



Katingan regency regional government synergy in mitigating forest and land fires

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ABSTRACT

Forest and land fires (*karhutla*) in Katingan Regency, Central Kalimantan, are a serious issue that occurs almost every year, particularly in peatland areas. *Karhutla* not only causes ecological damage, such as ecosystem degradation and loss of biodiversity, but also has social and economic impacts, including health problems caused by haze, economic losses, and increased carbon emissions that accelerate global warming. Peatland areas are of particular concern due to their large carbon reserves, which, when burned, release significant emissions. The issue addressed in this study is the effectiveness of the synergy between Katingan regency Local Government in forest and land fire mitigation, which still faces challenges, particularly in coordination between central and local governments, budget constraints, and suboptimal resources in fire control in vulnerable areas such as Katingan. This study evaluates the synergy between local governments, communities, and stakeholders in mitigating *karhutla* using a juridical-empirical approach. Although various policies have been implemented, such as regional regulations and the construction of canal blocks, their implementation faces challenges, including geographical factors, limited budgets, a lack of trained human resources, and weak law enforcement. The findings of this research indicate that the mitigation of forest and land fires in Katingan regency is still constrained by limited resources and coordination, hence stronger synergy among stakeholders is required. Hence, a more integrated approach and collaboration among all parties are needed to develop effective mitigation strategies, preserve ecosystem sustainability, and support the achievement of Sustainable Development Goals (SDGs).

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1. Introduction

The Indonesian legal system is rooted in the cultural values of the nation that have developed along with its society (Manan, 2020). In order to safeguard the welfare of the community, it is

necessary to intertwine the norms, behaviors, and values that prioritize communal interests. Law not only functions as a tool to achieve certain goals, but also as a means of national development, which encourages economic, social, and political growth. Therefore, laws and regulations must be designed to provide benefits to society and ensure legal protection for every individual (Ali, 2023).

The role of the government goes beyond just being a passive presence for times when there is a lack of peace, public order, and security (Hutabarat et al., 2022). In a modern state of law, the government has a broad obligation to take care of the needs of its people, including ensuring the rule of law, equality of rights, and protection of individuals. The law should have a philosophical foundation that promotes the welfare of society, with a focus on meeting basic needs, security, and equality (Cahyadi & Manullang, 2021). In the context of environmental protection, Article 28G Paragraph (1) of the 1945 Constitution guarantees the right of every citizen to protection and security, including from the threat of disasters such as forest fires. Therefore, local governments, within the framework of regional autonomy, have the responsibility to protect communities from the dangers of forest and land fires.

Forest and land fires are a frequent natural disaster in Indonesia, especially during the dry season. The impacts of forest and land fires are extensive, including environmental damage, financial losses and social challenges. These fires lead to land and forest degradation, as well as uncertainty in ecosystem recovery and loss of potential resources and biodiversity value (Yusuf et al., 2019). This phenomenon is often associated with the deliberate burning of land for agriculture, the rejuvenation of livestock feedgrass, and the clearing of idle land. Peatland becomes highly susceptible to fires when it undergoes drying. Additionally, forest and land fires (Kebakaran Hutan dan Lahan or karhutla) have significant social and economic impacts on communities, including health issues, loss of livelihoods, and environmental damage (Kementerian, 2020). From the forest and land fire data in Indonesia from 2015 to 2019, the largest incidents occurred in 2015 and 2019, causing damage to approximately 2.6 million and 1.6 million hectares of land, respectively. Nearly 29% of these fires occurred on peatland, which, despite its smaller area compared to non-peatland, contains high carbon content that, when burned, can produce significant CO₂ emissions. The Ministry of Environment and Forestry (KLHK) reported that 83.4% of peatland ecosystems in Indonesia have been damaged and require restoration efforts. The burning of peatland generates emissions that exacerbate global warming, with the forestry sector being the largest contributor to emissions in 2015 and 2019. Fires in the dry lower layers of peat can last for months, are difficult to extinguish, and cause significant air pollution (Putra & Abas, 2022).

