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THE *MALAN SEHA* LOCAL WISDOM IN PRESERVING FORESTS IN KAPUAS REGENCY, CENTRAL KALIMANTAN, INDONESIA

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ABSTRACT

This study investigates why regulatory and rehabilitative efforts to prevent recurring peatland fires in Kapuas Regency, Central Kalimantan, have failed to create environmentally conscious subjects or to shift local land-burning practices. Despite the implementation of numerous policies and programmes since the 1990s, fire incidents continue to occur. This indicates a persistent gap between state-led environmental governance and local community responses. Drawing on a multi-actor ethnographic approach and the Abductive-Causal-Eventism (ACE) framework, this study examines how regulatory interventions interact with local cultural values, economic rationalities, and lived experiences. Data were collected between 2010 and 2015 through participant observation, in-depth interviews, and secondary materials review. The findings reveal that, rather than fostering internalised environmental responsibility, these interventions have generated fragmented, tactical forms of compliance. This study conceptualises this condition as frictional environmentality, defined as a form of environmental subjectivity characterised by cultural tension and strategic behaviour that emerges when universal environmental goals encounter local socio-cultural realities. Overall, this study contributes to environmentality theory by extending the understanding of how environmental subjects are unevenly formed in contexts of contested governance. It also offers insights for designing more culturally embedded and participatory approaches to peatland fire governance in Indonesia.

Keywords: Frictional environmentality, multi-actor,ethnography, local wisdom, anthropology

INTRODUCTION

Over the past two decades, Indonesia, particularly peatland regions in Central Kalimantan, has experienced recurrent forest and peatland fires that have generated severe environmental, health, and economic impacts. This includes transboundary haze affecting neighbouring countries in Southeast Asia (Gellert 1998; Page et al. 2002; Carmenta et al. 2011; Gouyon and Simorangkir 2002). These fires occur almost every dry season and have evolved into a chronic environmental crisis rather than isolated natural disasters. Notably, prolonged haze episodes disrupt daily activities, undermine public health systems, reduce agricultural productivity, and trigger diplomatic tensions within the Association of Southeast Asian Nations (ASEAN) region. This underscores that peatland fires constitute a complex environmental governance problem with regional implications (Tacconi 2003; Aiken 2004). In response to the recurring fire crisis, the Indonesian government has implemented a wide range of regulatory and rehabilitative interventions since the 1990s. These include stricter law enforcement against open burning, peatland restoration programmes, the establishment of fire-control task forces, and international cooperation initiatives such as the Kalimantan Forests and Climate Partnership (KFCP) (Murdiyarso and Adiningsih 2007; McCarthy et al. 2012).

At the policy level, these interventions reflect an increasing commitment to environmental protection and climate change mitigation. However, despite the expansion of regulatory frameworks and institutional mechanisms, fire incidents continue to recur annually. This suggests a persistent gap between formal governance objectives and local land-use practices. Accordingly, scholarly research has offered multiple explanations for the persistence of forest and peatland fires in Indonesia. Early studies predominantly emphasised biophysical factors, as well as exceptionally prolonged droughts associated with climate anomalies such as El Niño (Fuller and Murphy 2006). These were identified as key triggers of large-scale fires (Visvanathan 1997; Brown 1998; Siegert et al. 2001). Subsequent research highlighted anthropogenic drivers, including land conversion for agriculture and plantations, commercial logging, and the strategic use of fire as a low-cost method of land clearing (Vayda 1999; Bowen et al. 2000; Applegate et al. 2001; Page et al. 2002). From this perspective, fires are understood as outcomes of rational economic decisions operating within weak regulatory environments. Another influential strand of literature approaches forest and peatland fires from a political ecology perspective, linking recurrent fires to broader structures of power, governance, and political economy.

Studies within this tradition argue that extractive forestry policies, unequal access to land and resources, clientelistic concession systems, and weak regulatory oversight have created conditions conducive to environmental degradation and recurrent fires. This is particularly evident during Indonesia's New Order period (Gellert 1998; McCarthy 2000; Aiken 2004; Murdiyarso and Adiningsih 2007). While these approaches have been instrumental in revealing the structural roots of forest fires, questions remain regarding whether post-Reformasi governance reforms have fundamentally altered these dynamics at the local level. More recently, research has begun to emphasise the significance of socio-cultural dimensions and local governance in shaping fire outcomes. Furthermore, bibliometric mapping of forest sustainability and conservation studies indicates a growing scholarly interest in the role of local wisdom and community participation in environmental management. In line with this, network and thematic density analyses suggest that local knowledge systems, cultural values, and customary practices play a significant role in sustaining forest ecosystems. This, in turn, enhances community engagement and improves the effectiveness of conservation initiatives. Moreover, these findings highlight the need for governance approaches that move beyond technical solutions and regulatory enforcement to engage more deeply with locally embedded norms and practices. Despite this growing recognition, relatively limited attention has been paid to how environmental regulations and rehabilitation programmes are interpreted, negotiated, and enacted within

everyday social and cultural contexts (Agrawal 2005; Li 2007). In particular, there remains a lack of in-depth understanding of how repeated state interventions shape the formation of environmental subjectivities among communities living in fire-prone peatland areas. Following this, existing studies tend to assess governance effectiveness in terms of compliance or enforcement outcomes. However, they often overlook how local actors strategically respond to, reinterpret, or disengage from regulatory initiatives.

Correspondingly, this study addresses this gap by examining the interaction between state-led fire governance and local community responses in Kapuas Regency, Central Kalimantan. Kapuas Regency provides a critical empirical site due to its long history of recurrent peatland fires and sustained exposure to regulatory and rehabilitative programmes since the late 1990s. Rather than evaluating policy effectiveness solely through indicators of compliance, this study focuses on how governance interventions are experienced and negotiated by local actors within their socio-cultural and economic contexts. Methodologically, this study employs a multi-actor ethnographic approach combined with the Abductive-Causal-Eventism (ACE) framework to trace causal processes linking governance interventions, social practices, and fire outcomes over time (Vayda and Walters 1999; Vayda 2009). Additionally, this approach enables a process-oriented analysis of environmental governance. It captures how specific policies and programmes generate both intended and unintended effects when they encounter complex local realities.

The central argument advanced in this study is that the persistence of peatland fires in Central Kalimantan cannot be explained solely by institutional weaknesses, technical limitations, or inadequate law enforcement. Drawing on the concept of environmentality (Agrawal 2005), this study conceptualises these dynamics as frictional environmentality, a condition. As such, universal environmental objectives and state regulatory frameworks interact with local norms, livelihood imperatives, and historical experiences, producing fragmented and strategic forms of compliance rather than fully internalised environmental responsibility. Thus, by foregrounding this concept, this study contributes to debates on environmentality and environmental governance while offering insights for designing more culturally grounded and participatory approaches to peatland fire management.

