of Ogan Komering Ilir (OKI) Regency plays a crucial role in controlling forest and land fires, with the responsibility of mobilizing local government agencies in budget allocation, human resources, and infrastructure. A common issue on the ground is that the command line within the government structure is stronger than the coordination line in the

form of a task force, which consists of multiple agencies. For instance, during fire extinguishing, Manggala Agni can only coordinate with village governments, but the village governments themselves are more likely to listen to instructions from the district head or regent. From the implementation of forest and land fire control coordination, factors affecting the effectiveness of forest and land fire control coordination include authority, communication, control, and leadership. Authority is related to who has the authority in controlling forest and land fires. Strengthening the institutional control of forest and land fires requires an institutional structure from the province to the footprint (village).

The Forest Fire Control Brigade owned by KLHK has been built at the field level but does not have a structure up to the village level, although in some locations the Community Cares for Fire (MPA) has been formed, but this institution is still voluntary (Novra & Fazrias, 2008). The local government itself still has limited brigades, generally moving when forest and land fires are declared an emergency. In addition to institutions, human resources and budgets for operational costs are also still limited. On-call funds at BPBD can only be rolled out when forest and land fires are declared a disaster. However, usually when forest and land fires are considered a disaster, the situation and conditions are difficult to predict, especially on peatland.

The weaknesses and obstacles in overcoming forest and land fires are the sectoral approach (prevention and handling strategies for forest and land fires are not systematic, comprehensive, and integrated), policies that are not synchronized and inconsistent, mechanisms and procedures that are not transparent and coordinated, activities or programs that are not coordinated and weak law enforcement (Simorangkir & Sumantri, 2002). To strengthen the institutional forest and land fires, an institution that has provincial-level authority is needed and increases the effectiveness of the Working Group by changing the sectoral approach to functional by involving the public, namely entrepreneurs and community leaders. The formal institution formed by the government to overcome fires is not yet effective while in the village there have been forest fire prevention teams. The existence of Manggala Agni and the Manggala Agni Unit is still tactical and limited (Saharjo & Yungan, 2014). In relation to the forest and land fire control institution, Thoha (2014) stated that in the region it is necessary to develop a community-based early warning system for forest and land fires.

3.4 The involvement of plantation companies in forest and land fires in OKI

In Southeast Asian countries, shifting cultivation has given way to more permanent and intense land usage in agricultural practices (Cramb et al., 2009; Mertz et al., 2009). It is true that moving cultivation to open space entails burning, and using fire makes settled fields safer. This does not, however, mean that Indonesia will no longer employ fire to clear land. In contrast, fire is still utilized in Indonesia as a straightforward means of avoiding convoluted and stringent regulations pertaining to land use and forest management, as well as an effective means of clearing land. In contrast, fire is still utilized in Indonesia as a straightforward means of avoiding convoluted and stringent regulations pertaining to land use and forest management, as well as an effective means of clearing land. The use of fire to increase the amount of land used for economic purposes reflects this. Since fire is an inexpensive and efficient instrument for clearing land, the first—and most contentious—use of fire in this situation is for the opening of palm oil and timber plantations (Gouyon & Simorangkir, 2002; Simorangkir, 2006).

The Indonesian government initially attributed the fire to shifting cultivators, but later acknowledged that large-scale companies clearing land for commercial plantations producing palm oil, pulp, and timber—some of which were prompted by government policy—were more likely to be the cause of the fire (Harrison et al., 2009). Numerous studies have been conducted on the causes and effects of fires in Indonesia after the major fires that occurred in 1997 and 1998. The use of fire for land opening by small-scale farmers (Cattau et al., 2016) as well as land use for industry, including forestry and timber plantation activities, and agricultural plantations, including palm oil plantations (Purnomo et al., 2017; Sloan et al., 2017), has been identified as the primary cause of large-scale fires. Ogan

Komering Ilir District (OKI) is one of the many places in Indonesia where there are a lot of timber and palm oil plantations, given their huge potential.