Katingan is one of the areas where forest and peatland fires occur every year, especially during the dry season. Forest and land fires are a common occurrence in nearly all regions of Katingan Regency, particularly prevalent in the sub-district of Katingan Hilir. This area is one of the sub-districts included in the Katingan Regency area, namely Kasongan City. Katingan hilir sub-district consists of 2 (two) villages and 7 (seven) villages, namely, Kasongan Baru Village, Kasongan Lama Village, Telangkah Village, Banut Kalanaman Village, Hampalit Village, Talian Kereng Village, Tumbang Liting Village and Tewang Kadamba Village. Katingan Hilir sub-district has an area of 63,109 hectares with an indicative distribution of peat ecosystem cultivation functions of 10,646 hectares, indicative peat ecosystem protection functions of 6,478 hectares and non-peat 45,985 hectares.

As the Katingan region develops, community activities that utilize forests and land also increase. This poses a threat to environmental sustainability (Trisasonkko, 2023). The Indonesian Constitution, in the Preamble of the 1945 Constitution and Article 33 paragraph (3),

emphasizes that the state is responsible for managing natural resources for the welfare of the people (Mahendra & Yustiawan, 2023). This provision is reinforced in Law No. 41 of 1999 concerning Forestry, which regulates the protection and management of forests.

The 1945 Constitution of the Republic of Indonesia emphasizes the protection of all national elements, including forests and land, as outlined in Article 33, Paragraph (3) of the 1945 Constitution and further clarified in Law No. 41 of 1999 concerning Forestry. In addition, Indonesia is committed to the Sustainable Development Goals (SDGs) Agenda, as stated in Presidential Regulation (Perpres) No. 59 of 2017. Forest and land fires can hinder the achievement of the SDGs, particularly Goal 15, which focuses on the sustainable management of terrestrial ecosystems (Munthaha, 2019).

Forest and land fires have a negative effect on both the populace and the nation of Indonesia. Conversely, combating forest fires through suppression necessitates substantial financial resources and effort (Ayuningutami & Najicha, 2022). Indonesia is facing challenges in combating forest fires due to financial constraints and limited firefighting technology. The high costs associated with extinguishing fires every year highlight the need for collaborative efforts to prevent their recurrence. It is crucial for all stakeholders to come together to address this ongoing issue and prevent future forest fires (Puniasih & Prakoso, 2022). In order to avoid and combat forest and land fires, it is essential for different parties to come together and make a collective effort in fire control. It is crucial for fire control efforts to be in line with established laws and regulations to ensure their efficiency.

The fire mitigation strategy in Katingan, Indonesia, can be compared to other regions such as Riau and South Sumatra to highlight effective and replicable approaches. Katingan has adopted an integrated landscape governance that involves local communities, government, and NGOs in managing peatlands sustainably (Widayati et al., 2022). This approach has demonstrated positive outcomes in reducing fire incidents through land restoration practices and enhancing local capacity. In Riau, the initiative of rewetting peatlands has proven effective in mitigating fire risks, with a significant decrease in extreme fire incidents following the implementation of the hydrological restoration program (Taufik et al., 2023). This model demonstrates that hydrologically-based ecosystem restoration can be implemented in Katingan as part of a wildfire mitigation strategy. Furthermore, community-based approaches such as those implemented in South Sumatra through the voluntary Fire Brigade have shown that community involvement can enhance preparedness and response to forest and land fires (Ramadhani et al., 2023). By adopting a similar strategy, Katingan can enhance the effectiveness of fire mitigation through a combination of hydrological management, land restoration, and community empowerment. By implementing an integrated landscape governance approach, hydrological restoration, and community participation, fire mitigation strategies in Katingan can be more effective in reducing the risk of forest and land fires.

Indonesia is recognized as the country with the third largest tropical rainforest in the world after Brazil and the Democratic Republic of Congo, boasting approximately 8% of the global carbon reserves, which equates to around 8800 MtC. Given the global significance of its forest wealth and carbon reserves, Indonesia has a responsibility to preserve its forests and address the issue of forest fires that contribute to climate change. Since 2016, the Indonesian government has committed to reducing Greenhouse Gas (GHG) emissions by 29% by 2030, as stipulated in the Paris Agreement ratified by Law No. 16 of 2016. In terms of regulations, the 1945 Constitution gives autonomy to regional governments to manage their own affairs based on the principle of autonomy. This allocation is outlined in Article 18, which divides Indonesia into provinces, regencies, and cities, each with its own authority to govern and implement policies.

