


Forest and Land Fires: A Perspectives on Peatland Ecosystem Protection Management in Jambi Province

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Abstract

Forest and land fires has had impact in the degradation of environmental conditions, human health, socio-economic conditions, and increased carbon emissions on the earth's surface. The phenomenon of Karhutla occurs almost every year in Jambi. Inadequate protection management and destructive practices, such as peatland drainage, have caused a decline in the carrying capacity and resilience of the environment, leading to various ecological disasters such as forest and land fires in Jambi. This study aims to capture the events of forest and land fires in Jambi that occurred between 2015 and 2024. The data are gathered from a peat restoration monitoring by Wahana Lingkungan Hidup Indonesia [WALHI] 2019-2020, Jambi Government, media information, and Peat Restoration Agency (BRG). The result of this study show that there are many peatland restoration projects carried out by companies do not comply with government regulations. Consequently, the peatland fires demonstrate a weak law enforcement effort and the failure of peatland restoration. From a political ecology perspective, the failure of peatland restoration reflects unequal power relations between the state, corporations, and local communities, where weak governance and profit-oriented policies undermine environmental justice and sustainability. Therefore, prevention through a political policy and political ecology are very essential.

INTRODUCTION

Forest and land fires in peatland ecosystems represent one of the most severe environmental, social, and economic challenges in Indonesia, including in Jambi Province. Peatland ecosystems play a crucial role in maintaining global environmental balance as major carbon sinks, hydrological regulators, and habitats for endemic species (Page et al., 2011). However, human activities such as land clearing for plantations, drainage, and logging have caused significant peat degradation, which in turn increases fire susceptibility (CIFOR-ICRAF, 2021). Jambi is among the provinces with extensive peatland areas on Sumatra Island

and has frequently experienced severe fire events, especially during prolonged dry seasons. The large-scale fires in 2015, for instance, led to enormous economic and social losses, along with substantial carbon emissions (Kiely et al., 2021). Therefore, the management and protection of peatland ecosystems in Jambi are of critical importance for preventing forest and land fires and mitigating climate change impacts.

Research has demonstrated that land-use change in Jambi's peatland areas significantly influences fire risk. A study by Adni, Putra, and Setiawan (2025) found substantial peatland conversion in East Tanjung Jabung Regency into agricultural and plantation areas, resulting in a lowered groundwater table and greater fire vulnerability. Similarly, Prasetyo (2016) identified historical patterns of fire occurrences closely correlated with dry-season conditions and El Niño events, particularly in degraded peat areas. Taufik et al. (2022) developed the Peat Fire Vulnerability Index to predict fire risk based on hydrological and soil-moisture parameters, underscoring the vital role of water-table management as a mitigation strategy. Furthermore, restoration efforts through revegetation and sustainable agroforestry (paludiculture) practices, as examined by Tata et al. (2019), have proven effective in rehabilitating ecosystem functions while supporting local livelihoods. Nonetheless, several studies also highlight persistent challenges in implementing peat protection policies at the local level, such as weak law enforcement, overlapping land-use regulations, and limited community participation (Hein et al., 2022).

Given the issues above, this study aims to comprehensively analyze peatland ecosystem management and protection in Jambi Province within the context of forest and land fires. Specifically, it seeks to: (1) describe the current conditions and levels of peatland vulnerability to fire in Jambi; (2) evaluate the effectiveness of existing management policies and strategies, including restoration, water-table control, and paludiculture implementation; and (3) formulate evidence-based policy recommendations integrating ecological, social, and institutional approaches. This study is expected to provide empirical contributions to strengthening sustainable peatland governance, particularly in supporting Indonesia's *Nationally Determined Contribution (NDC)* target for greenhouse gas emission reduction (Ministry of Environment and Forestry, 2023).

This paper argues that peatland fires in Jambi are not merely the result of natural factors but rather the outcome of complex interactions between hydrological degradation, unsustainable land use practices, and weak environmental governance (CIFOR-ICRAF, 2021). Therefore, an integrated and adaptive management approach is required one that combines hydrological restoration, protected-area management, community empowerment, and spatial data based monitoring. The main hypothesis of this study is that if peatland management in Jambi is implemented in an integrated manner through hydrological restoration, consistent land-use regulation, and enhanced local community participation then the frequency and intensity of peat fires will significantly decrease, and the ecological functions of peatlands can be restored. This argument is supported by empirical evidence showing that peatland restoration not only reduces fire occurrences but also yields long-term economic and health benefits for local communities (Kiely et al., 2021; Hein et al., 2022).