LITERATURE REVIEW

Forest and peatland fires in Indonesia have been widely examined from multiple analytical perspectives, ranging from biophysical explanations to anthropogenic drivers and political ecology approaches. Early studies primarily focused on climatic and ecological factors that increase fire vulnerability in tropical forest ecosystems. In particular, prolonged drought conditions associated with the El Niño Southern Oscillation were identified as a key trigger of large-scale forest and peatland fires across Southeast Asia (Brown 1998; Siegert et al. 2001; Page et al. 2002; Cochrane 2001). These studies emphasised how dry peat layers, degraded forest structures, and seasonal climatic variability create environmental conditions that are highly susceptible to fire outbreaks.

Subsequent research shifted attention towards anthropogenic causes of forest and land fires (Dennis et al. 2005). Scholars have demonstrated that fire is frequently used as a low-cost method for land clearing in agricultural expansion, plantation development, and smallholder farming activities (Vayda 1999; Bowen et al. 2000; Applegate et al. 2001). From this perspective, fire is not merely an ecological disturbance but also a rational economic strategy adopted within weak regulatory environments. The use of fire often reflects practical considerations among rural communities where alternative land-clearing technologies are limited or financially inaccessible.

Another important strand of scholarship approaches forest and land fires from a political ecology perspective. Studies within this tradition highlight how governance structures, land tenure conflicts, and unequal access to natural resources contribute to the persistence of environmental degradation (Gellert 1998; McCarthy 2000; Aiken 2004; Dauvergne 1993). These studies argue that extractive forestry policies, concession systems, and weak regulatory oversight during the New Order period created structural conditions that facilitated deforestation and recurrent fires. Although governance reforms have been introduced since the Reformasi era, the legacy of these institutional arrangements continues to shape land-use practices in many forest regions of Indonesia.

More recent studies have begun to emphasise the socio-cultural and institutional dimensions of forest fire governance. Several scholars highlight the importance of local wisdom, community participation, and customary ecological knowledge in sustaining forest ecosystems and preventing environmental degradation (Almegi 2022; Febri 2022). These studies suggest that environmental governance cannot rely solely on technical solutions or regulatory enforcement but must also engage with locally embedded cultural values and community institutions.

Despite this growing recognition of socio-cultural factors, relatively limited attention has been given to how environmental governance interventions are interpreted, negotiated, and enacted within everyday community practices. Many existing studies evaluate policy effectiveness primarily through indicators of compliance or institutional enforcement, while overlooking how local actors strategically respond to state-led environmental programmes within their socio-economic and cultural contexts. Therefore, there remains a need for research that examines environmental governance through a deeper understanding of local experiences, cultural meanings, and social interactions surrounding environmental regulation. Addressing this gap, the present study investigates how state-led fire governance programmes interact with local wisdom and community practices in Kapuas Regency, Central Kalimantan. By employing a multi-actor ethnographic approach, this study seeks to explore how environmental subjectivities are shaped through the encounter between regulatory frameworks and local socio-cultural realities.

METHODS

This study adopts a qualitative research design grounded in the constructivist paradigm to explore the social dimensions of peatland fire governance in Central Kalimantan. This study was conducted from 2010 to 2015 in villages participating in the KFCP project in the Mantangai subdistrict, Kapuas Regency. In particular, a combination of investigative methods and the ACE framework developed by Vayda (2013) was employed to trace causal sequences and explain fire-related events. Note that the investigative method is commonly used in journalism, criminology, and legal studies to uncover facts through systematic observation, interviewing, and the interpretation of physical evidence (Creswell and Creswell 2023; Flick 2022). At the same time, the ACE framework enhances explanatory rigour by focusing on specific actors operating within particular contexts that contribute to observable events (Vayda and Walters 1999; Vayda and Walters 2011).

Primary data collection involved in-depth interviews, focus group discussions, and participatory observation. Supplementary information was drawn from government policy documents, programme reports, and scholarly publications. Data triangulation across sources and methods ensured the reliability and validity of interpretations (Miles et al. 2014; Flick 2022). Correspondingly, the integration of investigative and ACE approaches allowed this study to extend beyond general perceptions and uncover the concrete patterns of action, behaviour, and environmental subjectivity formation among local actors. Overall, this methodological

design directly supports this study's analytical outcomes by linking regulatory interventions and local responses to the emergence of frictional environmentality, acting subjects within the governance landscape.

FINDINGS AND DISCUSSION

Failure of Regulatory and Programmatic Interventions in Preventing Peatland Fires

Despite decades of regulatory initiatives, peatland fires in Central Kalimantan continue to recur (as shown in Figure 1, for example). Field observations and interview data indicate that state interventions, such as prohibition laws, land-use zoning, and fire control programmes, are often poorly implemented, disconnected from community realities, or reactive. Meanwhile, government task forces and local regulations, including Governor Regulation No. 52/2008, remain largely ineffective due to limited enforcement, insufficient community involvement, and resource constraints. In addition, the ethnographic data reveal that many residents engage in covert or "hit-and-run" burning practices, especially in remote areas where enforcement is minimal. Furthermore, residents reported that fires are usually not investigated unless they directly threaten government assets or involve large economic losses. Consequently, the institutional response tends to focus more on extinguishing fires than on preventing them. Similarly, this reactive posture highlights the structural limitations of regulatory instruments in reducing fire incidents on a long-term basis. In many cases, programmes designed to prevent fires were perceived as project-based and temporary, often lacking continuity or meaningful follow-up. Following this, community members reported that fire control units, such as Community Fire Care Group (Masyarakat Peduli Api, MPA) or Fire Attack Team (Tim Serbu Api, TSA), were established without proper support or sustained training. In other words, these institutions lacked operational readiness during fire seasons. Additionally, the dominance of state-centred firefighting teams over participatory prevention measures illustrates a broader pattern: policies remain top-down and fail to integrate into everyday village governance or agricultural practices.

The findings indicate that environmental governance instruments employing disciplinary, power, or incentive approaches have not produced environmentally concerned subjects. Instead, they have given rise to actors as acting subjects, individuals who respond strategically to governance mechanisms rather than simply internalising them to find loopholes that benefit themselves. The failure of regulatory and rehabilitative efforts to form environmentally conscious subjects can be traced to several interrelated cultural and structural factors. First, most local actors prioritise immediate and concrete economic concerns, such as protecting their rubber plantations, over abstract environmental goals. This pragmatism shapes a myopic orientation towards fire control, where fires are only perceived as problematic when they threaten personal assets. As such, environmental awareness is not developed collectively, though it remains individualised and situational.

Second, state-led programmes, including KFCP and similar interventions, often operate through externally defined frameworks that do not resonate with local values or decision-making structures. These initiatives are often viewed as temporary and transactional rather than integrated into everyday life. Consequently, the regulations and conservation goals they introduce are not internalised by the community. Instead, they are met with tactical compliance or passive resistance. Third, the community's historical experience with inconsistent, often top-down environmental interventions has cultivated a strategic form of engagement. Rather than developing into environmental subjects (as envisioned by the governance models),

local individuals has emerged as "acting subjects" who are agents that selectively engage with programmes in ways that benefit them materially, though without deeper ideological or behavioural change. Essentially, this strategic engagement reflects a learned adaptation to external interventions, resulting in fragmented subjectivities and limited transformation in fire-related practices.