Article 18 also emphasizes that regional governments have the freedom to exercise autonomy, with exceptions specified by the central government.

As a result of decentralization, regions have the authority to establish Regional Regulations (PERDA) at both the provincial and regency/city levels in order to regulate governance affairs that have been delegated to them. While regions have freedom in managing policies, there is still oversight from the central government to ensure that the policies made are not in conflict with national law. This indicates that although regions have extensive autonomy, they are still bound by national law and do not have full freedom in decision-making.

The development and needs of the community are not enough to be regulated formally with the principle of legality, which means that the government is based on the law alone, so it has received a lot of criticism. In the context of the urgency of overcoming and preventing forest and land fires as legal protection for the people of Katingan Regency, especially Katingan Hilir, the author considers it necessary to study the implementation of overcoming and preventing forest and land fires in Katingan Hilir sub-district, Central Kalimantan Province by elaborating the Theory of Legal Effectiveness as the Grand Theory, in order to obtain optimal benefits from forests and land for the welfare of the community, in principle, all forests and land must be protected from fires and utilized while taking into account their nature, characteristics and vulnerability, and are not allowed to change their main function. With the delegation of authority from the legislature to local governments to make local regulations in order to accelerate the realization of legal ideals, and this allows local governments to ensure fairer order in an effort to protect the interests of the people. In this concept of the rule of law, the state's goal is to realize the welfare of all its people (*wohlfaarstaats* or welfare-state).

The change in the meaning of the principle of legality indicates a shift in values in society. The people are no longer too confrontational towards the power of the ruler, but have considered the government as a partner to achieve the goal, namely collective prosperity. However, if you look at the practice in the field, prevention activities have not been effective due to the limited authority of the Regional Government as regulated in the Legislation. Based on recent research by Widayati et al. (2022) and Taufik et al. (2023), the strategies for wildfire and land fire mitigation in Indonesia have evolved through ecosystem-based approaches, hydrological restoration, and community participation. Integrated landscape governance models implemented in certain regions like Riau and South Sumatra have shown effectiveness in reducing fire risks through peat restoration and community-based firefighting teams (Ramadhani et al., 2023). However, there are still gaps in policy implementation at the local level, particularly in the coordination between central and local governments, as well as limitations in budget and resources for fire control in vulnerable areas such as Katingan (Trisasonko, 2023). This study aims to analyze the effectiveness of synergy between the Katingan regency Local Government in wildfire and land fire mitigation, with the hope of providing more effective policy recommendations and collaboration models that can be applied in other areas with similar characteristics.

2. Method

This study utilized an empirical juridical method, which integrates legal norm analysis with empirical field studies (Marzuki, 2021). The research population included parties related to the legal issue under investigation, while samples were selected through purposive sampling, such as legal practitioners, government officials, academics, and affected community members. Data collection comprised of primary data through interviews and observations, as well as secondary data from primary, secondary, and tertiary legal sources. Data collection techniques included

literature review, interviews, and observations. Research procedures involved problem identification, literature review, instrument development, data collection, descriptive-analytical data analysis, and report preparation (Soekanto & Mamudji, 2020). The media utilized included interview recordings, printed legal documents, and field observation tools. This approach is expected to yield legal analysis that is not only theoretical but also practical in resolving legal issues.

3. Analysis and Results

Based on Law Number 5 of 2002 concerning the Establishment of Katingan Regency, Seruyan Regency, Sukamara Regency, Lamandau Regency, Gunung Mas Regency, Pulang Pisau Regency, Murung Raya Regency, and East Barito Regency in Central Kalimantan Province, Katingan Regency has its capital city in Kasongan.

According to Regulation 137 of 2017 by the Minister of Home Affairs in Indonesia, the official area of Katingan Regency is stated to be 17,500 square kilometers. Despite this, the local government in Katingan Regency has been ongoing with research to define their administrative borders since the region's establishment. As per the Katingan Regency Regional Government's study conducted up to 2019, the area was found to be approximately 20,393.70 square kilometers. Positioned within the geographical coordinates of 0°20'-3°38' South latitude and 112°00'-113°45' East longitude is the Katingan Regency.