Table 1. Plantation companies with burned land in South Sumatera during 2019 (Hutan Kita Institute – HaKI, 2019)

Company name	Permit	Location	Total burned area (Ha)
PT. Bumi Mekar Hijau	338/Menhut-II/2004 and 417/Menhut-II/2004	OKI	22,311.20
PT. Musi Hutan Persada	38/Kpts-II/1996	Muara Enim	10,175.79
PT. SBA	374/Menhut-II/2004	OKI	3,876
PT. Tiesico Cahaya Pertiwi	500/1168/IV/2002	Musi Banyuasin	3,815.50
PT. Rimba Hutani Mas	90/Menhut-II/2007	Musi Banyuasin	3,540.14
PT. Paramitra Mulia Langgeng	378/Menhut-II/2009	OKU dan Musi Rawas	3,409.55
PT. Hutan Bumi Lestari	01/SPK/KPHMM/IX/2016	Musi Banyuasin	2,084
PT. Bumi Andalas Permai	39/Menhut-II/2004	OKI	1,718.91
PT. Bumi Persada	688/Menhut-II/2010 and 79/Menhut-II/2009	Musi Banyuasin	1,546.91

Based on Bompard & Guizol (2000), since the 1980s most of the swamps on the OKI coast classified as Permanent Production Forests (about 500,000 ha), have been given to seven logging companies. PT. SBA Wood holds the largest concession of 134,200 Ha. In 1994 a fire occurred in the PT. SBA area but it is not known for certain whether the fire occurred deliberately or not related to logging and land opening activities in locations that were drained for the establishment of HPHTI plantations. The next fire appeared in the PT. SBA area in June 1999 until it burned an area of about 14,000 Ha. Currently, plantation companies in OKI are dominated by timber plantation companies for pulp and paper and palm oil plantations. Based on research by Martin & Winarno, (2010), stakeholders in OKI Regency have a preference for land utilization efforts for palm oil plantations because they are referred to as manifestations of collective action. There are several plantation companies in OKI, some companies can be seen in Table 1.

Based on Table 1, there are three plantation companies that have concession areas in OKI District with burned land in 2019, namely PT Bumi Mekar Hijau, PT. SBA, and PT. Bumi Andalas Permai. PT. Bumi Mekar Hijau is the company with the most extensive burned area, up to 22,311.20 Ha, due to its quite large concession area of 250,307 Ha. According to (Purnawan, 2019), the poor relationship between the village community and PT. Bumi Mekar Hijau due to conflict and land supervision caused a forest fire in 2015.

The Grand Design document for Forest, Plantation, and Land Fire Prevention published by Bappenas explains that, during the course of the last fifteen years, from 2000 to 2015, the years 2002, 2004, 2006, 2009, 2014, and 2015 saw the highest number of hotspot spots reaching fifteen thousand. These fires happened in the concession as well as outside of it. During this time period, concession areas accounted for 45% of hotspots on average. Specifically, 4% of hotspots were located in the Forest Product Utilization Business Permit in Natural Forest (IUPHHK-HA) area, 23% in the IUPHHK Industrial Plant Forest area, 16% in the oil palm plantation (KKS) area, and 2% in the overlapping area of the three. The remaining 55% took place outside the concession, with 21% and 34% of it in other use areas (APL) and forest areas, respectively. Between 2000 and 2015, a total of 101,791,661 hectares were burned; 34% of those fires occurred inside concessions, while 66% occurred outside (Rahayu et al., 2017). The majority of fires (68–71%) did not originate from concessions; instead, they originated from non-forest areas, and fires that did occur within concessions tended to be under control, according to research by Cattau et al. (2016).

Effective fire management should concentrate on separated land management activities in non-forested and degraded areas, particularly in areas close to oil palm concession borders and outside of settlement areas where fires are likely to occur. It should also target land management activities in oil palm concessions and areas surrounding

settlements. The Prosperous Village Cares for Fire (DMPA) is one initiative the Sinarmas Group company in OKI has developed. Integrated Forestry and Farming System (IFFS), or DMPA, was established in December 2015 with the goal of partnering with local communities to enhance livelihoods and lessen fires. The integration of forestry, agriculture, and vocational skill development is the main objective of the DMPA program. Similar to APP, other private sector organizations like APRIL and a number of oil palm and oil palm and plantation companies, as will be explained in the next section, initiated individual and collaborative village-based fire prevention programs and worked to improve the livelihoods of local communities, particularly in the OKI area, in addition to preventing fires and protecting land and forests (Purnomo et al., 2017).