METHODS

This study applies a qualitative descriptive research design combined with elements of documentary and spatial analysis to examine peatland ecosystem protection and management in Jambi Province. The qualitative approach enables an in-depth understanding of institutional, ecological, and socio-political aspects related to forest and land fire mitigation. The research focuses on the period 2019–2020, coinciding with the implementation of large-scale peat restoration programs by the Peat Restoration Agency (BRG) and the Provincial

Government of Jambi, following major fire events in 2015–2016. This design allows the integration of narrative interpretation with empirical evidence from restoration monitoring and spatial data on peatland conditions.

The data used in this study were obtained from multiple institutional sources. The primary data were derived from the *Peat Restoration Monitoring Report (2019–2020)* published by Wahana Lingkungan Hidup Indonesia (WALHI), which contains detailed observations on rewetting progress, land conditions, and community involvement in restoration activities. Secondary data were collected from official documents issued by the Jambi Government, including environmental policy reports and land-use regulations, and from BRG datasets related to peat hydrological unit (PHU) mapping, rewetting projects, and monitoring indicators. Media information from reputable national and local outlets was also analyzed to capture public discourse, perceptions, and the socio-political response toward peatland fires and management policies. All data were cross-checked and validated through triangulation to ensure accuracy and credibility.

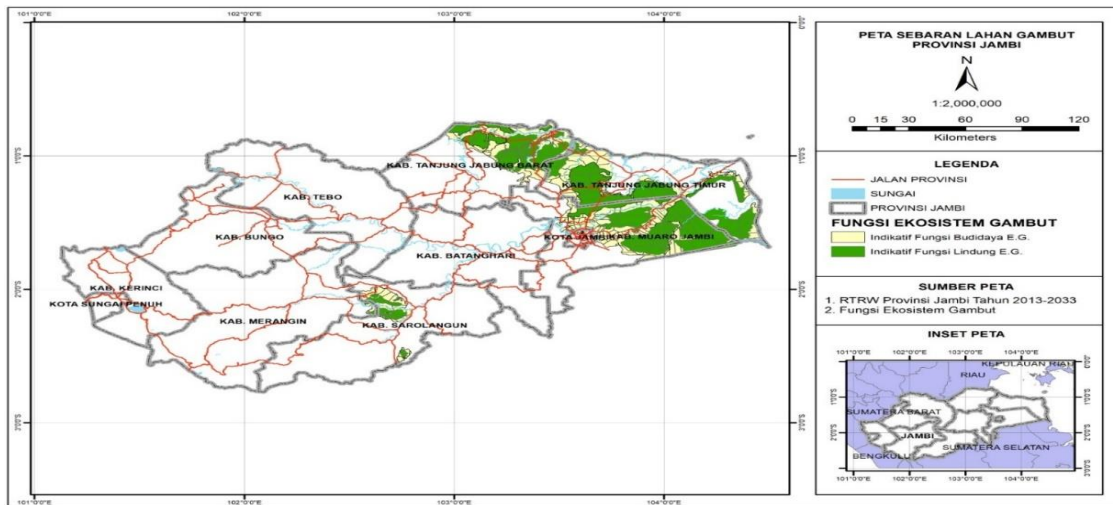
Data analysis combined document analysis, content analysis, and spatial interpretation. Thematic coding was applied to identify key issues such as policy effectiveness, restoration challenges, and community participation. Media reports were examined for recurring narratives and framing patterns, while spatial data from BRG and WALHI were overlaid with fire hotspot maps to visualize correlations between restoration zones and fire incidents in Jambi. This integrative analytical approach produced a holistic understanding of the dynamics of peatland protection management and allowed the identification of institutional gaps and best practices that can enhance sustainable peatland governance in Jambi Province.

