

# Forest and Land Fire Prevention and Management: Damage Environmental of Central Kalimantan, Indonesia

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**Abstract-** The purpose of this study is to analyze policies on the prevention and handling of forest and land fires in Central Kalimantan Province and analyze the factors that influence the prevention and handling of forest and land fires in Central Kalimantan Province. The study used qualitative research methods, with research informants consisting of the Governor, the Head of the Forest Service, the Head of the Environmental Service, Community Leaders, and the people of Central Kalimantan Province. The data collection technique is done by observation, interview, and documentation study. At the same time, the data analysis used is an interactive model analysis consisting of data condensation, data display, and drawing conclusions/verification. The results showed that in accordance with Regional Regulation No. 5 of 2003 and Governor's Regulation No. 24 of 2017, the policy of preventing and handling forest and land fires in Central Kalimantan Province was carried out in two stages, namely the prevention policy and the policy of handling forest and land fires. However, in its implementation, it prioritizes the policy to extinguish forest and land fires because it has more economic, social, educational, and health impacts. Efforts to prevent and handle forest and land fires in Central Kalimantan Province are constrained by inadequate human resources, limited budget, and lack of facilities and infrastructure.

**Keywords-** Policy Analysis, Prevention, Handling, Fire, Environmental Forest and Land

## I. INTRODUCTION

Forest and land fires have a huge impact, both material and non-material. The government has worked hard to resolve this problem through the issuance of various policies, providing institutional support, as well as funding. The reality is that forest and land fire disasters keep recurring. Indonesia as a country that is geographically located on the equator has 2 (two) seasons, rainy season, and dry season. Between November and February, the northwestern wind carries moist air towards the Northeast, North, Northwest, and West coasts of the Indonesian islands. February has a slightly dry nature compared to January, especially in the equator due to the start of the weakening of the

Northwest monsoon. During the April to October period, Indonesia was affected by the relatively dry southeastern wind coming from Australia. In March, there was a reduction in rainfall mainly along the Southeast coast of Nusa Tenggara, and this April, the region became dry. Starting in May, the dry airflow covers almost all parts of Indonesia, and in July, the eastern and northeastern parts of Indonesia are in the dry season.

The risk of the threat of forest and land fires in Indonesia is routinely faced in every dry season [1], [2]. Several relevant studies in several countries highlight the impact of forest and land fires [3] on economic analysis of health effects from forest fires; [4] on The wildland-urban interface fire problem – current approaches and research needs; [5] regarding economic losses to Iberian swine production from forest fires; [6] Methodological approach to assess the socio-economic vulnerability to wildfires in Spain; [7] study of forest Fires and Losses Caused by Fires - An Economic Approach.

Dry weather conditions with low water content and drastically decreased water levels are conditions that support and are prone to fire. Extreme weather conditions with high heat and coupled with the behavior of some people who are careless often lead to cases of forest and land fires from year to year. Forest and land fires in Indonesia always recur from year to year. Data is the area of forest and land fires that have occurred in the past five years in Table 1. The Republic of Indonesia Meteorology, Climatology and Geophysics Agency (BMKG) explained that there are 11 (eleven) provinces in Indonesia that are vulnerable to forest and land fires Figure 1.

Table 2. Hotspots monitored by the Meteorology, Climatology and Geophysics Agency (BMKG) from 2015 to 2018 were observed in 11 provinces in Indonesia that have been prone to fire. In 2015, Central Kalimantan and South Sumatra were among the most hotspots; at that time, the dry season was also relatively long, and the el-Nino phenomenon was quite strong with quite massive forest fires.

In 2015, the total area of forest and land burning in Central Kalimantan was 583,833.44 ha, while in the above years, it decreased relatively. In South Sumatra, more widely, 646,290.80 ha of land were burned in 2015. This means that the hotspots of the BMKG data provide a true picture of the extent of burned land.

If we compare it to the previous year, hotspots in 2019 have surpassed hotspots in 2018 (Head of Sub-Directorate for

Climate Information Analysis of BMKG. The Riau region recorded 4,965 hotspots in 2015, but in 2019 the region recorded up to 7,257 hotspots. Jambi recorded 5,164 hotspots in 2018, but in 2019 the figure increased to 7,941 hotspots. Meanwhile, for Central Kalimantan, the data obtained at BMKG also recorded an increase in the number of hotspots from 21,809 in 2015 to 24,902 in 2019.