4. Conclusions

Forest and land fires in the OKI Regency are partly caused by the slash-and-burn culture of the local community. The majority still use fire in land clearing (slash-and-burn) and believe that land preparation without burning is difficult to carry out. The community in OKI generally has realized that slash-and-burn activities can cause fires, health disturbances, and they are aware of the prohibition of burning land for land clearing. Therefore, there needs to be an institution at the village level (tapak) as a forum for local communities to get involved in controlling land and forest fires.

The plantation industry in OKI is dominated by wood plantation companies for pulp and paper and oil palm plantations. Effective fire management should target good land management activities within the concessions of private plantation companies. One of the efforts made by private plantation companies in OKI is by establishing Prosperous Villages Caring for Fire (DMPA) as a form of community involvement in controlling land and forest fires.

The existing fire control approach is still not optimal in the case of forest and land fires in 2015 in South Sumatra, including OKI Regency. There are coordination difficulties among related institutions, the absence of appropriate division of authority and responsibility among related institutions, and the institutional nature is still ad hoc. The governor has an important role in the leadership of controlling forest and land fires in the region, but in practice, the regent or sub-district head also has an important coordination role. In the region, it is necessary to develop a community-based early warning system for forest and land fires.

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Author Contribution

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References
Adinugroho, W. C., Suryadiputra, I. N. N., & Saharjo, B. H. (2005). *Panduan pengendalian kebakaran hutan dan lahan gambut*. Wetlands International - Indonesia Programme.

Afifuddin, Purwandani, A., Ardiyanto, R., Sumargana, L., & Frederik, M. C. G. (2019). Is Land and Forest Fire in Ogan Komering Ilir, Southern Sumatera, Affected by Climate Change?. In *2019 IEEE Asia-Pacific Conference on Geoscience, Electronics and Remote Sensing Technology (AGERS)*, 95–98. https://doi.org/10.1109/AGERS48446.2019.9034289

Andikaputra, A. (2022). Analisis potensi ekonomi dan kependudukan Kabupaten Ogan Komering Ilir. *Jurnal Paradigma Ekonomika*, *17*(2), 439–450. https://doi.org/10.22437/jpe.v17i2.16428

Arjasakusuma, S., Kusuma, S. S., Vetrita, Y., Prasasti, I., & Arief, R. (2022). Monthly Burned-Area Mapping using Multi-Sensor Integration of Sentinel-1 and Sentinel-2 and machine learning: Case Study of 2019's fire events in South Sumatra Province, Indonesia. *Remote Sensing Applications: Society and Environment*, *27*, 100790. https://doi.org/10.1016/j.rsase.2022.100790

Baker, P. J., & Bunyavejchewin, S. (2009). Fire behavior and fire effects across the forest landscape of continental Southeast Asia. *Tropical fire ecology: Climate change, land use, and ecosystem dynamics, 311-334.* https://doi.org/10.1007/978-3-540-77381-8_11

Basuki, A. T., & Gayatri, U. (2009). Penentu sektor unggulan dalam pembangunan daerah: Studi kasus di Kabupaten Ogan Komering Ilir. *Jurnal ekonomi & studi pembangunan*, *10*(1), 34-50. https://journal.umy.ac.id/index.php/esp/article/view/1280

Bompard, J. M., & Guizol, P. (2000). *Land management in the Province of South Sumatra, Indonesia. Fanning the flames: the institutional causes of vegetation fires*. Forest Fire Prevention and Control Project Kanwil Kehutanan dan Perkebunan, Palembang – European Union Ministry of Forestry and Estate Crops. https://agritrop.cirad.fr/476656/