It is bordered to the north by Malawi Regency of West Kalimantan Province; to the east by Gunung Mas Regency, Palangkaraya City, and Pulang Pisau Regency; to the south by the Java Sea; and to the west by East Kotawaringin Regency and Seruyan Regency.

Katingan Regency consists of 13 sub-districts, namely: Katingan Kuala, Mendawai, Kamipang, Tasik Payawan, Katingan Hilir, Tewang Sangalang Garing, Malan Island, Katingan Tengah, Sanaman Mantikei, Petak Malai, Marikit, Katingan Hulu, and Bukit Raya. The thirteen sub-districts are spread from south to north, with Bukit Raya sub-district having the furthest distance to the district capital, at 291 km. The district is crossed by the Katingan River, which is ± 650 km long with many tributaries.

A designated forest area is a specific region covered with trees, as determined by the government to ensure its preservation as a permanent woodland. This measure is taken to establish legal certainty regarding the status, boundaries, and size of a forest area designated for preservation. The Minister of Forestry in Indonesia designates forest areas through official decrees, specifying the boundaries of these areas in coordination with provincial spatial plans and forest use agreements. These designated forest areas may encompass water bodies within Nature Reserve and Conservation Areas. Nature Reserve Areas in KSA are designated spots on land and in water that serve to protect and sustain the wide array of plants, animals, and ecosystems found within them. These areas are crucial for maintaining the balance of life within their boundaries. Similarly, Nature Conservation Areas in KSA are specific locations both on land and water that aim to safeguard the life support systems, the varied species of flora and fauna, and ensure the sustainable utilization of biological resources and their ecosystems.

Under Law No. 41 of 1999 regarding Forestry, forest regions are categorized into Conservation Forest, Protection Forest, and Production Forest groups. Conservation Forest is defined as an area with specific qualities focused on safeguarding plant and animal diversity along with their ecosystems. Protection Forest is designated to maintain the life support system by managing water, preventing floods, controlling erosion, stopping seawater intrusion, and preserving soil fertility. Conservation Forest includes Nature Reserves such as Nature Reserves (CA) and

Wildlife Reserves (SM); Nature conservation areas like National Parks (TN), Forest Parks (THR), and Nature Tourism Parks (TWA).

Katingan is one of the regencies in Central Kalimantan with the largest rice production. Rice fields, both paddy and field rice, are both concentrated in Katingan Kuala Sub-district. The area of Katingan Kuala bordering the sea facilitates the continuous irrigation of rice fields. The largest plantation crop production in Katingan Regency comes from the oil palm commodity. Most production comes from Katingan Hilir Sub-district which also has the largest oil palm land area in Katingan Regency.

Currently, the dry season that still occurs in several regions of Indonesia has caused drought and can be a threat to forest and land fires, especially peatlands. Peat soil resembles a sponge in that under normal conditions it absorbs and retains water optimally, but during the dry season it dries out to a certain depth and can easily catch fire.

Peat stores plant remnants underground, serving as fuel that can lead to slow and hard-to-detect fires below the surface, producing dense smoke. The Ministry of Environment and Forestry has implemented several strategies to prevent peat fires, such as constructing barriers in canals and enhancing water control in peatlands. Canal barriers help maintain water levels in peat areas to keep the land moist and resistant to burning.

KLHK has coordinated with various parties in the construction of these canal blocks such as the central government, local governments, forestry business license holders, and also forestry NGOs. Peatland fires are difficult to extinguish and can last for days. Fires that are below ground level are difficult to detect. Therefore, ground firefighting needs to be supported by aerial firefighting or water bombing so that the fire can be completely extinguished. In addition to South Sumatra, Manggala Agni Daops Central Kalimantan is also fighting peatland fires together with a joint team from the National Disaster Management Agency (BNPB)(KLKH, 2017). The government continues to make efforts to improve policies to address environmental issues, particularly in the forestry sector of Indonesia. Deforestation in Indonesia is caused by weak enforcement of licensing regulations, allowing the industrial, mining, and private sectors to often overlook sustainability principles. In Kalimantan, the conversion of forests for plantations and mining deprives local residents of their rights and threatens the habitats of wildlife. The loss of habitat forces animals to descend into settlements or face extinction, while various plant species are also at risk of disappearing. Deforestation, especially through forest fires, not only reduces forest coverage but also damages biodiversity. Moreover, forest fires pollute the air, harm human health, and increase the risk of natural disasters such as landslides and earthquakes. Therefore, deforestation has extensive impacts on the environment, ecosystems, and quality of life of communities.