### Literature Review

Forest fire is an event where a fire engulfs vegetated fuel that occurs in a forest area that is spreading freely and uncontrollably. In contrast to forest fires, if a fire engulfs vegetated fuel that is spreading spontaneously and uncontrollably in a non-forest area, then it is called a land burn. Forest and land fires are defined as events where fire devours vegetated fuel, which occurs in forest and non-forest areas that spread freely and uncontrollably [8].

Forest/land fires in general terms, according to [9]–[15], included two types, namely wild or unwanted fires (wildfire or unwanted fire) and desired or planned fires or controlled burning or prescribed burning. Forest fires are distinguished from land fires. Forest fires are fires that occur inside forest areas, whereas land fires are fires that occur outside forest areas, and both can occur intentionally or unintentionally [1], [16]–[19].

Forest fire is the burning of something that creates a danger or brings disaster. Fires can occur due to uncontrolled combustion, due to a natural, spontaneous process, or because of intent. Natural processes such as lightning striking trees or buildings, volcanic eruptions that spread lumps of fire, and friction between dry branches of plants that contain oil due to wind shaking that causes heat or sparks [20]. Fires that occur due to human intentions are caused by several activities, such as field activities, plantations (PIR), Industrial Plantation Forest (HTI), land preparation for cattle, and so on [16].

In Indonesia, this term is more often heard related to the occurrence of forest fires because fires not only occur in the forest but also in non-forest areas. At present, 70% of fires occur in the land (non-forest) and 30% in forest areas (Dit. PKH 2010). Forest fires can be classified into three types, where the grouping is based on the fuel that dominates the fire. Three types of burnt [8], namely:

#### Ground Fire

Under fire is a situation where the fire burns organic material under the surface of litter. Slow propagation of fire and not affected by the wind makes this type of fire difficult to detect and control. Lower fires are a type of fire that is common in peatlands.

#### Surface Fire

Surface fires are situations where a fire burns litter, vegetation, logging waste, and other fuels that are on the forest floor. Surface fires are a type of fire that is common in all forest stands.

#### Crown Fire

Canopy fire is a situation where fire spreads from one canopy to another tree, which is close to one another. Canopy fires are greatly influenced by wind speed. Canopy fires often occur in coniferous forests, and fire originates from surface fires. Forest fires are distinguished from land fires, where the difference lies in the location of the incident. Forest fires are

fires that occur inside forest areas, while land fires are fires that occur outside forest areas [21].

## II MATERIAL AND METHOD

The type of writing that I use is a descriptive type of this type of research is qualitative data that is used obtained from sources, namely books, articles, documents, magazines, newspapers, and the internet. Data collection techniques in the form of library research and study documents with summarizing literature relating to the issue of forest and land fires. Data analysis techniques using qualitative descriptive analysis.

## III RESULTS AND DISCUSSION

Extensive and uncontrolled land and forest fires occur almost every year in the province of Central Kalimantan where most of the results are caused by human activities (anthropogenic) with the main interests including for meeting daily needs, the development of plantation or forestry businesses and even those related to being resistance to land conflicts. Fires occur both in forest areas, plantations, or other use areas. These fires have a detrimental impact on environmental, social, and economic aspects.

The impact from ecological and environmental aspects, the loss of several species, various types of trees and various types of animal habitats, then the threat of erosion due to fires on the slopes of the mountains has destroyed several plants that function to hold the ground in the top layer, loss of carbon dioxide filtering function and as eyes the larger chain of ecosystems to maintain the balance of planet earth. The disturbance of the coral reef ecosystem, because the sun does not penetrate the ocean, so cannot photosynthesize. The threat of deforestation and forest degradation, the long-term impact of forest fires, will significantly reduce the number of forests globally, depleting the ozone layer. Most of the burned forest is the forest on peatland, which contributes to reducing carbon emissions. This large number of peatland fires has increased the number of carbon emissions, which will impact the depletion of the ozone layer.

The impact of the economy, the loss of livelihoods for people who depend on forest products, cannot do their activities. In general, some people cannot carry out their activities in the morning because it is difficult for sunlight to penetrate the smoky air. Decreased foreign exchange, decreased productivity, thick smoke disrupted air transportation, so planes could not land at the airport due to the thick smoke.