RESULT AND DISCUSSION

If we examine Jambi Province Spatial Plan (RTRW) document for 2013-2033, we will find information on the extent and zoning scheme of three land areas by the Jambi Provincial Government. The land area of Jambi Province has currently shifted from 5.1 million hectares to 4.9 million hectares. This is due to a political decision regarding the transfer of administrative rights over the Berhala Island area, which previously belonged to Jambi Province, to Riau Province. For information on the regional zoning scheme, typologically, Jambi Province has three plains regions that stretch: highlands, midlands, and lowlands. The highlands start from Kerinci, Sungai Penuh, Merangin, and Bungo Regencies. Then the midlands, included in the Bukit Barisan range that stretches across the center of Sumatra Island from Aceh to Lampung, starting from Bungo, Sarolangun, Tebo, and Batanghari Regencies. And the lowlands are located on the East Coast of Sumatra which is an area of peatland distribution, starting from Muara Jambi Regency, East Tanjung Jabung, and West Tanjung Jabung, including Jambi City.

In this study, we will discuss more factually the facts related to the management of lowland areas owned by Jambi Province, which in fact has a wealth of peat hydrological unit (KHG) distribution areas. Based on data from the Peat Restoration Agency 2016, the area of KHG Jambi reached 929,203 hectares or 9.63 percent of the peat area that stretches across the island of Sumatra with an area of 9,646,459 hectares.

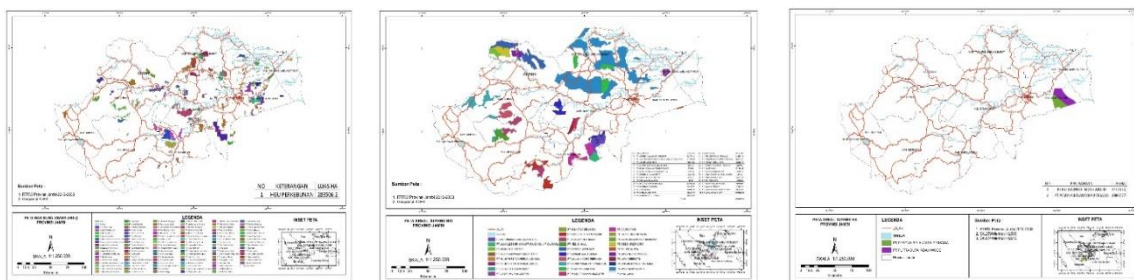
Picture 1. Map of peatland ecosystem distribution in Jambi



Source: Walhi (2020)

In 2013, WALHI Jambi gathered information regarding the implementation of its management policy from the peatland area in Jambi Province described above. They found that 70 percent of the peatland area in the province has been designated as licensed industrial areas. These permits are based on control of the peatland area for the oil palm plantation industry, HTI industrial plantation forest, and HPH forest management rights. Of the 70 percent of peatland areas that have been converted into licensed industrial areas, 36 villages have been granted oil palm plantation permits, and 48 villages have been granted HTI/HPH permits. Thus, a total of 84 villages have been burdened with industrial permits for oil palm plantations and HTI and HPH industries.

Picture 2. Map of the distribution of palm oil concession permits, HPH and HTI in Jambi



Source: Walhi (2020)

Peatland Protection and Management

The management and protection of all peatlands in Indonesia is regulated by Law Number 32 of 2009 concerning Environmental Protection and Management. This law serves as a legal umbrella for existing environmental governance mechanisms and management, specifically regulating proper environmental protection and management. While the governance of peat ecosystem protection and management is not explicitly regulated in Law 32 of 2009, various implementing regulations have emerged regarding peat ecosystem protection and management, including the 2016 Government Regulation on the Protection and Management of Peat Ecosystems and Presidential Regulation No. 1 of 2026 concerning the Establishment of the Peat Restoration Agency (BRG). Several peat ecosystem protection

policies currently face challenges. One challenge facing these policies is the proliferation of industrial management practices by permit holders within the peat ecosystem itself.

Peatland Ecosystem Protection Management Policy

If we use government regulations to assess the quality of peatland areas, we will be guided by a single established government policy. One of the government policy provisions regarding peatland area management is that natural peat ecosystems are wet and prone to flooding. This means that if we understand the government's peat management policy, we can conclude that for peat to be in an ideal (natural) condition, the groundwater level in the peat should be close to the ground surface. This is further stipulated in Government Regulation of the Republic of Indonesia (PPRI) No. 57 of 2026 concerning the protection and management of peat ecosystems. This stipulates that the natural peat water level is 40 cm below the ground surface. Article 23, paragraph 3, point a), states that a peat ecosystem for cultivation purposes is considered damaged if the groundwater level exceeds 0.4 meters. Under natural conditions, peat is fire-resistant (fire-resistant), oxidation-resistant (CO₂-resistant), and resistant to subsidence (land subsidence).