This is in accordance with the 1945 Constitution Article 28H Paragraph 1 where every human being has the human right to earn a good and healthy livelihood or live and live in a good and healthy environment. The provision of the human right to a good and healthy livelihood and environment is then emphasized and reinforced in Law No. 39/1999 on Human Rights and Law No. 32/2009 on Environmental Protection and Management, which in Law No. 32/2009, especially in Article 2, regulates the principle of responsibility imposed on the state in its role in addressing the problem of deforestation.

The protection and management of the environment are based on various principles, including state responsibility, sustainability, harmony and balance, integration, benefits, caution, justice, eco-regions, biodiversity, the "polluter pays" principle, participation, local wisdom, good governance, and regional autonomy. The role of the state in environmental responsibility is

crucial in addressing the negative impacts of unregulated deforestation (Hanafi et al., 2023; Wahid & Ilyas, 2021). In Kalimantan, a community of critical youth has emerged in response to the forest fires causing a climate crisis. They are urging the state to promptly provide solutions to the various environmental challenges faced by the community.

The Forestry Law of Indonesia grants the state full authority over forest management, as stipulated in Article 4 of Chapter III. The state controls all forests and natural resources for the welfare of the people, including regulating, supervising, and determining forest area status. Additionally, the state is obligated to consider the customary rights of local communities as long as they are recognized and do not contradict national interests. The role of the state includes: (1) ensuring the preservation of natural forests, such as those in Kalimantan, as a source of oxygen and habitat for flora and fauna; (2) ensuring sustainable utilization of forest resources without excessive exploitation; and (3) enforcing laws related to deforestation and environmental protection. Furthermore, in Government Regulation of the Republic of Indonesia Number 27 of 2012 concerning Environmental Permits, the local government has the right to grant legal licenses related to deforestation that runs in accordance with absolute government rules by paying attention to environmental balance and AMDAL.

Furthermore, Law Number 32 of 2004 in paragraphs 1 and 2 emphasizes the importance of the relationship between the government and local governments in the use of natural resources. This relationship includes authority, responsibility, revenue sharing, environmental harmony, and land rehabilitation. Additionally, article 17 paragraph 2 further clarifies the authority of local governments in managing natural resources in line with the provisions in paragraphs 4 and 5. (a) Implementation of the utilization of natural resources and other resources under regional authority; (b) Cooperation and profit sharing on the utilization of natural resources and other resources between regional governments, and (e) Management of joint licensing in the utilization of natural resources and other resources.

Based on this constitutional law, it can be seen that local governments have the authority to cultivate and utilize local resources. Of course, this implies that related to the management of the forest environment, starting from granting permits to actions that will be carried out by certain parties, must fully obtain permission from the local government. Through this instrument, the local government can control the granting of permits for the utilization of local forest land so that problems regarding the potential for forest damage, narrowing of forest land, and so on can be prevented and overcome.

One of the problems experienced by Kalimantan as the lungs of the world today is the shrinkage of forestry land due to the transfer of functions that are not in accordance with applicable regulations. However, the land use change carried out so far has been through the stage of forest burning, land conversion into mining, and so on. Where this has a huge negative impact on the Kalimantan Forest ecosystem. Therefore, this requires the government as the authorized party to be more intense in overcoming these problems (Wahyudi, 2021).

Incentives and educational programs play a crucial role in raising public awareness and reducing the risk of forest fires. Incentive-based policies, such as fuel stock regulations, have been proven to be more effective than cost-sharing programs because they can address misinformation and encourage proactive actions by forest owners (Al Abri, 2022). Furthermore, incentives that promote collaboration among forest owners also contribute to cost efficiency and improved forest fire management outcomes (Al Abri, 2022). Meanwhile, community-engaged education programs have demonstrated effectiveness in enhancing knowledge about disaster fire mitigation, as evidenced in research in Indonesia that documented a significant increase in

public understanding following educational interventions (Syswianti et al., 2022). Additionally, applying behavioral science in risk communication, such as personalized letters tailored to recipient characteristics, can increase community engagement by up to 12% (Byerly et al., 2020). From an economic perspective, forest fire prevention education has been shown to have a high cost-effectiveness, with economic benefits exceeding implementation costs, as seen in cases in Florida (Bayham et al., 2022). Consequently, the combination of incentives and educational programs is an essential strategy in effectively and sustainably mitigating forest fires.