Bowen, M. R., Bompard, J. M., Anderson, I. P., Guizol, P., & Gouyon, A. (2002, September 25). *Anthropogenic Fires in Indonesia: A View from Sumatra.* Cabi Digital Library. https://www.cabdirect.org/cabdirect/abstract/20023059365

BPBD. (2021). *Rencana Kontinjensi Bencana Kebakaran Hutan Dan Lahan (Karhutla) Provinsi Sumatera Selatan Tahun 2021*. Badan Penanggulangan Bencana Daerah

Provinsi Sumatera Selatan. http://bpbd.sumselprov.go.id/bpbd/renstra/rencana-kontijensi-bencana-karhutla-2021

Budiningsih, K. (2017). Implementasi kebijakan pengendalian kebakaran hutan dan lahan di Provinsi Sumatera Selatan. *Jurnal Analisis Kebijakan Kehutanan*, *14*(2), 165–186. http://dx.doi.org/10.20886/jakk.2017.14.2.165-186

Budiningsih, K., Nurfatriani, F., Salminah, M., Ulya, N. A., Nurlia, A., Setiabudi, I. M., & Mendham, D. S. (2022). Forest Management Units' Performance in Forest Fire Management Implementation in Central Kalimantan and South Sumatra. *Forests*, *13*(6), 894. https://doi.org/10.3390/f13060894

Cattau, M. E., Harrison, M. E., Shinyo, I., Tungau, S., Uriarte, M., & DeFries, R. (2016). Sources of anthropogenic fire ignitions on the peat-swamp landscape in Kalimantan, Indonesia. *Global Environmental Change*, *39*, 205–219. https://doi.org/10.1016/j.gloenvcha.2016.05.005

Cramb, R. A., Colfer, C. J. P., Dressler, W., Laungaramsri, P., Le, Q. T., Mulyoutami, E., ... & Wadley, R. L. (2009). Swidden transformations and rural livelihoods in Southeast Asia. *Human Ecology*, *37*, 323-346. https://doi.org/10.1007/s10745-009-9241-6

Edwards, S. A., & Heiduk, F. (2015). Hazy Days: Forest Fires and the Politics of Environmental Security in Indonesia. *Journal of Current Southeast Asian Affairs*, *34*(3), 65–94. https://doi.org/10.1177/186810341503400303

Fajrini, R. (2022). Environmental Harm and Decriminalization of Traditional Slash-and-Burn Practice in Indonesia. *International Journal for Crime, Justice and Social Democracy*, *11*(1), 28–43. https://doi.org/10.5204/ijcjsd.2034

Ferdinan. (2021, October 4). *KLHK Seals Oil Palm Plantation Company Land at OKI South Sumatra*. VOI English. https://voi.id/en/news/316681

Gouyon, A., & Simorangkir, D. (2002). *The economics of fire use in agriculture and forestry: a preliminary review for Indonesia*. Policy Commons. https://policycommons.net/artifacts/1375453/the-economics-of-fire-use-in-agriculture-and-forestry/1989716/

Hakim, A., Suwitri, S., Larasati, E., & Dwimawanti, I. (2021). Collaborative Governance in Peat Restoration in Ogan Komering Ilir District, South Sumatra Province. *Proceedings of the 1st Tidar International Conference on Advancing Local Wisdom Towards Global Megatrends, TIC 2020, 21-22 October 2020, Magelang, Jawa Tengah, Indonesia*. https://doi.org/10.4108/eai.21-10-2020.2311896

Hamzah, A. S., Darmawan, Sumawinata, B., Suwardi, & Djajakirana, G. (2019). Spatial analysis of hotspot data for tracing the source of annual peat fires in South Sumatera, Indonesia. *IOP Conference Series: Earth and Environmental Science*, *393*(1), 012068. https://doi.org/10.1088/1755-1315/393/1/012068

Harrison, M. E., Page, S. E., & Limin, S. H. (2009). The global impact of Indonesian forest fires. *Biologist*, *56*(3), 156–163. https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=f9dffea6c148af1ed969271b93944a6d862775be