Facts about Peatland Ecosystem Management in Jambi

In the context of environmental degradation, the peatland ecosystem in Jambi Province is currently experiencing a critical state of degradation. This is evidenced by several ecological disasters that occur periodically, recurring over several years. The forest and land fires in Jambi, particularly those occurring in peatland ecosystems, are inextricably linked to poor peatland management by permit holders, including oil palm plantations, HPH (concession-free plantations), and HTI (industrial timber plantations). One example of poor peatland management practices is the construction of canals around company concessions located in peatland ecosystems. To drain the peatland ecosystem and adjust the water level to suit the types of industrial crops they cultivate, all industrial permit holders, both oil palm plantations and HTI plantations, construct canals within their permit areas. With a width of 8-10 meters and a depth of 5-8 meters, the canals constructed by industrial permit holders in peatland ecosystems have effectively lowered the peatland water level.

Picture 3. Canals built by companies in peat areas



Source: Walhi (2020)

The construction of canals by companies holding permits in peatland ecosystems not only results in a decrease in the peatland water level, but more dangerously, it also causes the peatland surface to dry out to a depth exceeding 40 cm. This, from a management policy perspective, clearly violates Government Regulation of the Republic of Indonesia (PPRI) No. 57 of 2026 concerning the Protection and Management of Peatland Ecosystems, which stipulates that the natural peat water level is 40 cm below ground level. The decline in peat

water level of more than 40 cm, as evidenced by the forest and peatland fires in 2015-2019, not only contributes to the ease of peatland fires, but also, more concerningly, makes the burned peatland difficult to extinguish. In several peatland areas in Sumatra, which are not immune to forest and land fires, by 2019, peatland management methods had been developed to block canals.

The purpose of canal blocking is to restore the peat water level to 40 cm. Therefore, this strategy is believed to be a preventative management measure to prevent peat from drying out and catching fire easily. In addition to preventive measures through canal blocking management, efforts have been made to inject water into burning peat areas, with the same goal of rewetting. Regarding peat water level management, it is stated as interview below

“given the numerous failures in canal blocking construction, both in implementation and in its rewetting function, alternative methods for rewetting peat areas need to be encouraged. One such approach is the use of a method already practiced by local communities in peatland areas, known as *parit kongsi* or connected ditches/canals, either within a single KHG or across KHGs.” (Marolop, *interview*, 2025).

Forest and land fires, particularly in peat ecosystem areas, have become a milestone in the birth of a policy related to efforts to manage and save peat ecosystem areas by the Indonesian Government.

Table 1. Forest and Land Fire Area in July-August 2019 in Jambi Province

Luas Terbakar	Wilayah Gambut	Wilayah Konsesi
663,31 ha	345 ha	420.11 ha

Source: Walhi (2020)

One of the milestones in the birth of this peatland conservation policy was President Jokowi's establishment of the Peatland Restoration Agency (BRG), which was outlined in Presidential Regulation No. 1 of 2016, which he signed on January 6, 2016. The Peatland Restoration Agency is fully trusted to be a government agency capable of breaking the deadlock stemming from the government's weakness in addressing land and forest fires, particularly in peatland areas. The Peatland Restoration Agency is now entering its fourth year, and Jambi Province is one of the priority provinces under its management.

Table 2. Restoration Area Targets in Jambi Province According to the Indicative Map