Basically, the government has been very aggressive in making various efforts in order to prevent and deal with forest and land fires that occur in Kalimantan. Among these efforts is the effectiveness of various legal instruments and all related parties that have competence and authority in the forestry sector. Constitutionally, the law has also regulated various aspects of the law regarding sanctions that are quite strict in following up cases of forest burning in Kalimantan. In a study, it was mentioned that the Kalimantan regional government issued Regional Regulation Number 5 of 2003 and Governor Regulation Number 24 of 2017, policies in preventing and handling forest fires that occurred in Kalimantan. In the information provided by respondents through interviews, researchers found the results in the field of Central Kalimantan, the local government conducts two stages in forest fire management, namely through prevention policies and policies regarding the handling of forest and land fires. However, handling and prevention efforts are often hampered by several underlying factors. The first is geographical, where as described in the case above, the existence of peat soil that tends to dry out, coupled with very limited water sources, dry climate and weather are natural factors that can hinder the process of handling fires that are prone to occur due to deforestation. Not only that, the main obstacle in the handling process is inadequate local human resources. Not only that, this condition is further strengthened by the limitations of the existing regional budget to facilities and infrastructure that are less able to reach or are very limited. If human resources can be a major constraining factor in mobilizing the roles and responsibilities of the government as an effort to overcome and tackle Kalimantan Forest deforestation, then an alternative way should be thought of to first provide basic education about forestry to the community or citizens to then be able to work together with officials and the government in utilizing and empowering the potential of Indonesia's forests (Interview with the Head of BPBD Katingan Regency, April 28, 2023).

The forests in Indonesia are valuable natural assets that must be protected for the sake of future generations. The Forestry Law No. 41/1999, specifically Article 50 paragraph (3) letter d, unequivocally prohibits forest burning to ensure its sustainability. Despite the numerous benefits of forests, their utilization must be done responsibly, taking into consideration environmental conservation and sustainable forestry development. However, the implementation of Law No. 41/1999 in preventing forest fires in Katingan Regency faces various challenges, such as the lack of public awareness about the importance of forests for the environment and global climate change. Many people still view forests merely as an economic resource without realizing their long-term benefits. Additionally, weak law enforcement is a major obstacle in addressing forest fires in Katingan. Despite regulations prohibiting forest burning and designating it as a criminal offense with strict sanctions, forest fires continue to occur annually. Therefore, strict law enforcement is essential to prevent forest fires. According to Soerjono Soekanto, the effectiveness of law enforcement is influenced by five main factors: legal system, enforcement mechanisms, available resources, community involvement, and cultural factors. These five factors must be considered to ensure optimal and effective law enforcement against forest burning.

Law enforcement against the crime of forest burning in Katingan Regency according to Law No. 41/1999 on Forestry is in Article 78 Paragraph (3) of Law No. 41/1999 on Forestry which states that anyone who intentionally sets fire to a forest shall be punished with imprisonment of up to 15 (fifteen) years and a maximum fine of Rp5,000,000,000 (five billion rupiah). Furthermore, Article 78 Paragraph (4) of Law No. 41/1999 on Forestry also states that any person who, through negligence, causes a forest to catch fire shall be punished with a maximum imprisonment of 5 (five) years and a maximum fine of Rp1,500,000,000 (one billion five hundred million rupiahs).