These dynamics form the core of what this study terms frictional environmentality, a cultural condition marked by disjuncture, negotiation, and resistance between externally imposed environmental governance and deeply embedded local practices. It is this frictional condition that underlies the failure of subject formation and explains why regulatory programmes have not succeeded in shifting burning practices towards an anti-burning culture. In particular, the narrative in this section focuses more on practical situations where residents encounter the enforcement of Central Kalimantan Governor Regulation No. 52 of 2008. It outlines the guidelines for land and homestead opening for the community in Central Kalimantan.

Keterangan gambar:

Fire 6: Lahan terbakar 6 Agustus 2012, luas 50 Ha. Investigasi dilakukan tgl 26 Aug 2012
Fire 7: Lahan yang kembali terbakar diduga lanjutan dari tanggal 6 Agustus 2012

Fire 8: Lahan terbakar 7 Sept 2012, luas 40 Ha. Investigasi dilakukan tanggal 10 September 2012
Fire 9: Lahan terbakar diduga antara tgl 8-10 Sept 2012 (tidak ada investigasi disini)

Fire 10: Lahan gambut yang dibakar tgl 10 Sept 2012 pagi (sekitar pukul 10.00WIB)

Image descriptions:
Fire 6. A 50-hectare area burned on 6 August 2012 and was investigated on 26 August 2012.
Fire 7. The renewed burning was suspected to be a continuation of the 6 August 2012 fire.
Fire 8. A 40-hectare area burned on 7 September 2012 and was investigated on 10 September 2012.
Fire 9. The land was suspected to have burned between 8 and 10 September 2012; no investigation was conducted.
Fire 10. The peatland burned on the morning of 10 September 2012.

Figure 1: Sketch map of major fire incidents near the Tarantang/Plehun Canal, Mantangai Hulu.

Significant fire events have ravaged the Mantangai region since 1997, extensively damaging the local population's rubber trees in Blocks A, B, and E. Typically, the productive rubber plantations, which have matured over decades, are located near settlements. Nonetheless, in the absence of a prolonged drought, fires usually do not reach the economic assets near these settlements. By contrast, rubber plantations vulnerable to fire are generally situated further from villages, near areas where residents' farmland or peat swamp forests are located. Consequently, fires in the rubber plantations near farming areas can originate from the spread of flames used for clearing land for farming or from the spread of bushfires and deep peatland fires.

Efforts to save assets such as rubber plantations cannot always be undertaken by the owners when a fire occurs. Some only learn of the damage sometime later. For example, Pa' Udi was working in the Pujon area in the upstream Kapuas as a gold miner when a fire struck his rubber plantation in Sungai Luik. Meanwhile, in the case of Pa' Bas, perpetrators could be pursued legally since there were witnesses who saw the act of setting the fire that led to the blaze. At the time of the incident, the dry season had been ongoing for three months, and residents were already vigilant around their plantations. This particular case occurred due to the negligence of an individual who was burning land for farming without notifying the neighbouring landowners.

Since the mid-2000s, patterns of land burning have emerged that make it increasingly challenging for residents to identify the perpetrators. For instance, practices of "hit-and-run burning" have become common. That is, people tend to burn covertly, no longer notifying neighbouring landowners as was traditionally practised. Note that it is easy for someone to deny being the instigator of a fire. Even if residents can suspect the real perpetrators, such as after seeing who plants rice in the burned area, the suspected perpetrators easily respond with, "It was not us who burned it; we are just clearing the land after the fire". Thus, the blame is always shifted to someone else, allowing the actual perpetrators to remain anonymous. Due to the absence of formal complaints to the police, legal efforts to investigate these fire cases often stall (Poernomo 2021).

The issue of forest fires and their impact on air pollution falls under the jurisdiction of two government ministries: the Ministry of Forestry and the Ministry of Environment (as shown in Table 1 on national regulations regarding forests and environmental management).

Table 1: Key national regulations related to forest and land fire control in Indonesia (1967–2014)

Year	Number	Title
1967	Law No. 5 of 1967	Basic Provisions on Forestry
1982	Law No. 4 of 1982	Basic Provisions on Environmental Management
1985	Government Regulation No. 28 of 1985	Forest Protection
1997	Law No. 23 of 1997	Environmental Management
1998	Ministerial Decree of Forestry No. 97/1998	Procedures for Handling Forest Fire Crises
1999	Law No. 41 of 1999	Forestry
1999	Government Regulation No. 14 of 1999	Control of Air Pollution
2001	Government Regulation No. 4 of 2001	Control of Environmental Damage Related to Forest and Land Fires
2002	ASEAN Agreement	ASEAN Agreement on Transboundary Haze Pollution
2004	Government Regulation No. 45 of 2004	Forest Protection
2009	Law No. 32 of 2009	Protection and Management of the Environmental
2010	Ministry of Environment Decree No. 10/2010	Mechanisms for the Prevention of Pollution and Environmental Damage Related to Forest and Land Fires
2011	Presidential Instruction No. 16 of 2011	Improvement of Control of Forest and Land Fires
2013	Law No. 18 of 2013	Prevention and Eradication of Forest Destruction
2014	Ministry of Agriculture Decree No. 47/2014	Brigades and Guidelines for the Prevention and Control of Fires in Fields and Gardens

Fire-related regulations within the forestry sector were already established in Law No. 5 of 1967 on Basic Provisions on Forestry (UUK), which was enacted at the beginning of the New Order government. In essence, UUK No. 5/1967 is concise, containing only 21 articles. Particularly, fire management is addressed in Article 15, which states: "Forest protection includes efforts to (a) prevent and limit forest and forest product damages caused by human and livestock activities, fire, natural forces, pests, and diseases; (b) maintain and protect the State's rights over forests and forest products". Meanwhile, the explanatory section of Article 15 notes that "Forest damages caused by shifting cultivation and illegal grazing and fires that result in barren lands and grasslands, especially outside Java Island, need to be addressed as necessary". This law explicitly identifies shifting cultivation as a factor that can cause forest damage, along with human activities not specified in detail, and fire incidents themselves. Hence, it is crucial to recall that throughout the New Order period, shifting cultivation was consistently blamed as a major cause of forest fires.

The forestry law underwent changes post-reformation with the enactment of Law No. 41 of 1999 on Forestry. The substance of forest protection in this law remains the same as in Basic Forestry Law No. 5/1967, especially in point (a). However, point (b) has been expanded to also include efforts to "maintain and protect the rights of the state, communities, and individuals over forests, forest areas, forest products, investments, and devices related to forest management". Regarding fires, Article 50 paragraph (3) specifies that everyone is prohibited from: "burning forests" in point (d), and "disposing of objects that can cause fire and damage, and endanger the existence or continuity of forest functions in the forest area" in point (l). Violations of Article 50 paragraph (3) points (d) and (l) are subject to criminal sanctions and fines as outlined in Article 78 regarding criminal provisions.