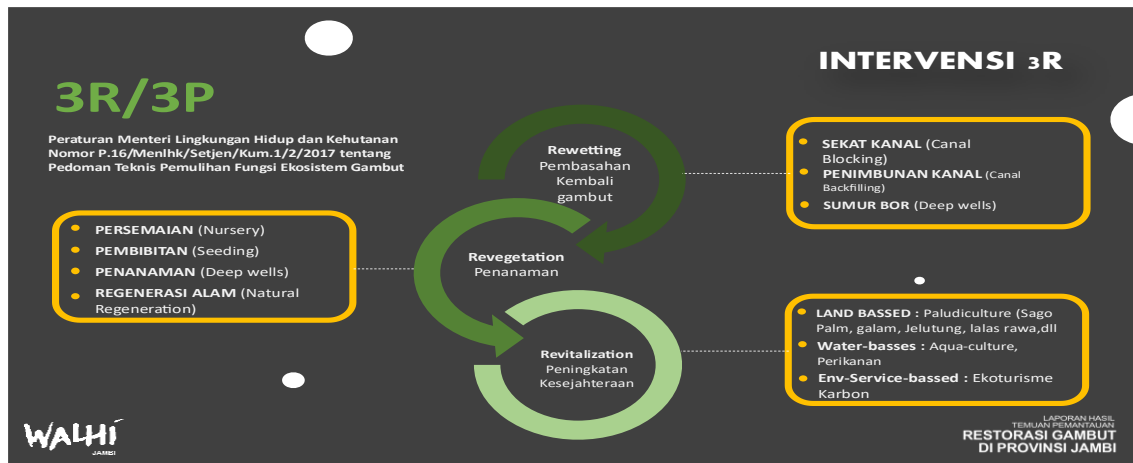
Area to be restored	Protected Area	Unauthorized cultivation	Authorized cultivation
200.772 ha	46.415 ha	25.885 ha	128.472 ha

Source: Walhi (2020)

The data show that the total area designated for restoration covers 200,772 hectares, consisting of 46,415 hectares of protected areas, 25,885 hectares of unlicensed cultivation land, and 128,472 hectares of licensed cultivation land. This composition indicates that most of the restoration areas fall within licensed cultivation zones, reflecting significant involvement of the private or corporate sector in peatland management. Meanwhile, the presence of unlicensed cultivation areas highlights weak land-use supervision and potential tenure conflicts among communities, companies, and the government. Overall, the data emphasize that restoration efforts require not only ecological approaches but also

institutional reform and stronger law enforcement to ensure the sustainability of peatland ecosystems and equitable resource governance.

Picture 4. Peatland Ecosystem Restoration Management of BRG



Source: Walhi (2020)

The data illustrates the 3R/3P concept as a technical guideline for restoring peatland ecosystem functions based on the *Regulation of the Minister of Environment and Forestry No. P.16/Menlhk/Setjen/Kum.1/2/2017*. The 3R approach consists of three main intervention strategies: *rewetting*, *revegetation*, and *revitalization*. The *rewetting* stage involves efforts such as canal blocking, canal backfilling, and the construction of deep wells to restore peatland moisture levels. The *revegetation* stage includes activities such as nursery development, seeding, planting, and natural regeneration to recover native vegetation. Meanwhile, *revitalization* focuses on improving community welfare through land-based activities (such as cultivating sago, gelam, and jelutung), water-based initiatives (such as aquaculture and fisheries), and environmental service-based efforts like carbon ecotourism. Overall, this scheme emphasizes the integration of ecological restoration with the socio-economic empowerment of communities living around peatland ecosystems.