The Katingan Regency Government continues to make efforts to anticipate the occurrence of Forest and Land Fires (Karhutla) despite high rainfall. Katingan Regent Sakariyas said, currently the Meteorology Climatology and Geophysics Agency (BMKG) predicts that Indonesia will experience El Nino in 2023. This phenomenon causes long droughts or the retreat of the rainy season. This indication refers to three consecutive years of La Nina in Indonesia. Of course, this condition causes the weather in Indonesia to become drier and has the potential for forest and land fires, so it is necessary to prepare prevention and control measures, so that forest and land fires can be handled properly. According to the regent, the Regional Government together with the TNI Police and related agencies, as well as existing plantation companies also have a role to be able to empower the strength of personnel and equipment, so that they can be mobilized in any situation and be able to provide the best in fire management in Katingan Regency. Based on today's news, a preparedness event was held to anticipate the danger of forest and land fires. Let us synergize and work together to anticipate disasters in Katingan Regency (MC Provinsi Kalimantan Tengah, 2023).

Katingan Regency in Central Kalimantan Province is considered highly susceptible to forest and land fires, emphasizing the need for preventive measures to reduce fire incidents. Various stakeholders in Katingan Regency are responsible for carrying out activities aimed at preventing forest fires, including the Regional Disaster Management Agency (BPBD) of Katingan Regency. Research findings from interviews reveal that the BPBD in Katingan Regency fulfills its role as a regional disaster management organization by conducting risk assessments of fire-prone areas in the region. This assessment involves three main stages: evaluating regional and land conditions, determining vulnerability levels and hotspot areas, and sharing this information with local authorities and communities through awareness campaigns (Interview with Mr. Markus, Chief Executive of BPBD Katingan Regency, July 28, 2024). The Katingan regency Government implements a collaborative approach in handling forest and land fires by involving various parties, including central and regional government agencies, the Armed Forces/Police, the Regional Disaster Management Agency (BPBD), the community, and the private sector. This synergy aims to strengthen efforts in preventing, mitigating, and enforcing laws against perpetrators of forest and land burning. Various strategic steps have been implemented, such as educating and socializing to the community, forming the Community Care Fire Group (MPA), and improving supporting infrastructure in fire control.

One concrete solution that can be implemented is AI-based fire monitoring technology, using drones and satellites for early detection and continuous monitoring (Hawkins et al., 2023). The integration of machine learning algorithms enables real-time environmental data analysis, enhancing early warning accuracy and rapid response in fire management (Lakshmanaswamy et al., 2024). Furthermore, water management to maintain peatland moisture is also a strategic step in fire mitigation. The construction of canals and reservoirs can help maintain water levels and reduce the risk of excessive drying, while reforestation with fire-resistant species enhances

ecological resilience. On the other hand, strengthening legal sanctions against illegal burning practices is necessary through higher fines and stricter enforcement, including criminal penalties for serious offenders. Collaboration between the Disaster Management Agency, law enforcement authorities, and the community is also crucial in enhancing monitoring and accountability for violations. By combining AI technology, sustainable water management, and stricter legal policies, efforts to mitigate forest fires in Katingan can be more effective and sustainable.

4. Conclusion

The Katingan Regency in Central Kalimantan faces a serious threat from forest and land fires, particularly in the highly vulnerable peatland areas. These fires have become an annual problem, causing significant ecological, social, and economic damage. Various efforts have been made, such as the implementation of local regulations, the construction of canal barriers to manage water in peatlands, and collaboration among institutions. However, the implementation of these efforts still faces various challenges, including budget constraints, a lack of trained human resources, and inadequate supporting facilities and infrastructure. Effectively mitigating the risk of forest and land fires requires strong synergy between local government, communities, and the private sector. This should include sustainable environmental management, strict monitoring of activities in peatlands, and strict law enforcement against forest burners. With an integrated approach and support from all parties, it is hoped that the threat of fires can be minimized, ensuring the sustainability of the ecosystem in the regency of Katingan remains preserved.

This study has several limitations. Firstly, data collection was conducted within specific time and location ranges, thus not fully reflecting the evolving dynamics in fire mitigation efforts. Secondly, the study focused more on analyzing existing policies and implementation challenges, without conducting in-depth quantitative evaluations on the effectiveness of mitigation strategies. For future research, it is recommended to conduct longitudinal studies to understand long-term changes in forest and land fire mitigation. Additionally, a more comprehensive quantitative approach is needed to objectively measure the impact of various policies. Future research can also explore the role of technology and innovation in enhancing the effectiveness of fire prevention in peatland areas.

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