The definition of "human actions" that can cause forest damage, as referred to in Basic Forestry Law No. 5/1967 and Law No. 41/1999, is further clarified by Government Regulation No. 45 of 2004 on Forest Protection. In addition, Article 18 paragraph (2) of PP 45/2004 specifies that the human actions in question are "conducting burning without permission" in point (a), and "disposing of objects that can cause fires" in point (b). Conversely, Article 19, paragraph (1) clearly states "everyone is prohibited from burning forests". However, paragraph (2) provides exceptions to the prohibition of forest burning. This indicates that limited burning may be conducted for specific purposes or unavoidable conditions, including forest fire control, pest and disease eradication, and habitat management for flora and fauna. Nevertheless, its implementation must be authorised by the competent official.

A regional regulation specifically focused on forest fires was issued in 1988 through the Central Kalimantan Provincial Regulation No. 7 of 1988 concerning the Prevention and Extinguishing of Forest Fires. Table 2 presents the local regulations on forest management and forest fire control. The issuance of this regulation was based on the consideration that forests are a highly valuable natural resource for national development and thus need to be protected from all threats and disturbances. Forest fires are perceived as one form of threat/disturbance to forest sustainability. Additionally, efforts to prevent forest fires, as outlined in Regulation No. 7/1988, are conducted through education and outreach to the community. This ultimately reduces the likelihood of forest fires, enhances vigilance, and detects forest fires.

Table 2: Central Kalimantan local government regulations related to forest and land fires

Year	Number	Title
1959	Central Kalimantan Regulation 13/1959	Protection and Exploitation of Autonomous Region Level I Forests in Central Kalimantan
1962	Central Kalimantan Regulation 22/1962	Protection and Exploitation of Autonomous Region Level I Forests in Central Kalimantan
1966	Central Kalimantan Regulation 06/1966	Protection and Exploitation of Forests within the Province of Central Kalimantan
1968	Central Kalimantan Regulation 09/1968	Forestry within the Province of Central Kalimantan
1988	Central Kalimantan Regulation No. 7/1988	Prevention and Extinguishing of Forest Fires
2003	Central Kalimantan Regulation No. 5/2003	Control of Forest and Land Fires
2014	Kapuas Regency Regulation 20/2014	Standard Procedures for the Control of Forest and Land Fires in Kapuas Regency

The regulatory instruments described above are manifestations of forest and land fire control policies outlined by the government. In Foucault's terminology, these policies and regulatory products are considered "political technology" and technologies of government instruments of power that theoretically shape individuals or subjects. This suggests that policies or regulations are intended to mould how individuals construct themselves as subjects (Shore and Wright 1997). However, this transformation does not occur automatically. For instance, Agrawal's (2005) study demonstrated that state regulations have emerged as part of self-formation (subject formation) only when they are sufficiently integrated into the community's lives. This enables members to participate and engage in decision-making processes on how regulations should be implemented within their community. There is a stage where communities have incorporated regulations into their self-regulation (regulatory communities). In the case of Kumaon, Agrawal (2005) observed that the village forest council functioned effectively in mediating this process.

The policies for controlling forest and land fires, both national and regional, ideally also function as "conduct of conduct" regulating behaviour, actions, and forming the subjectivity of the community members involved (Inda 2005: 5). In the Indonesian legal system, every citizen is assumed to be aware of the existence of legal products as soon as they are enacted and published in the national or regional gazettes (Umasangaji 2017). Moreover, this system presumes that every citizen will incorporate existing regulatory products into their self-regulation, and one cannot avoid punishment for violations simply since they were unaware of the regulations. Nonetheless, in the context of controlling forest and land fires in Central Kalimantan, the situation does not mirror Agrawal's (2005) findings. As such, gaps were observed where regulators have not performed their role in building what Agrawal (2005: 178) calls "the intimate government", referred to as the "haze of smoke" (Lubis 2017: 34).

Notably, the institutionalisation process of regulation is a planned process through which regulators build a bridge connecting existing fire control regulations with the community members targeted to implement and comply with them. From Foucault's (1995: 195–228) perspective, this process requires "panoptic power" or surveillance to ensure that regulations function as mechanisms of discipline. Meanwhile, Agrawal (2005: 178) refers to it in more collaborative terms as the condition of "the intimate government". In particular, there are at least two entry points through which the processes of institutionalisation of regulations can be examined. First, by exploring the institutions previously established by the government as

containers for these processes. Second, by exploring practical situations in which the government as a regulator attempts to socialise norms and propriety of behaviour to citizens. This ensures they can internalise these norms and proprieties as part of their own regulation (Surahno 2023; Ananda et al. 2022: 179).

The concept of fire control, according to government definitions, actually encompasses a range of efforts, including prevention, extinguishing, post-fire management, and rescue (refer Article 1, paragraphs 39 and 40, of Regulation of the Minister of Environment and Forestry of the Republic of Indonesia No. 32 of 2016). Prevention is defined as all efforts, actions, or activities undertaken to prevent or reduce the likelihood of forest and land fires. Furthermore, extinguishing is understood as all efforts, actions, or activities performed to eliminate or extinguish fires burning in forests. Building on this, prevention is inherently related to measures that must be taken before or well in advance of a fire occurring, suggesting that what is needed here are anticipatory efforts to prevent or reduce the likelihood of fires. Such anticipatory efforts can be built in response to past experiences addressing fire events. Moreover, extinguishing is a reactive action to address fires (Zulkifli et al. 2017). An interesting point to note regarding efforts to control forest and land fires in Central Kalimantan, and in Indonesia in general, is the tendency to employ a reactive rather than a responsive approach. In addition, the institutions, agencies, task forces, or similar entities commonly formed to manage fire control tend to be firefighting in nature, which is inherently reactive. Both the central and regional governments establish control centres, coordination units, command posts, implementation units, and brigades, structured from the national level down to the village level, aimed at controlling fires. The existence of such ad hoc institutions can be traced back to at least 1995 to 2014, as presented in Table 3.

Table 3: Units for Forest and Land Fire Control

No.	Year	Name of special unit	Legal basis
1	1995	National Forest Fire Control Centre (PUSDALKARHUTNAS) [National] Forest Fire Control Task Force (Satlakkarhutnas) [Province] Forest Fire Control Brigade → Manggala Agni → Operational Area (DAOPS)	Ministerial Decree of Forestry No. 188/1995
2	1995	National Coordinating Body for Land Fire Control Coordination Team for Land Fire Control [Province]	Ministerial Decree of Environment No. 18/1995
3	1998	PUSDALKARHUTNAS [National] Provincial/Regency Forest and Land Fire Control Task Force (Pusdalkarhutla/Satlakkarhutla)	Ministerial Decree of Forestry No. 97/1998
4	2002	National Command Post for Forest Fire Control (POSKODALKARHUTNAS)	Director General Decree of Forest Protection and Nature Conservation No. 30/2002
5	2005	Disaster Management Coordination Team (Satkorlak Penanggulangan Bencana)	National Coordinating Agency for Disaster Management (Bakornas PB)
6	2007	Integrated Command Post for Forest and Land Fire Control	Governor Decree of Central Kalimantan No. 660/904 of 2007
7	2014	Regency Forest and Land Fire Control Task Force (Satlakdalkarhutla) [Regency] Firefighting Task Force (Satgasdamkarhutla) [Sub-district]/Regulatory Firefighting Unit (Regdamkarhutla) [Village]	Kapuas Regency Regulation No. 20 of 2014

The Central Kalimantan Provincial Government also established a team referred to as the Integrated Movement Team for Utilising Idle Land (Geber-MLT) through Governor Regulation No. 188.44/150/2009. The formation of this team was conceived as an effort by the local government to reduce fire risk, especially along the Trans-Kalimantan highway. It should be noted that peatland fires frequently occur along the Trans-Kalimantan highway both to the south and north of Palangkaraya city. Specifically, the team's task is to identify and inventory lands on both sides of the Trans-Kalimantan road that have the potential to be developed into productive lands that could function to prevent fires.