Health and social impacts, The increase in the amount of smoke caused by forest and land fires causes the emergence of ARI (Respiratory Infections). This symptom is usually characterized by tightness in the chest and watery eyes, increasing the number of pests. Some species are said to be pests when their existence and activities interfere with the human production process. More than 90% of residents in seriously impacted regions have respiratory problems, and elderly people's general health has declined dramatically [22]. Additionally, thick smoke impairs visibility, causing an increase in traffic accidents, and a general lack of public health service and the high cost of health insurance means that treatment is not typically received for smoke-related ailments [23].

For this reason, it is necessary to have a clear and decisive policy from the Government of Central Kalimantan Province to take preventative measures and to deal with forest and land fires in the Central Kalimantan Province so that it does not become a routine natural disaster occurrence in Central Kalimantan Province.

#### **Forest and Land Fire Prevention and Management Policy**

The general pattern of policies undertaken by local governments in the prevention and control of forest and land fires (karhutla) in normal situations with an emergency alert status set by the Regional Head, fires are handled by the Fire Brigade. However, if the status changes to a disaster emergency, the forest, and land fire will be handled by several agencies that are members of the Forest and Land Fire Control Task Force (Dalkarhutla Task Force) formed by the Governor for the provincial level and the Regent/Mayor for the regency/city.

#### **Inhibiting Factors for Prevention and Management of Land and Forest Fires**

The Central Kalimantan Provincial Government's policy in preventing and dealing with forest and land fires in Central Kalimantan Province is certainly not an easy thing to do so that everything can be resolved and controlled. Natural factors in the area of Central Kalimantan Province is a barrier to the process of suppressing forest and land fires (karhutla), with dry peat soils, limited water resources, and dry weather making obstacles in the suppression of fires.

#### **Discussion**

Central Kalimantan Provincial Government's policy in preventing and overcoming forest and land fires (Karhutla) by issuing Central Kalimantan Governor's Decree Number: 188.44/222/2018 dated May 27, 2019, concerning the Emergency Status of Forest and Land Fire Disasters. In addition, the prevention and handling of forest and land fires are also based on the Regional Regulation of the Province of Central Kalimantan Number 5 of 2003 and the Governor's Regulation Number 24 of 2017 concerning the Implementation of Emergency Management of Forest and Land Fire Disasters in the Central Kalimantan Province.

The Central Kalimantan Provincial Government takes policies in the context of controlling forest and land fires in the Province of Central Kalimantan so as not to have a broad impact. Forest and land fire control is an effort to protect forests and land from illegal fires and the use of water to achieve the goals set in forest management [10]. Therefore, control of forest and land fires includes at least two components that prevent forest and land fires and extinguish forest and land fires as soon as possible so that the fire does not enlarge.

#### **Forest and Land Fire Prevention and Management Policy**

Forest and Peatland Fire in Central Kalimantan is a recurring event every year, especially in the dry season. These forest and peat fires have not only a negative impact on public health but also the economy, society, culture, and transportation. The cause of forest and peatland fires can be said to be 99% due to human activity, both intentional and negligent. Natural factors also support, such as long drought, such as the occurrence of El Nino symptoms.

The causes of forest and land fires are grouped into natural and human factors. In Indonesia, 99% of the factors causing forest and land fires are caused by humans, whether intentional or unintentional [1], [24]. This was deliberately carried out, especially in preparing land for agriculture, plantations, and other functions. In some cases, fire is also used in land conflicts; for example, companies use fire to urge farmers who own land to accept compensation at low prices or are used by farmers to take revenge against companies that harm them in buying and selling land. Natural factors, for example, are due to extended drought and the onset of El Nino symptoms, which make the dry season very dry.

According to [25] in Indonesia, almost 99% of forest and land fires are caused by human activities, whether intentional or not (negligence element). Among these percentages, land conversion activities contributed 34%, illegal farming 25%, agriculture 17%, social jealousy 14%, transmigration projects 8%, whereas only 1% is caused by nature. Other factors that cause forest and land fires to escalate and trigger fires are extreme climate, energy sources in wood, coal, and peat deposits.

#### **Inhibiting Factors for Prevention and Management of Land and Forest Fires**

The problem of forest and land fires is a recurring event and almost occurs every year, especially in the dry season, and gets worse when extreme climate phenomena such as El Nino occur. Forest and land fire control is often difficult, especially in the peatland area of Central Kalimantan Province, because fire burns not only above the surface but also below the surface.