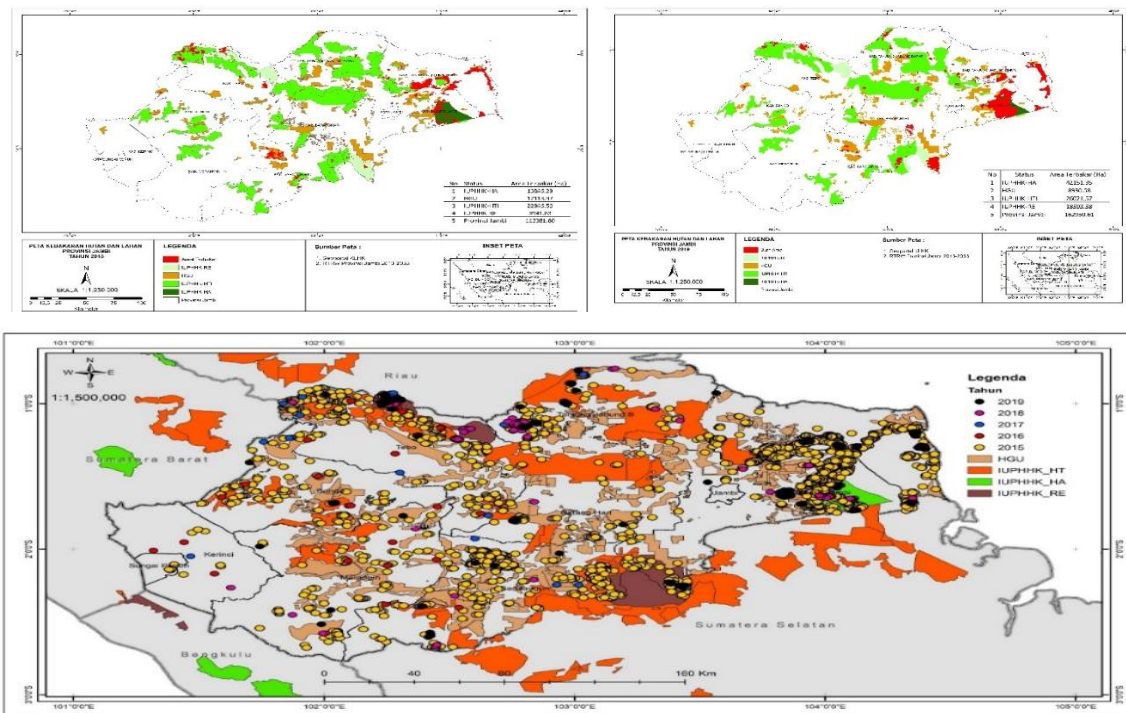
Since the establishment of the Peat Restoration Agency (BRG) by the Indonesian President in 2016, many, especially environmental observers and activists, have expressed doubts about its success in restoring peat ecosystems. The fact that Indonesia's peatlands are still dry, making them susceptible to fire, demonstrates that the BRG has failed to address the root causes of the problem. The process of draining peatlands, resulting in lower water levels of less than 40 cm, continues. The canal blocking policy, which is mandated by the BRG for industrial permit holders on peatlands, continues to fail, and many permit holders have failed to build canal blocking.

The facts about peatland damage due to mismanagement

Forest and peatland fires in Jambi have occurred repeatedly, the most monumental of which occurred between 2015 and 2019. Of Jambi's 900,000 hectares of peatland, 80% burned in 2015 and burned again in 2019 and subsequent years. This is confirmed by a report by *TribunJambi.com* on January 15, 2016, in which the Head of the Jambi Provincial Forestry Service stated that of the approximately 900,000 hectares of peatland in Jambi Province, 80% burned during the 2015 forest and land fires. Meanwhile, for 2019, the data on the extent of fires in Jaambi was successfully consolidated by WALHI and processed using data sourced from Landsat 8 and Sentinel 2 satellites in the period of August 1 - October 31, 2019. And

to help indicate the indication of the burned area, the Normalize Burn Ratio and Hotspot overlay methods were processed with a fire area figure of 165,186.58 hectares with a composition of 114,900.2 hectares of peatland and 50,286.38 hectares of non-peatland.

Picture 5. Distribution of forest and land fire locations in Jambi, 2015–2019

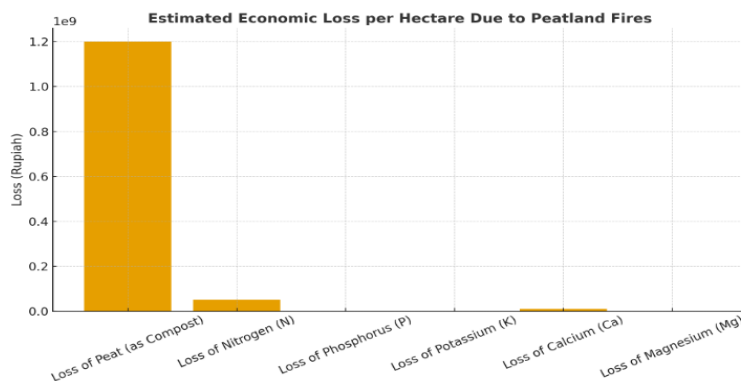


Source: Spatial Analysis Map of Walhi (2020)

Environmental losses due to forest and land fires in Jambi Peatland

Forest and land fires in peatland areas have become a recurring environmental challenge in Jambi, resulting in significant ecological, economic, and social impacts. These fires not only contribute to the loss of biodiversity and degradation of critical ecosystems but also release large amounts of greenhouse gases, exacerbating climate change. Understanding the scope and patterns of these losses is essential for developing effective management strategies. The following section presents data that highlight the scale of environmental damage caused by peatland fires in Jambi, providing a foundation for evidence-based policy and restoration interventions