The formation of these ad hoc fire control institutions, when observed, almost always coincides with seasons of large-scale forest fires in Indonesia. Thus, it can be concluded that they tend to be reactive. The nature of these institutions is highly bureaucratic and cumbersome, generally encompassing all related sectoral agencies, with ex officio officials from each agency attached to bureaucratic structures, hence not flexible in action. In line with this, their presence serves more as a support institution for fire extinguishing acceleration, than being designed for planned and systematic activities focused on fire prevention. Therefore, such task forces are not institutions that function as a vessel for the institutionalisation of regulations in the sense of transferring regulations from regulators to the regulated. With personnel comprised entirely of government officials, these task forces also do not serve as a platform where community members can be involved and participate in control efforts. In other words, they do not function as institutions that can bring the involved governmental apparatus closer to the general populace. Hence, a governmental atmosphere that integrates with the community is not observed here (Qamariyanti et al. 2023). Furthermore, community members can actively participate in fire control through the formation of teams, groups, or community-level task forces. In Central Kalimantan, such units have been realised under several names:

1. MPA, which originated from the Ministry of Forestry (Directorate of Conservation) and was established regionally by the forestry service;
2. Community Fire Care Groups (Kelompok Masyarakat Peduli Kebakaran, KMPK), formed by the Environmental Agency;
3. TSA and Neighbourhood Fire Attack Team (Tim Serbu Api Kelurahan, TSAK), initiated by the Center for International Cooperation in Management of Tropical Peatland (CIMTROP) Institute at the University of Palangkaraya;
4. Disaster Alert Cadets (Taruna Siaga Bencana, TAGANA), established by the District/City Social Services;
5. Fire Control Teams (Regu Pengendali Kebakaran, RPK), formed by non-government organisations such as Borneo Orangutan Survival Foundation and Cooperative for Assistance and Relief Everywhere through the Central Kalimantan Peatland Project consortium; and
6. Early Fire Monitoring Team, formed by the KFCP.

The existence of community-level units is ideally a perfect setting for the convergence of government elements, such as regulators, with community members to develop a mutual understanding of regulations and collaboratively design fire mitigation programmes that are more collaborative and participatory. Nevertheless, as observed in the field, the interactions between community members and government elements through units such as MPA, TSA, RPK, and others remain far from such a situation. Examples of the existence of MPAs formed by Manggala Agni DAOP II Kapuas and TSA, as well as those managed by the Environmental Agency, are discussed in another section.

Thus, it can be concluded that the institutionalisation process of fire control regulation is not functioning, partly since there is no effective mechanism or venue designed for this purpose. That is, the regulatory instruments related to the control of forest and land fires appear to be suspended in a metaphorical haze, preventing them from being enculturated to or internalised by the community members. In addition, the process of enculturation seems not to be considered vital by the government, as the largest resources in the fire control process are allocated for firefighting and fire mitigation efforts. Nonetheless, in reality, the lists of task forces, operational units, command posts, teams, and similar entities (as shown in Table 3), as well as smaller community-level units, are merely nominal. Pa' Han, an informant from the Central Kalimantan Provincial Environmental Agency, noted that unequal allocations of firefighting resources have left the institutionalisation of these regulations enveloped in a persistent "haze", a metaphor for the enduring ambiguity and uncertainty surrounding their implementation.

The Inability to Foster Environmental Subjectivity in Local Communities

A central objective of regulatory and rehabilitative interventions is to create environmentally conscious citizens who internalise anti-burning norms. However, this study discovered that such subjectivity has not emerged meaningfully among the target population. Instead, residents act based on personal interest, particularly in protecting their economic assets (e.g., rubber plantations), and demonstrate minimal collective concern for broader environmental threats unless they are directly affected. Following this, the use of fire is still viewed as a practical and legitimate method of land clearing. Moreover, cultural perceptions among the Dayak Ngaju, who differentiate between *bakehu'* (controlled, acceptable fire) and *baseha'* (uncontrolled, dangerous fire), further complicate attempts to impose uniform anti-burning regulations. Additionally, many residents only mobilise to act when their personal property is threatened, rather than due to a shared environmental ethic. Collectively, this reflects the failure of programmes such as KFCP to instil long-term ecological awareness or collective responsibility (Nurjanah and Lestari 2021).

Further complicating this issue is the fragmented understanding of legal obligations. Although laws prohibit open burning, villagers often do not perceive these laws as legitimate or relevant to their customary land-use practices. For example, interviews revealed that many community members view fire-related rules as external impositions disconnected from their lived realities (Anhar et al. 2022). Furthermore, the absence of meaningful involvement in regulatory design and implementation contributes to this detachment. In practice, environmental subjectivity is not fostered, yet bypassed by pragmatic concerns, mistrust, and passive resistance. Consistent with this, the state's approach to behaviour change relies heavily on informational campaigns and technical training without adequately engaging with the socio-cultural dimensions of local life. On a similar note, programmes tend to assume a rational choice model of behaviour, that if people are informed, they will change. However, this overlooks how deeply embedded burning practices are in local identities, traditions, and land-use systems. Consequently, the failure to frame environmental behaviour change within these cultural logics results in low resonance and shallow programme uptake (Febri 2022).

Building on this, there is an absence of community-driven environmental leadership. Interviews and observations revealed that individuals who might serve as normative figures, village leaders, elders, or religious authorities, are often excluded from programme design or implementation (Darsono et al. 2022). This exclusion weakens the potential for local ownership of environmental norms. Without trusted community intermediaries promoting and legitimising these norms, top-down messages are either ignored or reinterpreted in ways that suit individual or group interests.

In summary, the failure to foster environmental subjectivity stems from weak enforcement, lack of outreach, and a deeper misalignment between governance frameworks and the cultural ecological context of rural peatland communities. However, building genuine environmental subjectivity would require sustained dialogue, inclusive participation, and the integration of indigenous environmental values into the heart of regulatory frameworks (Yunianto 2021).

Frictional Environmentality: Cultural Tension in Environmental Governance

This study introduces the concept of frictional environmentality to describe how environmental governance strategies interact with localised cultural norms and socioeconomic constraints (Tsing 2005; Li 2007; Forsyth 2013). Rather than producing a shared subjectivity aligned with state goals, these interventions often result in fragmented, tactical responses, termed as *acting subjects* (Agrawal 2005; Ortner 2006). Accordingly, local actors selectively engage with programmes when short-term benefits are visible, or resist participation when regulations conflict with traditional knowledge or economic survival (Ferguson 1994). This friction emerges from power imbalances, historical distrust, and the failure to embed environmental norms through culturally resonant mechanisms. As a result, policy implementation becomes symbolic or procedural, lacking the depth required for transformative change (Mosse 2005).