Herawati, H., & Santoso, H. (2011). Tropical forest susceptibility to and risk of fire under changing climate: A review of fire nature, policy and institutions in Indonesia. *Forest Policy and Economics*, *13*(4), 227–233. https://doi.org/10.1016/j.forpol.2011.02.006

Hicks, R. (2021, July 23). *Revealed: APP's controversial Indonesian paper mill OKI plans to triple in sizeRevealed: APP's controversial Indonesian paper mill OKI plans to triple in size*. Eco-Business. https://www.eco-business.com/id/news/revealed-apps-controversial-indonesian-paper-mill-oki-plans-to-triple-in-size/

Hutan Kita Institute – HaKI. (2019, November 5). *Forestry Companies with Largest Burned Areas in South Sumatera Province In 2019.* Media Briefing by Hutan Kita Institute – HaKI, 1–7. https://hutaninstitute.or.id/release-fire-2019/

Konecny, K., Ballhorn, U., Navratil, P., Jubanski, J., Page, S. E., Tansey, K., ... & Siegert, F. (2016). Variable carbon losses from recurrent fires in drained tropical peatlands. *Global Change Biology, 22*(4), 1469-1480. https://doi.org/10.1111/gcb.13186

Martin, E., & Winarno, B. (2010). Peran Para Pihak Dalam Pemanfaatan Lahan Gambut; Studi Kasus Di Kabupaten Ogan Komering Ilir, Sumatera Selatan. *Jurnal Analisis Kebijakan Kehutanan*, *7*(2), 81–95. https://doi.org/10.20886/jakk.2010.7.2.81-95

Mertz, O., Padoch, C., Fox, J., Cramb, R. A., Leisz, S. J., Lam, N. T., & Vien, T. D. (2009). Swidden Change in Southeast Asia: Understanding Causes and Consequences. *Human Ecology*, *37*(3), 259–264. https://doi.org/10.1007/s10745-009-9245-2

Novra, A., & Fazrias. (2008). *Kajian kebijakan pengendalian kebakaran lahan dan hutan Provinsi Jambi: Analisis kebijakan secara antisipatif dan responsif.* Balai Penelitian dan Pengembangan Daerah Provinsi Jambi.

Nurhayati, A. D., Hero Saharjo, B., Sundawati, L., Syartinilia, S., & A. Cochrane, M. (2021). Forest and Peatland Fire Dynamics in South Sumatra Province. *Forest and Society*, 591–603. https://doi.org/10.24259/fs.v5i2.14435

Nurhayati, A. D., Saharjo, B. H., Sundawati, L., & Vetrita, Y. (2020). Perilaku dan persepsi masyarakat terhadap terjadinya kebakaran gambut di Ogan Komering Ilir Provinsi Sumatera Selatan. *Jurnal Pengelolaan Sumberdaya Alam dan Lingkungan (Journal of Natural Resources and Environmental Management)*, *10*(4), 568-583. https://doi.org/10.29244/jpsl.10.4.568-583

Pais, S., Aquilué, N., Honrado, J. P., Fernandes, P. M., & Regos, A. (2023). Optimizing Wildfire Prevention through the Integration of Prescribed Burning into 'Fire-Smart' Land-Use Policies. *Fire*, *6*(12), 457. https://doi.org/10.3390/fire6120457

Purnasari. (2011). *Strategi pencegahan kebakaran berbasis masyarakat: Kajiaan biofisk, ekonomi, sosial dan budaya masyarakat sekitar kawasan Suaka Margasatwa Padang Sugihan di Provinsi Sumatera Selatan*. UNDIP. http://eprints.undip.ac.id/31412/

Purnawan, H. W. (2019). *Skenario Kemitraan Kehutanan 2022 Gabungan Kelompok Tani Riding Bersatu Dan PT. Bumi Mekar Hijau*. Universitas Indonesia. https://lib.ui.ac.id/detail?id=20482519&lokasi=lokal

Purnomo, H., Komarudin, H., Ilham, Q. P., Joni, A., Aenunaim, J., Puspitaloka, D., ... & Pacheco, P. (2018). *Public policy for strengthening and scaling up community-based fire prevention initiatives of private corporations to benefit the environment and livelihoods*. Center for International Forestry Research.