Graph 1. Estimated economic loss per hectare due to peatland fires



Source: Data processed by author

The graph above illustrates the estimated economic loss per hectare due to peatland fires, measured in Rupiah. It is evident that the largest loss comes from the depletion of peat as compost, amounting to approximately 1.2 billion Rupiah per hectare, which far exceeds other types of losses. Meanwhile, the loss of nutrients such as nitrogen (N) also contributes to economic damage, though on a much smaller scale around tens of millions of Rupiah per hectare. Other elements such as phosphorus (P), potassium (K), calcium (Ca), and magnesium (Mg) have a minimal impact, appearing almost insignificant in the chart. This indicates that the economic value of peatlands heavily depends on their organic content and function as natural compost, meaning that fires destroying the peat layer cause a much greater economic loss compared to the loss of specific nutrients.

Forest and land fires (*karhutla*) in Jambi Province represent a complex ecological problem closely linked to the fragile condition of peatland ecosystems. Peatlands play an essential ecological role as carbon sinks, water regulators, and habitats for high biodiversity. However, land-clearing practices through burning for agricultural and oil palm plantation purposes have led to massive degradation of these ecosystems. According to *Political Ecology* theory, environmental degradation is not solely caused by natural factors but also by interrelated social, political, and economic dynamics (Bryant & Bailey, 1997). In the context of Jambi, conflicts of interest among the government, plantation companies, and local communities have worsened land governance, making it difficult to implement peatland protection policies consistently.

From the perspective of *Environmental Governance Theory*, managing forest and land fires in Jambi requires cross-actor collaboration involving local governments, non-governmental organizations, the private sector, and indigenous communities. Ostrom (1990) emphasizes the importance of shared or co-management in natural resource governance, where clearly defined access rights, local participation, and monitoring mechanisms are key factors for success. In practice, however, many fire mitigation policies in Jambi remain reactive and top-down in nature, focusing on firefighting operations and law enforcement after fires occur, rather than strengthening community-based prevention systems. The peatland restoration programs initiated by the Peatland and Mangrove Restoration Agency (BRGM) are a positive step, yet their effectiveness remains limited due to weak inter-agency coordination and low community capacity in maintaining peatland moisture.

Ecologically and socially, protecting Jambi's peatland ecosystems requires a *socio-ecological resilience* approach referring to the ability of social and ecological systems to adapt to environmental changes and pressures (Folke, 2006). This approach highlights the need to integrate ecological science with social dynamics in designing sustainable fire prevention strategies. For instance, strengthening community fire-care institutions, promoting no-burn agricultural practices, and applying peat moisture monitoring technologies can all serve as adaptive strategies. Thus, the success of forest and land fire management in Jambi depends not only on technical interventions but also on the development of environmental governance that is inclusive, adaptive, and grounded in local knowledge.

The political approach to policy plays a central role in addressing forest and land fire issues, particularly within Jambi's peatland ecosystems, which involve multiple actors and competing interests. Within the framework of *policy analysis theory*, public policy is understood as the outcome of interactions among power, interests, and knowledge; thus, the implementation of peatland protection cannot be separated from the political dynamics at both local and national levels (Dunn, 2018). Peatland management policies often encounter conflicts between economic interests especially those related to the oil palm and industrial plantation forest (HTI) sectors and ecological imperatives for environmental sustainability. According to the *advocacy coalition framework* developed by Sabatier (1988), effective policy change requires the formation of coalitions among actors who share similar beliefs and long-

term policy objectives. Consequently, protecting peatland ecosystems in Jambi necessitates the establishment of policy coalitions involving government institutions, civil society organizations, academics, and the private sector to strengthen the legitimacy and consistency of environmental protection policies.

Furthermore, the political approach to policy demands adaptive and responsive policy governance that reflects socio-ecological dynamics on the ground. In the context of *environmental policy integration* (EPI), environmental considerations should be mainstreamed across all development sectors rather than treated as an isolated domain (Jordan & Lenschow, 2010). In Jambi, this implies that peatland management policies must be harmonized with agricultural, forestry, and spatial planning policies. Such integration ensures that every development initiative accounts for the ecological risks and social impacts of economic activities on peatlands. However, the implementation of EPI in Indonesia continues to face structural challenges, including weak inter-agency coordination, limited political transparency, and a persistent short-term economic growth orientation. Strengthening *policy coherence* mechanisms and promoting transparency in public decision-making processes can make the political policy approach a strategic instrument to address the root causes of peatland fires and ensure the sustainable management of ecosystems in Jambi.