The formation of frictional environmentality is not accidental. It is the product of prolonged exposure to fragmented and overlapping interventions. Community members have encountered both exploitative and conservation-oriented initiatives, often with contradictory goals and inconsistent actors. This has created a cynical view of external programmes, where villagers adapt superficially to requirements without internalising their intended purpose. Environmental subjectivity is therefore shaped not through discipline or participation, but rather through negotiation, avoidance, or strategic compliance (Scott 1998). Ultimately, frictional environmentality reveals the limitations of top-down environmental governance in complex socioecological contexts such as peatland areas. In addition, effective fire management must address technical or legal deficiencies and grapple with the embedded cultural, economic, and historical realities of the communities involved. Notably, bridging these gaps requires inclusive, dialogical, and sustained engagement that extends beyond regulation and encompasses co-produced environmental stewardship (Li 2007; Forsyth 2013). Such an initiative aims to describe how environmental governance strategies interact with localised cultural norms and socioeconomic constraints.

Bibliometric Mapping of Forest Sustainability Research

To complement the qualitative findings of this study, a bibliometric mapping analysis was conducted using VOSviewer to identify dominant themes and research trends in forest sustainability and conservation studies. Bibliometric mapping allows researchers to visualise the intellectual structure of a research field by analysing keyword co-occurrence networks and thematic clusters. This approach is useful for situating the present research within the broader landscape of academic debates while identifying areas that remain underexplored.

Figure 2 presents the concept network derived from keyword co-occurrence analysis within forest sustainability research. The network illustrates the relationships among key concepts frequently discussed in the literature, including forest conservation, sustainability, community participation, local wisdom, and environmental management. The clustering patterns demonstrate that forest sustainability studies increasingly incorporate socio-cultural and governance perspectives alongside ecological and technical approaches.

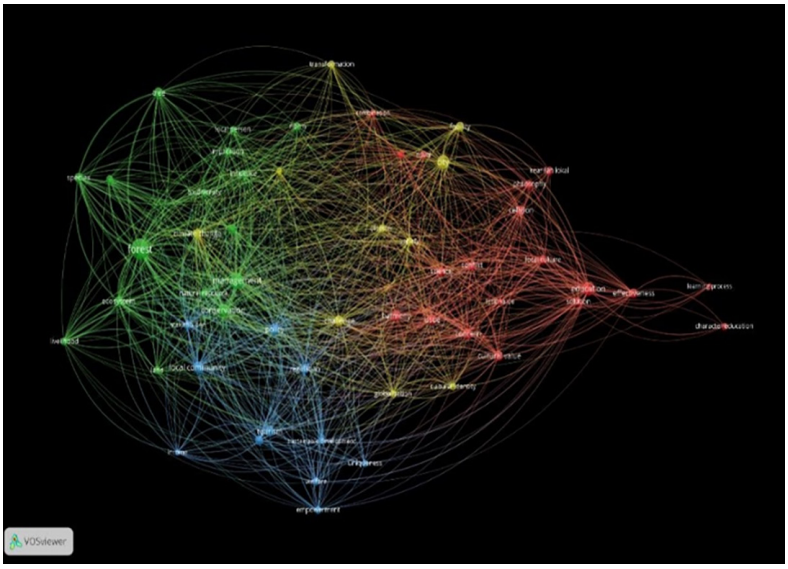

Figure 2: Concept network of forest sustainability and protection research.

The bibliometric network also reveals the growing importance of community-based forest management and indigenous knowledge systems within environmental governance research. These findings reflect an emerging shift in scholarly attention towards participatory conservation approaches that integrate local communities into environmental management strategies.

Figure 3 provides a density visualisation of thematic clusters within forest sustainability research. High-density areas represent topics that have received significant scholarly attention, particularly conservation practices, community participation, and local knowledge systems. These results indicate that contemporary environmental governance studies increasingly recognise the importance of socio-cultural factors in sustaining forest ecosystems.

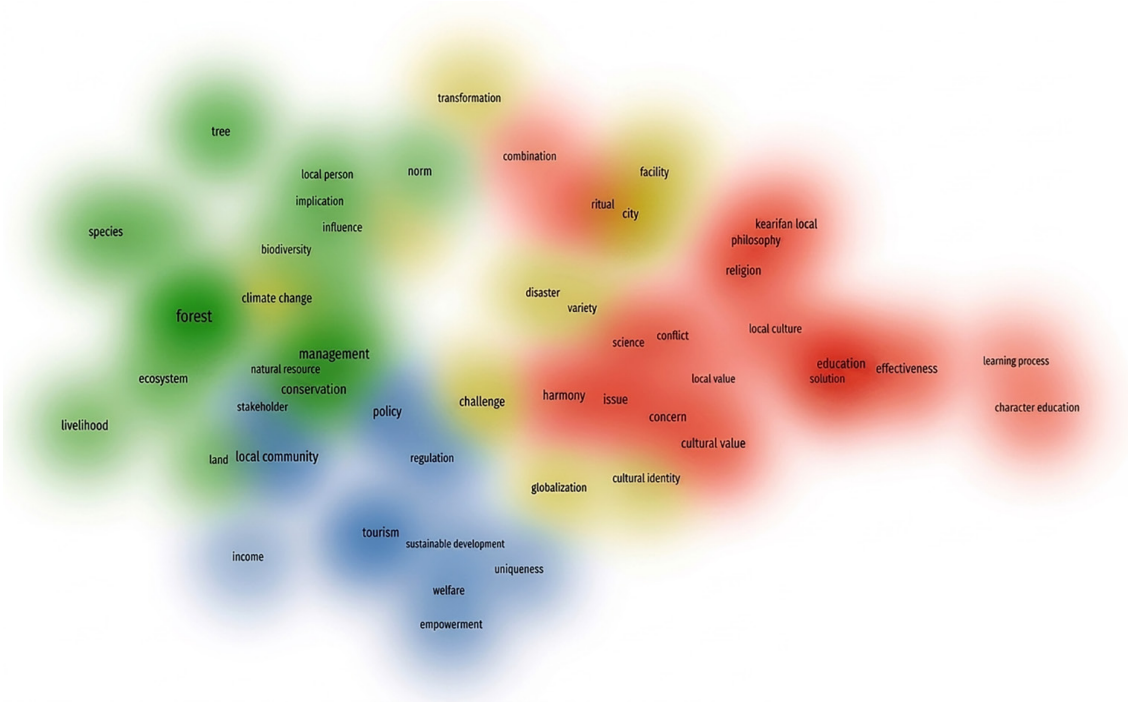

Figure 3: Density visualisation of thematic clusters in forest sustainability studies.