Purnomo, H., Shantiko, B., Sitorus, S., Gunawan, H., Achdiawan, R., Kartodihardjo, H., & Dewayani, A. A. (2017). Fire economy and actor network of forest and land fires in Indonesia. *Forest Policy and Economics*, *78*, 21–31. https://doi.org/10.1016/j.forpol.2017.01.001

Rahayu, N. H., Widiaryanto, P., Rosylin, L., Firdaus, R., Suprapto, U., Purnomo, H., ... & Nugraha, M. (2017). *Grand Design: Pencegahan kebakaran hutan, kebun dan lahan 2017-2019*. Direktorat Kehutanan dan Konservasi Sumber Daya Air Kementerian Perencanaan Pembangunan Nasional/Badan Perencanaan Pembangunan Nasional (BAPPENAS) https://www.cifor.org/knowledge/publication/6669/

Rendana, M., Idris, W. M. R., Rahim, S. A., Abdo, H. G., Almohamad, H., Al Dughairi, A. A., & Albanai, J. A. (2023). Current and future land fire risk mapping in the southern region of Sumatra, Indonesia, using CMIP6 data and GIS analysis. *SN Applied Sciences*, *5*(8), 210. https://doi.org/10.1007/s42452-023-05432-6

Resosudarmo, I. A. P., Tacconi, L., & Waluyo, E. A. (2023). Enforcement and compliance with the no-burning policy on villagers in Indonesia. *Forest Policy and Economics*, *151*, 102968. https://doi.org/10.1016/j.forpol.2023.102968

Risdiyanto, I., Turyanti, A., & Kurniawan, F. (2020). Quantification methods of forest and land fires impact on the atmospheric environment (case study: oil palm plantation in Kayuagung District, OKI Regency, South Sumatra). *IOP Conference Series: Earth and Environmental Science*, *504*(1), 012023. https://doi.org/10.1088/1755-1315/504/1/012023

Saharjo, B. H., & Novita, N. (2022). The High Potensial of Peatland Fires Management for Greenhouse Gas Emissions Reduction in Indonesia. *Jurnal Silvikultur Tropika*, *13*(1). https://journal.ipb.ac.id/index.php/jsilvik/article/download/40972/23385/

Saharjo, B., & Yungan, A. (2014). Pengaruh kebijakan dalam upaya pengendalian kebakaran hutan dan lahan terhadap penurunan emisi gas rumah kaca. *Jurnal Silvikultur Tropika*, *5*(2), 124–130. https://journal.ipb.ac.id/index.php/jsilvik/article/download/8951/7005

Simorangkir, D. (2006). Fire use: Is it really the cheaper land preparation method for large-scale plantations? *Mitigation and Adaptation Strategies for Global Change*, *12*(1), 147–164. https://doi.org/10.1007/s11027-006-9049-2

Simorangkir, D., & Sumantri. (2002). *A review of legal, regulatory and institutional aspects of forest and land fires in Indonesia*. Project FireFight South East Asia.

Siregar, K. (2023, September 28). *Coughing babies, DIY-firefighting farmers: Anger rising among locals in South Sumatra as province battles forest fires*. CNA Worldwide. https://www.channelnewsasia.com/asia/indonesia-forest-fires-health-risks-children-safety-3803201

Sitanggang, I. S., Syaufina, L., Trisminingsih, R., Ramdhany, D., Nuradi, E., Hidayat, M. F. A., ... & Krisnanto, F. (2022). Indonesian forest and land fire prevention patrol system. *Fire*, *5*(5), 136. https://doi.org/10.3390/fire5050136

Sloan, S., Locatelli, B., Wooster, M. J., & Gaveau, D. L. A. (2017). Fire activity in Borneo driven by industrial land conversion and drought during El Niño periods, 1982–2010. *Global Environmental Change*, *47*, 95–109. https://doi.org/10.1016/j.gloenvcha.2017.10.001