A political policy approach is crucial for addressing forest and land fire issues in Jambi's peatlands, as these problems are inherently cross-sectoral and rooted in licensing processes, land-use practices, and economic incentives that promote peatland conversion. Recent studies indicate that decades of land-cover change and conversion have increased peatland vulnerability to fires, suggesting that reactive, suppression-based policy interventions are far less effective than preventive policies that regulate land use and licensing systems (Song et al., 2024). Moreover, ecological-economic evaluations demonstrate that peatland restoration efforts such as rewetting and revegetation can significantly reduce burned areas, and public health impacts. However, the success of such restoration measures depends on sustained policy support, clear financing mechanisms, and effective inter-agency coordination (Kiely et al., 2021; Choi et al., 2024).

At the local level, studies in Jambi highlight that recurring fire incidents are closely linked to land-clearing practices within concession areas and degraded landscapes, as well as weak oversight of licensing processes. Consequently, governance reforms such as implementing a moratorium on peatland permits, revising high-risk concession licenses, and improving permit data transparency constitute critical policy instruments for preventing future fires (Song et al., 2024). These observations are further reinforced by spatial and fire-mapping analyses, which show a concentration of fire incidents within concession zones and land-cover change areas, reflecting inadequate enforcement of spatial planning regulations.

Furthermore, the political policy framework must incorporate participatory mechanisms and binding incentives that engage local actors ranging from indigenous communities and farmer groups to private companies in sustainable peatland management. Empirical evidence from Jambi and other provinces indicates that community-based prevention programs enhance prevention capacity and reduce fire occurrences when combined with fiscal and technical policy support (Sundari et al., 2022; Kamal, 2023). At both national and provincial levels, integrating environmental policy into agricultural, forestry, and spatial planning policies through mechanisms of *environmental policy integration* (EPI) and *policy coherence* has proven effective in reducing policy conflicts that have historically undermined prevention efforts (Jordan & Lenschow, 2010; Choi et al., 2024).

Modern monitoring techniques, such as satellite-based early warning systems and weather-model-based peat moisture monitoring, must also be supported by policies that guarantee public access to data and establish clear response procedures. Early detection and

rapid response in peatland areas depend critically on the synergy between technology, field-level resources, and the political legitimacy to act (Taufik et al., 2022). Therefore, a political policy approach that integrates licensing reform, restoration financing, community participation, and cross-sectoral policy alignment provides the most realistic and effective framework to address the root causes of peatland fires in Jambi and to ensure long-term socio-ecological sustainability.

CONCLUSION

The issue of forest and land fires within Jambi's peatland ecosystems is a multidimensional problem encompassing not only ecological aspects but also social, economic, and political dimensions. The analysis indicates that peatland vulnerability to fires is rooted in unsustainable land management practices, weak licensing oversight, and reactive policy responses. The *political ecology* and *environmental governance* perspectives emphasize that solutions to peatland fires cannot be achieved solely through technical interventions but require governance transformation and policy coalitions that engage multiple cross-sectoral actors. Strengthening evidence-based policymaking, integrating environmental considerations into other development sectors, and implementing principles of *adaptive governance* are crucial to ensuring both peatland ecosystem sustainability and local community well-being. Therefore, the success of peatland protection in Jambi is highly dependent on the synergy between environmentally oriented political policies, community empowerment, and technological innovations that enable early fire prevention.

Nevertheless, this study has several limitations that warrant consideration. First, much of the analysis relies on conceptual frameworks and literature reviews, without a comprehensive quantitative evaluation of on-the-ground policy effectiveness. Second, the lack of longitudinal data on the social and economic dynamics of communities surrounding peatlands constrains the comprehensiveness of causal mapping related to fire occurrences. Future research should therefore adopt *mixed-methods* approaches combined with spatial and participatory methodologies to assess the actual impacts of peatland restoration and governance policies. Moreover, further studies should explore innovative financing mechanisms such as carbon credit schemes and green bond financing and examine the potential for cross provincial collaboration in fire management. By broadening the research dimensions and deepening empirical analysis, future studies can provide a stronger foundation for designing adaptive policies capable of sustainably addressing peatland fire challenges in Jambi Province and other peat-dominated regions across Indonesia.

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