However, despite this growing body of literature, the bibliometric mapping also highlights several underexplored areas. In particular, relatively few studies examine how environmental subjectivities are formed through the interaction between state governance mechanisms and local cultural practices. While community participation and local wisdom are frequently discussed, the processes through which environmental norms are internalised, negotiated, or resisted within everyday social contexts remain insufficiently examined.

This gap highlights the importance of ethnographic research that investigates how environmental governance policies are experienced and interpreted by local communities. Therefore, the present study contributes to the literature by examining how environmental regulations and conservation programmes intersect with local cultural practices in peatland communities of Central Kalimantan. Through this approach, this study expands the discussion on environmentality by introducing the concept of frictional environmentality, which captures the cultural tensions that emerge when universal environmental governance frameworks encounter local socio-economic realities.

CONCLUSION

This study aimed to understand why regulatory and rehabilitative programmes have failed to prevent recurring peatland fires and foster environmental subjectivities in Central Kalimantan. Using an ethnographic approach, it revealed a persistent disconnection between top-down environmental governance and culturally embedded lived practices of local communities. Despite extensive interventions, laws, programmes, and partnerships such as KFCP, fire prevention remains largely ineffective, mainly due to the fact that policies have not been internalised at the community level.

The findings indicate that local actors respond to regulations not through internalised awareness but rather pragmatic and tactical adaptation. They function as acting subjects. That is, individuals who selectively engage with governance mechanisms for immediate benefit, rather than from genuine ecological commitment. Accordingly, this behaviour reflects the cultural and structural friction between universal environmental goals and local economic realities. The resulting condition, termed frictional environmentality, captures this tension, where external governance efforts collide with local values. This, in turn, results in fragmented forms of compliance and resistance rather than coherent environmental consciousness.

At its core, frictional environmentality exposes the limits of technocratic, disciplinary, and incentive-based approaches. Fire control in peatland regions cannot rely solely on regulation or punishment. Instead, it must engage with the socio-cultural fabric of local life. This study thus contributes conceptually to environmentality theory by reframing how environmental subjects are formed, or fail to form, under contested governance. Practically, it urges policymakers to design culturally grounded, participatory models that integrate local wisdom (*malan seha*), strengthen trust, and institutionalise dialogue between state agencies and rural communities.

Overall, this study underscores that sustainable environmental governance requires more than policy enforcement. It demands shared meaning. Only when environmental norms resonate with local values can they evolve from external mandates into internalised responsibilities, transforming frictional environmentality into collaborative stewardship of Indonesia's fragile peatlands.

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COMPLIANCE WITH ETHICAL STANDARDS

This study was conducted in accordance with the ethical principles applicable to social science research. Ethical approval was granted by the Social Humanities Research Ethics Committee of Universitas Sumatera Utara (Approval No. 7503/UN5.2.9.D2/PT/2025). Before data collection, all participants were informed about the purpose of the study, the voluntary nature of their participation, the confidentiality of their responses, and their right to withdraw at any time. Informed consent was obtained from all participants. The identities and personal information of the participants were anonymised throughout the data collection, analysis, and publication processes.

CONFLICT OF INTEREST

The authors declare that the study was carried out without any financial or commercial ties that might be interpreted as a potential conflict of interest.

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REFERENCES

Agrawal, A. 2005. Environmentality: Community, intimate government, and the making of environmental subjects in Kumaon, India. *Current Anthropology* 46 (2): 161–190. https://doi.org/10.1086/427122

Aiken, S. R. 2004. Runaway fires: Smoke-haze pollution and unnatural disasters in Indonesia. *Geographical Review* 94 (1): 55–79. https://doi.org/10.1111/j.1931-0846.2004.tb00158.x

Almegi, A. 2022. Kearifan lingkungan masyarakat adat Kenagarian Rumbio, Kabupaten Kampar dalam menjaga kelestarian hutan. *Tsaqifa Nusantara: Jurnal Pembelajaran dan Isu-Isu Sosial* 1 (1): 64–84. https://doi.org/10.24014/tsaqifa.v1i1.16544

Ananda, F. R., Purnomo, E. P., Fathani, A. T. and Salsabila, L. 2022. Strategi pemerintah daerah dalam mengatasi kebakaran hutan dan lahan di Kabupaten Kotawaringin Barat. *Jurnal Ilmu Sosial dan Humaniora* 11 (2): 83–91. https://doi.org/10.23887/jish.v11i2.34698

Anhar, I. P., Mardiana, R. and Sita, R. 2022. Dampak kebakaran hutan dan lahan gambut terhadap manusia dan lingkungan hidup (Studi kasus: Desa Bunsur, Kecamatan Sungai Apit, Kabupaten Siak, Provinsi Riau). *Jurnal Sains Komunikasi dan Pengembangan Masyarakat* 6 (1): 75–85. https://doi.org/10.29244/jskpm.v6i1.967

Applegate, G., Chokkalingam, U. and Suyanto. 2001. The underlying causes and impacts of fires in Southeast Asia: Final report. https://www.landscapealliance.org/knowledge/publication/33561/ (accessed 11 July 2026).

Bowen, M. R., Bompard, J. M., Anderson, I. P., Guizol, P. and Gouyon, A. 2000. Anthropogenic fires in Indonesia: A view from Sumatera. In *Forest fires and regional haze in Southeast Asia*, eds. Peter, E. and Radojevic, M., 41–66. New York: Nova Science Publishers.

Brown, N. 1998. Out of control: Fires and forestry in Indonesia. *Trends in Ecology and Evolution* 13 (1): 41. https://doi.org/10.1016/S0169-5347(97)01252-4

Carmenta, R., Parry, L., Blackburn, A., Vermeylen, S. and Barlow, J. 2011. Understanding human–fire interactions in tropical forest regions: A case for interdisciplinary research across the natural and social sciences. *Ecology and Society* 16 (1): 53. https://doi.org/10.5751/ES-03950-160153

Cochrane, M. A. 2001. In the line of fire: Understanding the impacts of tropical forest fires. *Environment: Science and Policy for Sustainable Development* 43 (8): 28–38. https://doi.org/10.1080/00139150109604505

Creswell, J. W. and Creswell, J. D. 2023. *Research design: Qualitative, quantitative, and mixed methods approaches*, 6th ed. Thousand Oaks, California: SAGE Publications, Inc.

Darsono, D., Priambudi, H. W., Kurniansyah, A. R., Hidayat, A. T., Martono, A. and Agstenesya, I. 2022. Desa Karet Berdaya: Implementasi program pemberdayaan petani karet di Desa Pagar Dewa. *Prospect: Jurnal Pemberdayaan Masyarakat* 1 (4): 203–212. https://doi.org/10.55381/jpm.v1i4.46

Dauvergne, P. 1993. The politics of deforestation in Indonesia. *Pacific Affairs* 66 (4): 497–518. https://doi.org/10.2307/2760676

Dennis, R., Meijaard, E., Nasi, R., et al. 2005. Fire, people and pixels: Linking social science and remote sensing to understand underlying causes and impacts of fires in Indonesia. *Human Ecology* 33 (4): 465–504. https://doi.org/10.1007/s10745-005-5156-z

Febri, F. 2022. Penanggulangan kebakaran lahan gambut berbasis kearifan lokal pada petani sagu di Desa Lukun Kecamatan Tebing Tinggi Timur Kabupaten Kepulawan Meranti. *Jurnal Agribisnis* 24 (2): 321–335. https://doi.org/10.31849/agr.v24i2.9045

Ferguson, J. 1994. *The anti-politics machine: Development, depoliticization, and bureaucratic power in Lesotho*. Minneapolis MN: University of Minnesota Press.