Sommer, J. M. (2022). The impacts of corruption on forest loss: A review of cross-national trends. *Sociology Compass*, *16*(9). https://doi.org/10.1111/soc4.13016

Suhardi, M., Suleman, Z., & Azwardi, A. (2019). Mediation and Agreement of Forestry Cooperation as a Conflict Settlement of Bumi Mekar Hijau LLC Production Forest Area with Community of Riding Village (Case study of Riding village, Ogan Komering Ilir Regency, South Sumatra Indonesia). *Sriwijaya Journal of Environment*, *4*(1), 7–13. https://doi.org/10.22135/sje.2019.4.1.7

Syaufina, L., Rihuljihad, M. H., & Nurhayati, A. D. (2021). The possibility of covid-19 pandemic in eliminating burning activities: a case study at Ogan Komering Ilir Regency, South Sumatera. *Jurnal Manajemen Hutan Tropika*, *27*(3), 165-165. https://doi.org/10.7226/jtfm.27.3.165

Tacconi, L. (2016). Preventing fires and haze in Southeast Asia. *Nature Climate Change*, *6*(7), 640–643. https://doi.org/10.1038/nclimate3008

Tampubolon, J., Aluyah, C., & Heptiana, E. (2019). Persepsi masyarakat Desa Riding Kabupaten Ogan Komering Ilir terhadap upaya pencegahan kebakaran di lahan gambut. *Sylva: Jurnal Penelitian Ilmu-Ilmu Kehutanan*, *7*(2), 49–57. https://jurnal.um-palembang.ac.id/sylva/article/download/1540/1296

Taufik, M., Setiawan, B. I., & Van Lanen, H. A. J. (2019). Increased fire hazard in human-modified wetlands in Southeast Asia. *Ambio*, *48*(4), 363–373. https://doi.org/10.1007/s13280-018-1082-3

Thoha, A. S. (2014). *Model penguatan kelembagaan pengelolaan risiko kebakaran hutan dan lahan berbasis masyarakat*. IPB University. https://repository.ipb.ac.id/handle/123456789/69980

Thoha, A. S., Saharjo, B. H., Boer, R., & Ardiansyah, M. (2019). Characteristics and causes of forest and land fires in Kapuas District, Central Kalimantan Province, Indonesia. *Biodiversitas*, *20*(1). https://doi.org/10.13057/biodiv/d200113

Thompson, M. P., Gannon, B. M., & Caggiano, M. D. (2021). Forest roads and operational wildfire response planning. *Forests*, *12*(2). https://doi.org/10.3390/f12020110

Tomar, J. S., Kranjčić, N., Đurin, B., Kanga, S., & Singh, S. K. (2021). Forest fire hazards vulnerability and risk assessment in sirmaur district forest of Himachal Pradesh (India): A geospatial approach. *ISPRS International Journal of Geo-Information*, *10*(7). https://doi.org/10.3390/ijgi10070447

Watts, J. D., Tacconi, L., Hapsari, N., Irawan, S., Sloan, S., & Widiastomo, T. (2019). Incentivizing compliance: Evaluating the effectiveness of targeted village incentives for reducing burning in Indonesia. *Forest Policy and Economics*, *108*, 101956. https://doi.org/10.1016/j.forpol.2019.101956

Yunardy, S., Ulya, N. A., Junaedy, A., Kunarso, A., Harbi, J., & Milantara, N. (2018). *Hutan OKI Kembali Lestari: Pembelajaran dari Pengelolaan Hutan di Kabupaten OKI Sumatera Selatan.* Unsri Press.

Yuningsih, L., Bastoni, B., Yulianty, T., & Harbi, J. (2019). Analisis Vegetasi pada Lahan Hutan Gambut Bekas Terbakar di Kabupaten Ogan Komering Ilir (OKI), Provinsi Sumatera Selatan, Indonesia. *Sylva: Jurnal Penelitian Ilmu-Ilmu Kehutanan*, *7*(2), 58–67. https://jurnal.um-palembang.ac.id/sylva/article/view/1541/1297

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