#### **IV CONCLUSION**

Based on the results of research and discussion on the analysis of prevention and control of forest and land fires in Central Kalimantan is based on Regional Regulation No. 5 of 2003 and Governor Regulation No. 24 of 2017, which is carried out in two steps: prevention and handling of forest and land fires. Various prevention programs include community-based forest management and land clearing without burning and implementing integrated forest and land fire prevention socialization. Meanwhile, the prevention of forest and land fires is also carried out utilizing extinction and jurisdictional efforts. Deal with forest and land fires that always threaten every long dry season, the Central Kalimantan government has again made regional regulation no 1 of 2020, but inside it still allows burning of land with restrictions per family head of only 1 hectare, as well as on land that is not peat.

Because it still allows burning on non-peat land, it is feared that forest and land fires in Central Kalimantan will still occur, especially in the long dry season that can cause El Nino; therefore, the authors suggest, prevention programs must also be prioritized, not only focused on extinguishing and jurisdiction effort. Thus, environmental damage in Central Kalimantan can be avoided in advance; at least, it can prevent the impacts arising from forest and land fires. The limitation of this study is the prevention and control of forest and land fires in Central Kalimantan, Indonesia seems to be more focused on handling suppression and neglecting prevention so that for the future of the forest and land fire prevention in Central Kalimantan, the focus is on how to prevent it.

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Table 1. The extent of Forest and Land Fires in Indonesia in 2013-2018

Year	Land and Forest Fire Area (Ha)
2013	4.918.74
2014	44.411.36
2015	261.060.44
2016	14.604.84
2017	11.127.49
2018	4.666.39

Source: Data from the Ministry of Environment and Forestry of the Republic of Indonesia that has been processed.

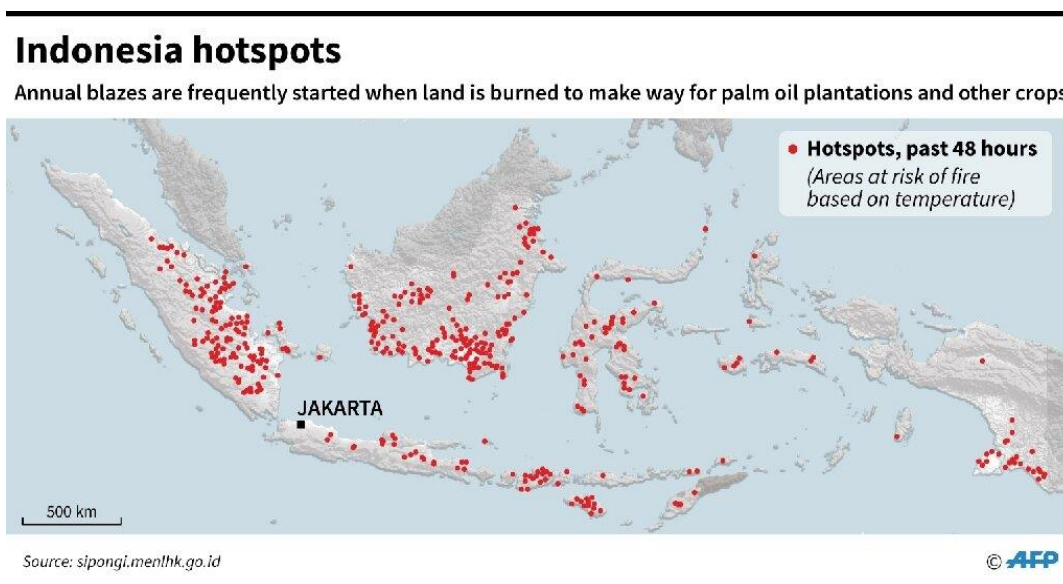


Figure 1. Indonesian Areas that are Vulnerable to Forest and Land Fires

Furthermore, it can be explained that the 11 (eleven) provinces have a different amount of heat (hotspots) as the following table:

Table 2. Recapitulation of Hotspots (as of August 20, 2018)

Provinces	Year			
	2015	2016	2017	2018
Aceh	218	431	420	124
Riau	4.965	2.120	600	1.154
Jambi	5.164	183	233	154
South Sumatera	21.767	495	594	348
North Sumatera	590	817	245	218
Bangka Belitung	1.465	262	248	273
West Kalimantan	6.156	2.967	2.010	5.252
East Kalimantan	6.923	1.380	498	326
Middle Kalimantan	21.809	724	492	894
South Kalimantan	4.533	199	339	281
Papua	11.134	1.467	861	517

Source: BMKG @ infobmkg Official Instagram Account data processed.