Flick, U. 2022. Revitalising triangulation for designing multi-perspective qualitative research. In *The SAGE handbook of qualitative research design*, ed. Flick, U., 652–664. City Road, London: SAGE Publications Ltd.

Foucault, M. 1995. *Discipline and punish: The birth of the prison*, 2nd Vintage Books ed. New York: Random House.

Forsyth, T. 2003. *Critical political ecology: The politics of environmental science*. London: Routledge.

Fuller, D. O. and Murphy, K. 2006. The ENSO-fire dynamic in insular Southeast Asia. *Climate Change* 74: 435–455. https://doi.org/10.1007/s10584-006-0432-5

Gellert, P. K. 1998. A brief history and analysis of Indonesia's forest fire crisis. *Indonesia* 65: 63–85. https://doi.org/10.2307/3351404

Gouyon, A. and Simorangkir, D. 2002. *The economics of fire use in agriculture and forestry: A preliminary review for Indonesia*. Jakarta: Project FireFight South East Asia.

Inda, X. (ed.). 2005. Analytics of the modern: An introduction. In *Anthropologies of modernity: Foucault, governmentality, and life politics*, 5. Oxford: Blackwell Publishing.

Li, T. M. 2007. *The will to improve: Governmentality, development, and the practice of politics*. Durham, NC: Duke University Press.

Lubis, Z. 2017. Menggantang asa di kabut asap: Fenomena environmentaliti friksional pada kasus pengendalian kebakaran lahan gambut di Kabupaten Kapuas, Kalimantan Tengah. PhD diss., Universitas Indonesia, Indonesia.

McCarthy, J. 2000. The changing regime: Forest property and reformasi in Indonesia. *Development and Change* 31: 91–129. https://doi.org/10.1111/1467-7660.00148

McCarthy, J. F., Vel, J. A. C. and Afiff, S. 2012. Trajectories of land acquisition and enclosure: Development schemes, virtual land grabs, and green acquisitions in Indonesia's Outer Islands. *The Journal of Peasant Studies* 39 (2): 521–549. https://doi.org/10.1080/03066150.2012.671768

Miles, M. B., Huberman, A. M. and Saldana, J. 2014. *Qualitative data analysis: A methods sourcebook*. Thousand Oaks, CA: SAGE Publications

Mosse, D. 2005. *Cultivating development: An ethnography of aid policy and practice*, 1st ed. London: Pluto Press. https://doi.org/10.2307/j.ctt18fs4st

Murdiyarso, D. and Adiningsih, E. S. 2007. Climate anomalies, Indonesian vegetation fires and terrestrial carbon emissions. *Mitigation and Adaptation Strategies for Global Change* 12: 101–112. https://doi.org/10.1007/s11027-006-9047-4

Nurjanah, U. and Lestari, P. 2021. Dampak kebakaran lahan gambut bagi masyarakat Desa Pedamaran III, Kecamatan Pedamaran, Kabupaten Ogan Komering Ilir. *Jurnal Pendidikan Sosiologi* 10 (1): 2–20.

Ortner, S. B. 2006. *Anthropology and social theory: Culture, power, and the acting subject*. Durham, NC: Duke University Press. https://doi.org/10.1215/9780822388456

Page, S. E., Siegert, F., Rieley, J. O., Boehm, H.-D. V., Jaya, A. and Limin, S. 2002. The amount of carbon released from peat and forest fires in Indonesia during 1997. *Nature* 420: 61–65. https://doi.org/10.1038/nature01131

Poernomo, G. 2021. Kearifan lokal dalam pengaturan larangan pembakaran hutan dan lahan. *Lex Journal: Kajian Hukum dan Keadilan* 4 (1): 85–109. https://doi.org/10.25139/lex.v4i1.3372

Qamariyanti, Y., Rudi, U. and Dewi, R. 2023. Pencegahan dan penanggulangan kebakaran lahan gambut dan hutan. *Jurnal Ilmu Lingkungan* 21 (1): 132–142. https://doi.org/10.14710/jil.21.1.132-142

Scott, J. C. 1998. *Seeing like a state: How certain schemes to improve the human condition have failed*. New Haven, CT: Yale University Press.

Shore, C. and Wright, S. 1997. *Anthropology of policy: Critical perspectives on governance and power*. London: Routledge.

Siegert, F., Ruecker, G., Hinrichs, A. and Hoffmann, A. A. 2001. Increased damage from fires in logged forests during droughts caused by El Niño. *Nature* 414: 437–440. https://doi.org/10.1038/35106547

Surahno, S. 2023. Institusionalisasi Pancasila dalam pembangunan karakter perancang peraturan perundang-undangan. *Pancasila: Jurnal Keindonesiaan* 3 (2): 191–203. https://doi.org/10.52738/pjk.v3i2.162

Tacconi, Luca. 2003. *Fires in Indonesia: Causes, costs and policy implications*. Bogor, Indonesia: Center for International Forestry Research. https://doi.org/10.17528/cifor/001130

Tsing, A. L. 2005. *Friction: An ethnography of global connection*. Princeton, NJ: Princeton University Press. https://doi.org/10.1515/9780691263526

Umasangaji, S. 2017. Kebijakan pengendalian kebakaran hutan dan lahan. *Jurnal Demokrasi and Otonomi Daerah* 15 (2): 121–130.

Vayda, A. P. 2013. Causal explanation for environmental anthropologists. In *Environmental anthropology: Future directions*, eds. H. Kopnina and E. Shoreman-Ouimet, 207–224. New York: Routledge.

_____. 2009. *Explaining human actions and environmental changes*. New York: AltaMira Press.

_____. 1999. *Finding causes of the 1997–98 Indonesian forest fires: Problems and possibilities*. Jakarta: WWF Indonesia.

Vayda, A. P. and Walters, B. B. (eds.). 2011. *Causal explanation in social sciences: A reader*. Lanham, MD: AltaMira Press.

Vayda, A. P. and Walters, B. B. 1999. Against political ecology. *Human Ecology* 27: 167–179. https://doi.org/10.1023/A:1018713502547

Visvanathan, S. 1997. *A carnival for science: Essays on science, technology and development*. Delhi: Oxford University Press.

Yunianto, A. S. 2021. Pemetaan permasalahan kebakaran hutan dan lahan: Kasus di Provinsi Riau. *Jurnal Penelitian Kehutanan Sumatrana* 2 (1): 25–37.

Zulkifli, Ismail, and Kamarubayana, L. 2017. Studi pengendalian kebakaran hutan di wilayah Kelurahan Merdeka, Kecamatan Samboja, Kalimantan Timur. *AGRIFOR: Jurnal Ilmu Pertanian dan Kehutanan* 16 (1): 141–150.